2679 - Bank Street Repair - Phase 2: Property Acquisition and Floodplain Restoration

Application Details

Funding Opportunity:	2336-Virginia Community Flood Preparedness Fund - Project Grants - CY24 Round 5
Funding Opportunity Due Date:	Jan 24, 2025 11:59 PM
Program Area:	Virginia Community Flood Preparedness Fund
Status:	Under Review
Stage:	Final Application
Initial Submit Date:	Jan 24, 2025 2:56 PM
Initially Submitted By:	Darryl Walker
Last Submit Date:	
Last Submitted By:	

Contact Information

Primary Contact Information

Active User*:	Yes
Type:	External User
Name*:	Mr. (Salutation) Darryl (First Name) Middle Name Walker (Last Name)
Title:	
Email*:	dwalker@petersburg-va.org
Address*:	1340 E. Washington Street
	Petersburg (City) Virginia (State/Province) 23803 (Postal Code/Zip)
Phone*:	(804) 733-2357 Ext. (Phone) ###-###-####
Fax:	###-###-####
Comments:	

Organization Information

Status*:	Approved
Name*:	PETERSBURG CITY
Organization Type*:	Local Government
Tax ID*:	
Unique Entity Identifier (UEI)*:	

Organization Website:	sturille@petersburg-va.org
Address*:	City of Petersburg 135 N. Union Street Petersburg Virginia 23803 City State/Province Postal Code/Zip
Phone*:	(804) 733-2300 Ext. ###-###-####
Fax:	###-###-####
Benefactor:	
Vendor ID:	
Comments:	

VCFPF Applicant Information

Project Description

Name of Local Government*:	Petersburg City

Your locality's CID number can be found at the following link: Community Status Book Report

NFIP/DCR Community Identification Number (CID)*:	510112

If a state or federally recognized Indian tribe,

Name of Tribe:	
Authorized Individual*:	March Altman First Name Last Name
Mailing Address*:	135 N. Union Street Address Line 1 Address Line 2 Petersburg Virginia 23803 City State Zip Code
Telephone Number*:	804-733-2300
Cell Phone Number*:	804-733-2301
Email*:	maltman@petersburg-va.org

Is the contact person different than the authorized individual?

Contact Person*:	Yes
Contact:	Darryl Walker First Name Last Name 135 N. Union Street Address Line 1 Address Line 2 Petersburg Virginia 23803 City State Zip Code
Telephone Number:	804-733-2357
Cell Phone Number:	804-733-2357
Email Address:	dwalker@petersburg-va.org

Enter a description of the project for which you are applying to this funding opportunity

Project Description*:

The City of Petersburg is applying for CFPF assistance to implement a flood prevention and protection project at a property located within a

mapped FEMA floodway along W Bank St, in the downtown area of Petersburg. A sinkhole appeared in 2021 exposing the underground stormwater tunnel system and tributary Brickhouse Run. The City has already taken steps to manage immediate stabilization of the tunnel and prevent further collapse, but requires assistance to complete repair and restoration efforts

Low-income geographic area means any locality, or community within a locality, that has a median household income that is not greater than 80 percent of the local median household income, or any area in the Commonwealth designated as a qualified opportunity zone by the U.S. Secretary of the Treasury via his delegation of authority to the Internal Revenue Service. A project of any size within a low-income geographic area will be considered.

Is the proposal in this application intended to benefit a low-income geographic area as defined above?

Benefit a low-income geographic area*: Yes

Information regarding your census block(s) can be found at census.gov

Census Block(s) Where Project will Occur*: Census Tracts 8113

Is Project Located in an NFIP Participating Community?*: Yes

Is Project Located in a Special Flood Hazard Area?*: Yes

Flood Zone(s) (if applicable): X, AE

Flood Insurance Rate Map Number(s) (if applicable): 510112-0006D, 0007D

Eligibility CFPF - Round 4 - Projects

Eligibility

Is the applicant a local government (including counties, cities, towns, municipal corporations, authorities, districts, commissions, or political subdivisions created by the General Assembly or pursuant to the Constitution or laws of the Commonwealth, or any combination of these)?

Local Government*: Yes

Yes - Eligible for consideration
No - Not eligible for consideration

Does the local government have an approved resilience plan and has provided a copy or link to the plan with this application?

Resilience Plan*: Yes

Yes - Eligible for consideration under all categories
No - Eligible for consideration for studies, capacity building, and planning only

If the applicant is not a town, city, or county, are letters of support from all affected local governments included in this application?

Letters of Support*: N/A

Yes - Eligible for consideration
No - Not eligible for consideration
N/A - Not applicable

Has this or any portion of this project been included in any application or program previously funded by the Department?

Previously Funded*: No

Yes - Not eligible for consideration
No - Eligible for consideration

Has the applicant provided evidence of an ability to provide the required matching funds?

Evidence of Match Funds*: Yes

Yes - Eligible for consideration
No - Not eligible for consideration
N/A - Match not required

Scoring Criteria for Flood Prevention and Protection Projects - Round 4

Scoring

Category Scoring:

Hold CTRL to select multiple options

Project Category*:

Acquisition of developed property consistent with an overall comprehensive local or regional plan for purposes of allowing inundation, retreat, or acquisition of structures and where the flood mitigation benefits will be achieved as a part of the same project as the property acquisition.

Is the project area socially vulnerable? (based on ADAPT Virginia?s Social Vulnerability Index Score)

Social Vulnerability Scoring:

Very High Social Vulnerability (More than 1.5)
High Social Vulnerability (1.0 to 1.5)
Moderate Social Vulnerability (0.0 to 1.0)
Low Social Vulnerability (-1.0 to 0.0)
Very Low Social Vulnerability (Less than -1.0)

Socially Vulnerable*: Very High Social Vulnerability (More than 1.5)

Is the proposed project part of an effort to join or remedy the community?s probation or suspension from the NFIP?

NFIP*: No

Is the proposed project in a low-income geographic area as defined below?

"Low-income geographic area" means any locality, or community within a locality, that has a median household income that is not greater than 80 percent of the local median household income, or any area in the Commonwealth designated as a qualified opportunity zone by the U.S. Secretary of the Treasury via his delegation of authority to the Internal Revenue Service. A project of any size within a low-income geographic area will be considered.

Low-Income Geographic Area*: Yes

Projects eligible for funding may also reduce nutrient and sediment pollution to local waters and the Chesapeake Bay and assist the Commonwealth in achieving local and/or Chesapeake Bay TMDLs. Does the proposed project include implementation of one or more best management practices with a nitrogen, phosphorus, or sediment reduction efficiency established by the Virginia Department of Environmental Quality or the Chesapeake Bay Program Partnership in support of the Chesapeake Bay TMDL Phase III Watershed Implementation Plan?

Reduction of Nutrient and Sediment Pollution*: Yes

Does this project provide ?community scale? benefits?

Community Scale Benefits*: More than one census block

Expected Lifespan of Project

Expected Lifespan of Project*: Over 20 Years

Comments:

Scope of Work - Projects - Round 4

Scope of Work

Upload your Scope of Work

Please refer to Part IV, Section B. of the grant manual for guidance on how to create your scope of work

Scope of Work*: Scope of Work Narrative.pdf

Comments:

Budget Narrative

Budget Narrative Attachment*: Budget Narrative.pdf

Comments:

Scope of Work Supporting Information - Projects

Supporting Information - Projects

Provide population data for the local government in which the project is taking place

Population*: 33309.00

Provide information on the flood risk of the project area, including whether the project is in a mapped floodplain, what flood zone it is in, and when it was last mapped. If the property or area around it has been flooded before, share information on the dates of past flood events and the amount of damage sustained

Historic Flooding data and Hydrologic Studies*: 3 - Historic Flooding Data.pdf

Include studies, data, reports that demonstrate the proposed project minimizes flood vulnerabilities and does not create flooding or increased flooding (adverse

impact) to other properties

No Adverse Impact*: No Adverse Impact Statement.pdf

Include supporting documents demonstrating the local government's ability to provide its share of the project costs. This must include an estimate of the total project cost, a description of the source of the funds being used, evidence of the local government's ability to pay for the project in full or quarterly prior to reimbursement, and a signed pledge agreement from each contributing organization

Ability to Provide Share of Cost*: Ability to Provide Share of Cost Statement.pdf

A benefit-cost analysis must be submitted with the project application

Benefit-Cost Analysis*: 10 - Benefit Cost Analysis.pdf

Provide a list of repetitive loss and/or severe repetitive loss properties. Do not provide the addresses for the properties, but include an exact number of repetitive loss and/or severe repetitive loss structures within the project area

Repetitive Loss and/or Severe Repetitive Loss Properties*: Repetitive Loss Statement.pdf

Describe the residential and commercial structures impacted by this project, including how they contribute to the community such as historic, economic, or social value. Provide an exact number of residential structures and commercial structures in the project area

Residential and/or Commercial Structures*:

The City is respectfully seeking assistance for flood prevention/protection activity to reduce property damage caused by flooding and to provide for natural floodplain restoration by repairing and reconstructing the channel conveying Brickhouse Run located on the 110 W Bank St property, which has currently formed a sinkhole on the property. The sinkhole has already caused the demolition of the building on the subject property, which is located in the downtown area of Petersburg. If left unaddressed, the sinkhole may cause impacts for up to 8 other mixed-use commercial and residential structures in the near vicinity; two of those buildings are actively in the Floodway, and the remaining 6 are within the 100-year floodplain. This project will daylight portions of the stream which have been underground, reconnecting them to the floodplain by converting a parcel of commercial property into an open space park for residents of the City to enjoy.

If there are critical facilities/infrastructure within the project area, describe each facility

Critical Facilities/Infrastructure*:

West Bank Street is a primary road which has an Annual Average Week Day Traffic (AAWDT) count of 3,600 cars/day. Its stability is directly threatened by the sinkhole which has emerged at a property located along W Bank Street.

Explain the local government's financial and staff resources. How many relevant staff members does the local government have? To what relevant software does the local government have access? What are the local government's capabilities?

Financial and Staff Resources*:

The City of Petersburg's need for assistance is well documented in terms of financial and staff limitations. The City Engineer will have primary oversight of this project, supported by the Stormwater Program Manager for grant-related activities. The local government's capabilities will be to execute Contracts to administer the requested CFPF funds to compete the work.

Identify and describe the goals and objectives of the project. Include a description of the expected results of the completed project and explain the expected benefits of the project. This may include financial benefits, increased awareness, decreased risk, etc.

Goals and Objectives*:

The goals of this project will be:

1. Acquisition of the subject property located along W Bank St.
2. The development of design-build plans in order to convert the property into a green space which daylights the previously enclosed, historic channel and reconnects it to the floodplain.
3. The completion of construction of the approved design plans.
4. Regulatory permitting associated with the project.

Converting the subject parcel along W Bank St into a green space park which reconnects the channel to the floodplain will have several protective benefits which will decrease the risk to public safety. Conversion will protect W Bank Street itself, which is immediately downstream of the sinkhole and is at risk of structural instability if the sinkhole expands to the underground culvert through which the channel currently passes. Conversion will also provide opportunity for infiltration as water moves towards the culvert, reducing the volume and speed of water and thus reducing the impacts on the culvert and downstream storm sewer infrastructure from precipitation driven flooding. The channel's reconnection to the floodplain will also allow for the settling of sediment which may be carried through the impervious section of the channel, reducing pollutants entering the Appomattox River. Finally, the park can be a valuable site for education and connection of the populace to the local natural world, increasing public awareness about the importance of floodplain protection and restoration.

Outline a plan of action laying out the scope and detail of how the proposed work will be accomplished with a timeline identifying expected completion dates. Determine milestones for the project that will be used to track progress. Explain what deliverables can be expected at each milestone, and what the final project deliverables will be. Identify other project partners

Approach, Milestones, and Deliverables*: Work Plan.pdf

Where applicable, briefly describe the relationship between this project and other past, current, or future resilience projects. If the applicant has received or applied for any other grants or loans, please identify those projects, and, if applicable, describe any problems that arose with meeting the obligations of the grant and how the obligations of this project will be met

Relationship to Other Projects*:

This project represents the City's commitment to nature-based solutions addressing properties with buildings in the floodplain. Further, this project is consistent with the City's Chesapeake Bay TMDL requirements for which land conversion from impervious to managed turf or conserved open space will result in credit for nutrients and sediment pollutants.

For ongoing projects or projects that will require future maintenance, such as infrastructure, flood warning and response systems, signs, websites, or flood risk applications, a maintenance, management, and monitoring plan for the projects must be provided

Maintenance Plan*: 5 - Maintenance and Management Plan.pdf

Describe how the project meets each of the applicable scoring criteria contained in Appendix B. Documentation can be incorporated into the Scope of Work Narrative

Criteria*:

Eligible Projects: Acquisition: The project will acquire a city parcel and convert it into a green space park to daylight a stream channel and reconnect it to the floodplain (30 points).
Social Vulnerability Index Score: The average social vulnerability index score is 1.9 across both census tracts in the City of Petersburg and therefore qualifies as Very High Social Vulnerability (10 points).
Community Scale of Benefits: This project will serve to benefit all of Petersburg by generating a park for use by all residents in Petersburg, and will additionally seek to help the current residents and business owners of properties along W. Bank St. Therefore, benefits will apply to more than one census block (30 points).
Expected Lifespan of Project: This project will provide a long-lasting community space and restore the floodplain locally in an urban section of downtown Petersburg. The expected lifespan of the project is indefinite (10 points).
Remedy for NFIP probation or suspension: No, this project is not being completed to remedy NFIP probation or suspension (0 points).
Proposed project part of a low-income geographic area: Yes, as described in the Need for Assistance section, the City is a low-income geographic area (10 points).
Proposed Project Implements a Chesapeake Bay TMDL BMP: Yes, land use conversion is an effective Chesapeake Bay TMDL reduction strategy. This project will result in land conversion from regulated impervious to pervious land cover (5 points).
Point Total: 95 points

Budget

Budget Summary

Grant Matching Requirement*: LOW INCOME - Projects that will result in nature-based solutions - Fund 95%/Match 5%

Is a match waiver being requested?

Match Waiver Request Yes

Note: only low-income communities are eligible for a match waiver.

***:**

I certify that my project is in a low-income geographic area: Yes

Total Project Amount (Request + Match)*: $4,600,000.00

**This amount should equal the sum of your request and match figures

REQUIRED Match Percentage Amount: $230,000.00

BUDGET TOTALS

Before submitting your application be sure that you meet the match requirements for your project type.

Match Percentage: 5.00%

Verify that your match percentage matches your required match percentage amount above.

Total Requested Fund Amount: $4,370,000.00

Total Match Amount: $230,000.00

TOTAL: $4,600,000.00

Personnel

Description	Requested Fund Amount	Match Amount	Match Source

No Data for Table

Fringe Benefits

Description	Requested Fund Amount	Match Amount	Match Source
No Data for Table			

Travel

Description	Requested Fund Amount	Match Amount	Match Source
No Data for Table			

Equipment

Description	Requested Fund Amount	Match Amount	Match Source
No Data for Table			

Supplies

Description	Requested Fund Amount	Match Amount	Match Source
No Data for Table			

Construction

Description	Requested Fund Amount	Match Amount	Match Source
No Data for Table			

Contracts

Description	Requested Fund Amount	Match Amount	Match Source
Acquisition and Conversion	$4,370,000.00	$230,000.00	Cash
	$4,370,000.00	**$230,000.00**	

Maintenance Costs

Description	Requested Fund Amount	Match Amount	Match Source
No Data for Table			

PreAward and Startup Costs

Description	Requested Fund Amount	Match Amount	Match Source
No Data for Table			

Other Direct Costs

Description	Requested Fund Amount	Match Amount	Match Source
No Data for Table			

Long and Short Term Loan Budget - Projects - VCFPF

Budget Summary

Are you applying for a short term, long term, or no loan as part of your application?

If you are not applying for a loan, select "not applying for loan" and leave all other fields on this screen blank

Long or Short Term*:	Not Applying for Loan
Total Project Amount:	$0.00
Total Requested Fund Amount:	$0.00
TOTAL:	$0.00

Salaries

Description	Requested Fund Amount
No Data for Table	

Fringe Benefits

Description	Requested Fund Amount
No Data for Table	

Travel

Description	Requested Fund Amount
No Data for Table	

Equipment

Description	Requested Fund Amount
No Data for Table	

Supplies

Description	Requested Fund Amount
No Data for Table	

Construction

Description	Requested Fund Amount
No Data for Table	

Contracts

Description	Requested Fund Amount
No Data for Table	

Other Direct Costs

Description	Requested Fund Amount
No Data for Table	

Supporting Documentation

Supporting Documentation

Named Attachment	Required	Description	File Name	Type	Size	Upload Date
Detailed map of the project area(s) (Projects/Studies)		Project Area Map	1 - Project Map.pdf	pdf	9 MB	01/24/2025 12:12 PM
FIRMette of the project area(s) (Projects/Studies)		FIRMette displaying project extents of Bank Street improvements.	2 - FIRMette of Bank Street.pdf	pdf	858 KB	12/23/2024 09:23 AM
Historic flood damage data and/or images (Projects/Studies)		Historic Flooding Data	3 - Historic Flooding Data.pdf	pdf	60 MB	01/23/2025 03:01 PM
A link to or a copy of the current floodplain ordinance		Petersburg Floodplain Ordinance	4 - Petersburg Floodplain Ordinance.pdf	pdf	311 KB	12/23/2024 09:27 AM
Maintenance and management plan for project		Project Maintenance and Management Plan	5 - Maintenance and Management Plan.pdf	pdf	28 KB	01/20/2025 08:25 PM
A link to or a copy of the current hazard mitigation plan		Hazard Mitigation Plan Executive Summary from 2017 + Updated Combined Richmond Crater PDC Plan from 2022.	6 - Combined Hazard Mitigation Plan.pdf	pdf	25 MB	12/23/2024 09:34 AM
A link to or a copy of the current comprehensive plan		Current Petersburg Comprehensive Plan	7 - Comprehensive Plan 2024-05-21.pdf	pdf	47 MB	12/23/2024 09:37 AM
Social vulnerability index score(s) for the project area		Petersburg Social Vulnerability Index	8 - Petersburg SVI 2024.pdf	pdf	1 MB	01/20/2025 08:21 PM
Authorization to request funding from the Fund from governing body or chief executive of the local government		Authorization Letter from City Manager	9-Authorization Letter.pdf	pdf	357 KB	01/20/2025 08:21 PM
Signed pledge agreement from each contributing organization						
Maintenance Plan						
Benefit-cost analysis must be submitted with project applications over $2,000,000. in lieu of using the FEMA benefit-cost analysis tool, applicants may submit a narrative to describe in detail the cost benefits and value. The narrative must explicitly indicate the risk reduction benefits of a flood mitigation project and compares those benefits to its cost-effectiveness.						
Benefit Cost Analysis		Project Benefit Cost Analysis	10 - Benefit Cost Analysis.pdf	pdf	1 MB	01/21/2025 03:32 PM
Other Relevant Attachments		Petersburg Qualified Opportunity Zone Map	11 - OZ Map 2024.pdf	pdf	990 KB	12/23/2024 09:39 AM

Letters of Support

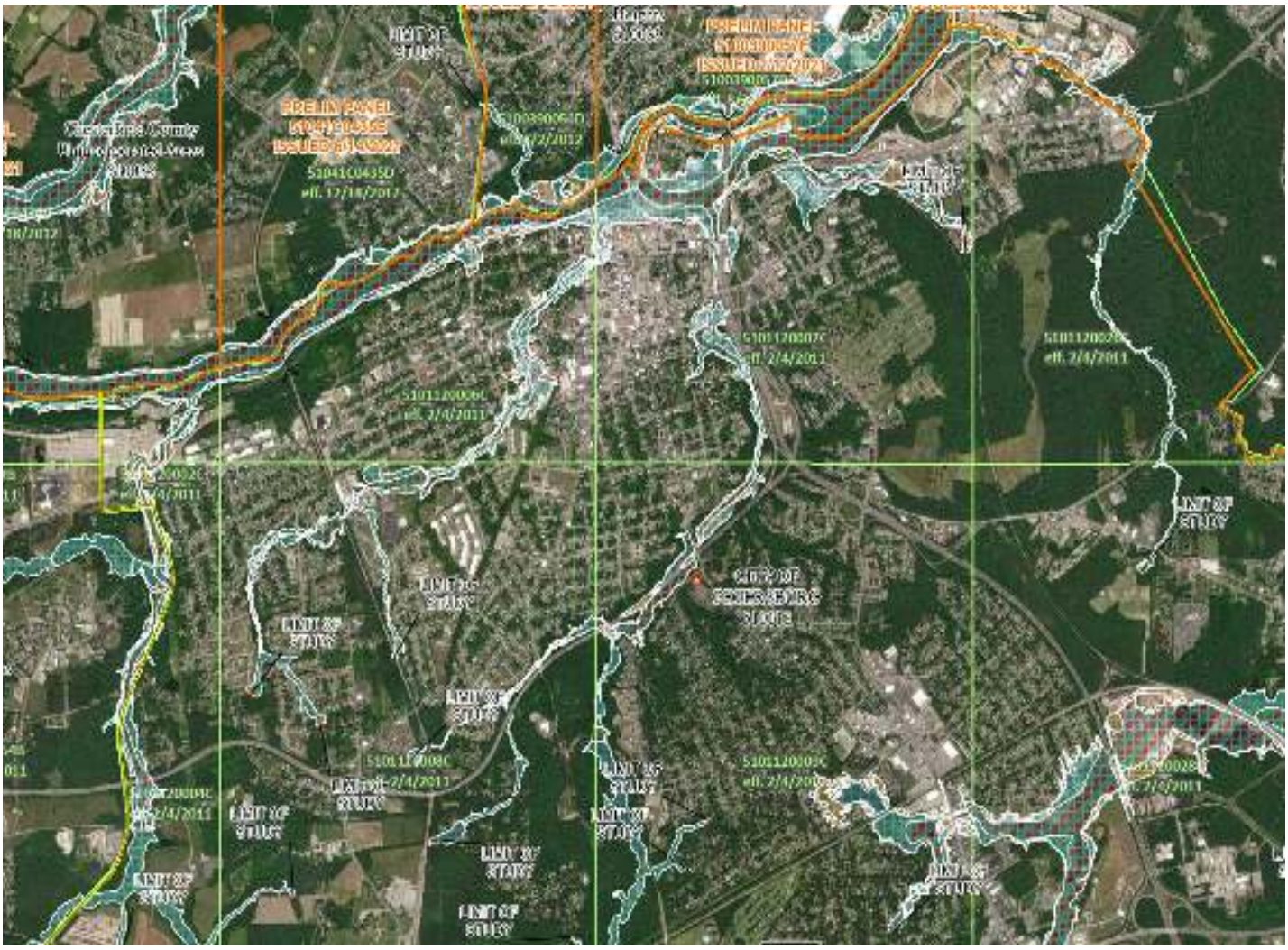
Description	File Name	Type	Size	Upload Date
No files attached.				

Resilience Plan

Resilience Plan

Description	File Name	Type	Size	Upload Date
2022 Resilience Plan & Approval Letter	Resilience Plan Approval CID 510112.pdf	pdf	1 MB	01/22/2025 10:39 AM

COMMUNITY FLOOD PREPAREDNESS FUND
PROJECT GRANT APPLICATION



CITY OF PETERSBURG, VA
COMMUNITY ID #510112
SUBMITTED JANUARY 24, 2025

Table of Contents

CFPF Grant Application: Projects

1.0. Scope of Work Narrative

Needs and Problems

The City of Petersburg is applying for Community Flood Preparedness Fund assistance to implement a flood prevention and protection project at a property located within a mapped FEMA floodway along W Bank St, in the downtown area of Petersburg. The land use of the subject property consists of a commercial building with parking lot, both located over a historic underground tunnel drainage system. A sinkhole opened on the subject property in 2021 exposing the underground stormwater tunnel system and tributary Brickhouse Run, which was further exacerbated by a storm on August 30, 2024. The conditions have since worsened, requiring emergency repair. The City of Petersburg has already taken steps to manage immediate stabilization of the tunnel and prevent further collapse, including the portion of the tunnel which runs under Bank Street, but additional needs have been identified for the successful resolution of this public safety hazard.

Specific problem being solved:

With immediate stabilization efforts underway, the City will utilize CFPF funds to provide additional mitigation measures to the parking lot and manage debris and sediment loads related to the sinkhole by completing a land use conversion and floodplain restoration project. The project will include acquisition of the subject property and the design and implementation of a nature-based solution. The City plans to provide land use conversion of the parking lot to open space reconnecting the channel to its floodplain and providing City residents an amenity downtown. The round 5 CFPF grant request is for: 1) the acquisition of the subject property located along W Bank St, 2) the development of design-build bridging documents to convert the parcel into an open space, reconnecting the channel to its floodplain, 3) construction, including demolition of pavement, grading work, and the installation of plants and amenities, and 4) associated permitting required for the project.

Factors which contribute to the identified problem:

The City is a low-income geographic area, as defined in the CFPF Grant Manual, as an area where the median household income ($50,741) is significantly less than 80% of the local median household income ($90,974 in VA), according to the US Census Data in 2023[1]. Further, several areas in the City are designated as Qualified Opportunity Zones, as presented in the supporting documentation. As a low-income geographic area, the City struggles with limited public funding. As a result, the City relies on funding assistance and partnerships to complete many studies and capital projects. The repair and construction of channel infrastructure on Bank Street is not possible within the City's current budget. The City has already funded the cost of the demolition of the building on the property but does not have the resources available to provide timely repair of the sections of the channel which need immediate resolution to protect public safety and prevent a loss of connectivity in the City.

Why the project is needed:

DCR has previously identified the sinkhole on the subject parcel as a potential violation of the National Flood Insurance Program through a Community Assistance Visit (9/26/2022). DCR has also met with the current property owner, elected officials, local staff, and stakeholders to provide technical assistance on the corrective actions needed to remedy the violations. An additional site visit with DCR was held on September 3, 2024 after conditions at the site worsened following the storm event on August 30, 2024. The outcome of this project will

[1] https://www.census.gov/quickfacts/fact/table/petersburgcityvirginia,VA/PST045222

specifically adhere to DCR's recommendations summarized on the inspection report from the September 3, 2024 site visit, included with this application.

How the project decreases the risk to public safety through flood risk reduction:
Proper management of the City's regulated floodplains is essential for decreasing the risk to public safety through flood risk reduction. This project will result in a decrease to the risk to public safety, by continuing emergency repair, management of debris and sediment loads, enforcement of the City's floodplain ordinance, and through coordination with DCR and FEMA, as needed.

How the project protects or conserves natural resources:
The project protects or conserves natural resources by reconnecting the tributary to its floodplain, and land use conversion through floodplain restoration. The City will be able to utilize this effort for Chesapeake Bay TMDL compliance, documenting pollutant removal credit associated with land use conversion.

Who is protected:
Enforcement of the City's floodplain ordinance results in protection for all citizens of the City.

The Safety Threats or Environmental Concerns Related to Flood Risk.
The existing tunnel stormwater infrastructure on the subject property originated in the 1800s and is in poor structural condition. Aging infrastructure subjected to high flows from precipitation is the likely cause behind the sinkhole's formation in 2021, and there has been at least two people who have been injured by falling into the sinkhole even after it had been fenced off, demonstrating an active risk to public safety despite the current efforts of the City to prevent citizens from entering. W Bank Street, located directly adjacent to the sinkhole, receives an Annual Average Week Day Traffic (AAWDT) count of 3,600 cars/day; if the tunnel crossing under the road were to collapse, it could generate significant threats to public safety, causing delays, auto damage, or injuries. The degrading tunnel also poses potential concern to the Appomattox River; as the channel's brick/stone walls degrade, increased potential for sediment and debris to enter the stormwater system and for pollutants to make their way downstream increase.

Groups who might directly benefit from this flood risk reduction effort.
The citizens of the City of Petersburg will directly benefit from this flood risk reduction effort.

What would happen (or not happen) if the applicant does not receive funding:
Without round 5 CFPF funding, the City will not be able to complete the acquisition and conversion of the parcel into a green space that reconnects the channel to the floodplain. The City will need to pursue a less extensive repair for the sinkhole or put other projects on hold to complete a smaller scope of repairs to protect public safety. The City has already re-allocated funding intended to fund drainage improvement projects in the Lakemont neighborhood to address immediate stabilization efforts and may need to reallocate funding intended for other flood reduction projects to address these issues, which will reduce the City's ability to address flooding in other areas.

Alternatives Analysis of the Viability of the Project

There are alternatives which could be used to address the current sinkhole and degraded tunnel system. A few of these alternatives are laid out below:

1. The remaining tunnel could be cleared of debris, stabilized and the sinkhole kept fenced off. No other construction or improvements will be completed. An elevated risk to citizen safety remains with this option and it will result in degraded property values in the vicinity of the subject parcel, and throughout the downtown area.
2. The tunnel within the subject property could be rebuilt entirely and the sinkhole repaired and repaved. The structure on the property will not be replaced because it is in the floodway. Risks to life safety from the failure will be abated. No increase in the Base Flood Elevation would be anticipated.
3. The parcel could be acquired, the tunnel could be reconstructed into an open but impervious channel, similar to the channel reach upstream and downstream of the subject property, and the parcel converted into a paved park. No increase in the Base Flood Elevation would be anticipated. Risks to life safety concerns will be present during storm events to keep citizens away from the paved channel on public property.
4. The parcel could be acquired, the channel could be rebuilt and converted into an open but impervious channel, like much of it is to the immediate north and south of the property, and the parcel converted into a green space park. Care will need to be taken to make sure that the change in land cover does not increase the Base Flood Elevation. Risks to life safety concerns will be present during storm events to keep citizens away from the paved channel on public property.

The first option will require the least financial investment from the City but leaves the greatest risk of further impacts to the area and citizens, making it an undesirable option. Essentially returning the channel to its prior function by rebuilding the impervious underground tunnel, stabilizing eroded soils nearby, and recovering and repaving the hole is another potential option, but the cost of these improvements will likely be considerable and will not result in improvements which provide TMDL credit, nor would this provide a public amenity. The third option would share some of the costs of the second option but would likely remain more cost effective than the proposed solution; however, this option would leave the City with a less desirable option both from the potential for TMDL credit, and from the potential for an aesthetically pleasing amenity for residents. The fourth option would provide more in terms of aesthetic appeal but still lacks the improvements that will serve to meaningfully improve drainage, reduce pollutants, and protect natural resources that the proposed option offers.

Goals and Objectives

The goals of this project will be achievable within the three-year grant agreement period and are as below:

1. Property acquisition.
2. Development of design-build bridging documents.
3. Construction.
4. Regulatory permitting.

Work Plan

The Work Plan provided below details the major activities and tasks with the following sub-components identified for each task: (a) who is responsible for completing the activities and tasks, (b) the timeframe for accomplishing activities and tasks, (c) required partners to ensure success, and (d) deliverables, and (e) whether there is a maintenance plan tied to the identified viability of the project, and what the plan is for sustaining the project after the agreement if so.

1. Acquisition of the subject property.
    a. The Petersburg Department of Public Works is responsible for completing the activities.
    b. The task will be accomplished within the three-year grant agreement period.
    c. Required partners for the task will primarily include the City staff who must coordinate to complete property acquisition.
    d. Deliverables include the acquired property deed.
    e. This task will not require a maintenance plan.
2. The development of design-build bridging documents.
    a. The Petersburg Department of Public Works is responsible for securing an Engineer to completing the activities.
    b. The task will be accomplished within the three-year grant agreement period.
    c. Required partners for the task include engineering and surveying consultants to develop design-build documents, City staff to review and approve plans, and coordination for approval of plans with Virginia DCR staff, as necessary.
    d. Deliverables for the project will be completed and approved design-build plans to convert the parcel obtained into a green space park which reconnects the channel to its floodplain and provides an amenity for Petersburg City residents.
    e. This task will not require a maintenance plan.
3. Construction.
    a. The Petersburg Department of Public Works is responsible for securing a Contractor to complete the activities.
    b. This task will be achievable within the three-year grant agreement period.
    c. Required partners for the task include engineering, surveying, and construction consultants to complete the demolition, grading, and construction work necessary to build the design plans, City staff to inspect and review ongoing construction, and any coordination with Virginia DEQ staff as necessary.
    d. Deliverables for the project will be the completion of construction of the green space conversion project.
    e. A maintenance plan will be put in place to maintain and manage the green space park, to ensure that it remains a community amenity for years to come.
4. Regulatory permitting associated with the project.
    a. The Petersburg Department of Public Works is responsible for completing the activities.
    b. This task will be achievable within the three-year grant agreement period.
    c. Required partners for the task includes engineering consultants for the permitting of the proposed improvements and Virginia DCR for approval and coordination work.
    d. Deliverables for the task will be the completed permitting associated with the reconnection to the floodplain as necessary.
    e. This task will not require a maintenance plan.

Evaluation

Indicators of success for this project will be the acquisition and conversion of the subject property to reconnect the channel to the floodplain/floodway, regulatory permitting, and completion of floodplain restoration work. The project is cost-effective because it improves water quality with the removal of impervious surfaces, provides ecological uplift, and provides community uplift with the transformation of an underutilized parcel into a public amenity.

Appendix A: Application Form for Grant and Loan Requests for All Categories

Virginia Department of Conservation and Recreation
Virginia Community Flood Preparedness Fund Grant Program

Name of Local Government:

Category Being Applied for (check one):

☐ **Capacity Building/Planning**

☒ **Project**

☐ **Study**

NFIP/DCR Community Identification Number (CID) 510112B

Name of Authorized Official and Title: March Altman, City Manager

Signature of Authorized Official: _____

Mailing Address (1): 135 North Union Street

Mailing Address (2): _____

City: Petersburg **State:** Virginia **Zip:** 23803

Telephone Number: (804) 744-2300 **Cell Phone Number:** (804) 744-2301

Email Address: maltman@petersburg-va.org
Contact and Title (If different from authorized official): Darryl Walker, Stormwater Program Manager

Mailing Address (1): 135 North Union Street

Mailing Address (2): _____

City: Petersburg **State:** Virginia **Zip:** _____

Telephone Number: (804 **)** 733-2353 **Cell Phone Number: (**____**)** _____

Email Address: dwalker@petersburg-va.org

Is the proposal in this application intended to benefit a low-income geographic area as defined in the Part 1 Definitions? Yes X No ____

Categories (select applicable activities that will be included in the project and used for scoring criterion):

Capacity Building and Planning Grants

☐ Floodplain Staff Capacity.

☐ Resilience Plan Development

- ☐ Revisions to existing resilience plans and integration of comprehensive and hazard mitigation plans.
- ☐ Resource assessments, planning, strategies, and development.
  - Policy management and/or development.
  - Stakeholder engagement and strategies.

☐ Other: _____

Study Grants (Check All that Apply)

☐ Revising other land use ordinances to incorporate flood protection and mitigation goals, standards, and practices.

☐ Conducting hydrologic and hydraulic (H&H) studies of floodplains. *Changes to the base flood, as demonstrated by the H&H must be submitted to FEMA within 6 months of the data becoming available.*

☐ Studies and Data Collection of Statewide and Regional Significance.

☐ Revisions to existing resilience plans and modifications to existing comprehensive and hazard.

☐ Other relevant flood prevention and protection project or study.

☐ Pluvial studies.

☐ Studies to aid in updating floodplain ordinances to maintain compliance with the NFIP, or to incorporate higher standards that may reduce the risk of flood damage. This must include establishing processes for implementing the ordinance, including but not limited to, permitting, record retention, violations, and variances. This may include revising a floodplain ordinance when the community is getting new Flood Insurance Rate Maps (FIRMs), updating a floodplain ordinance to include floodplain setbacks, freeboard, or other higher standards, RiskMAP public noticing requirements, or correcting issues identified in a Corrective Action Plan.

Project Grants and Loans (Check All that Apply – Hybrid Solutions will include items from both the "Nature-Based" and "Other" categories)

Nature-based solutions

☒ Acquisition of property (or interests therein) and/or structures for purposes of allowing floodwater inundation, strategic retreat of existing land uses from areas vulnerable to flooding; the conservation or enhancement of natural flood resilience resources; or acquisition of structures, provided the acquired property will be protected in perpetuity from further development, and where the flood mitigation benefits will be achieved as a part of the same project as the property acquisition.

☐ Wetland restoration.

☐ Floodplain restoration.

☐ Construction of swales and settling ponds.

☐ Living shorelines and vegetated buffers.

☐ Permanent conservation of undeveloped lands identified as having flood resilience value by *ConserveVirginia* Floodplain and Flooding Resilience layer or a similar data driven analytic tool, or the acquisition of developed land for future conservation.

☐ Dam removal.

☐ Stream bank restoration or stabilization.

☐ Restoration of floodplains to natural and beneficial function.

Other Projects

☐ Developing flood warning and response systems, which may include gauge installation, to notify residents of potential emergency flooding events.

☐ Dam restoration.

☐ Beneficial reuse of dredge materials for flood mitigation purposes

☐ Removal or relocation of structures from flood-prone areas where the land will not be returned to open space.

☐ Structural floodwalls, levees, berms, flood gates, structural conveyances.

☐ Storm water system upgrades.

☐ Medium and large-scale Low Impact Development (LID) in urban areas.

☐ Acquisition of property (or interests therein) and/or structures for purposes of allowing floodwater inundation, strategic retreat of existing land uses from areas vulnerable to flooding; the conservation or enhancement of natural flood resilience resources; or acquisition of structures, provided the acquired property will be protected in perpetuity from further development, and where the flood mitigation benefits will **not be** achieved as a part of the same project as the property acquisition.

☐ Other project identified in a DCR-approved Resilience Plan.

Location of Project or Activity (Include Maps): See Supporting Documentation mapping.

NFIP Community Identification Number (CID#) : 510112B

Is Project Located in an NFIP Participating Community? ☒ Yes ☐ No

Is Project Located in a Special Flood Hazard Area? ☒ Yes ☐ No

Flood Zone(s) (If Applicable): N/A

Flood Insurance Rate Map Number(s) (If Applicable): N/A

Total Cost of Project: $4,600,000

Total Amount Requested $4,600,000

Amount Requested as Grant $4,600,000

Amount Requested as Project Loan (Long-Term, not including short-term loans for up-front costs)
$0

RVRF Loan Amount Requested as Project Match (Not including short-term loans for up-front costs)
$0

Amount Requested as Short-Term loan for Up-Front Costs (not to exceed 20% of amount requested as Grant) $0

For projects, planning, capacity building, and studies in low-income geographic areas: Are you requesting that match be waived? ☒ Yes ☐ No

For informational purposes only: Supplemental information for loan requests may include but are not limited to the following. This information will be collected AFTER a CFPF award is made, prior to the signing of a grant agreement.

- General Obligation
- Lease, Revenue
- Special Fund Revenue
- Moral obligation from other government entity)
- Desired loan term
- Since the date of your latest financial statements, any new debt
- Pending or potential litigation by or against the applicant
- Five years of current audited financial statements (FY18-22) or refer to website if posted
- Capital Improvement Plan
- Financial Policies
- List of the ten largest employers in the jurisdiction.
- List of the ten largest taxpayers in the jurisdiction

All loan requests are subject to credit review and approval by Virginia Resources Authority.

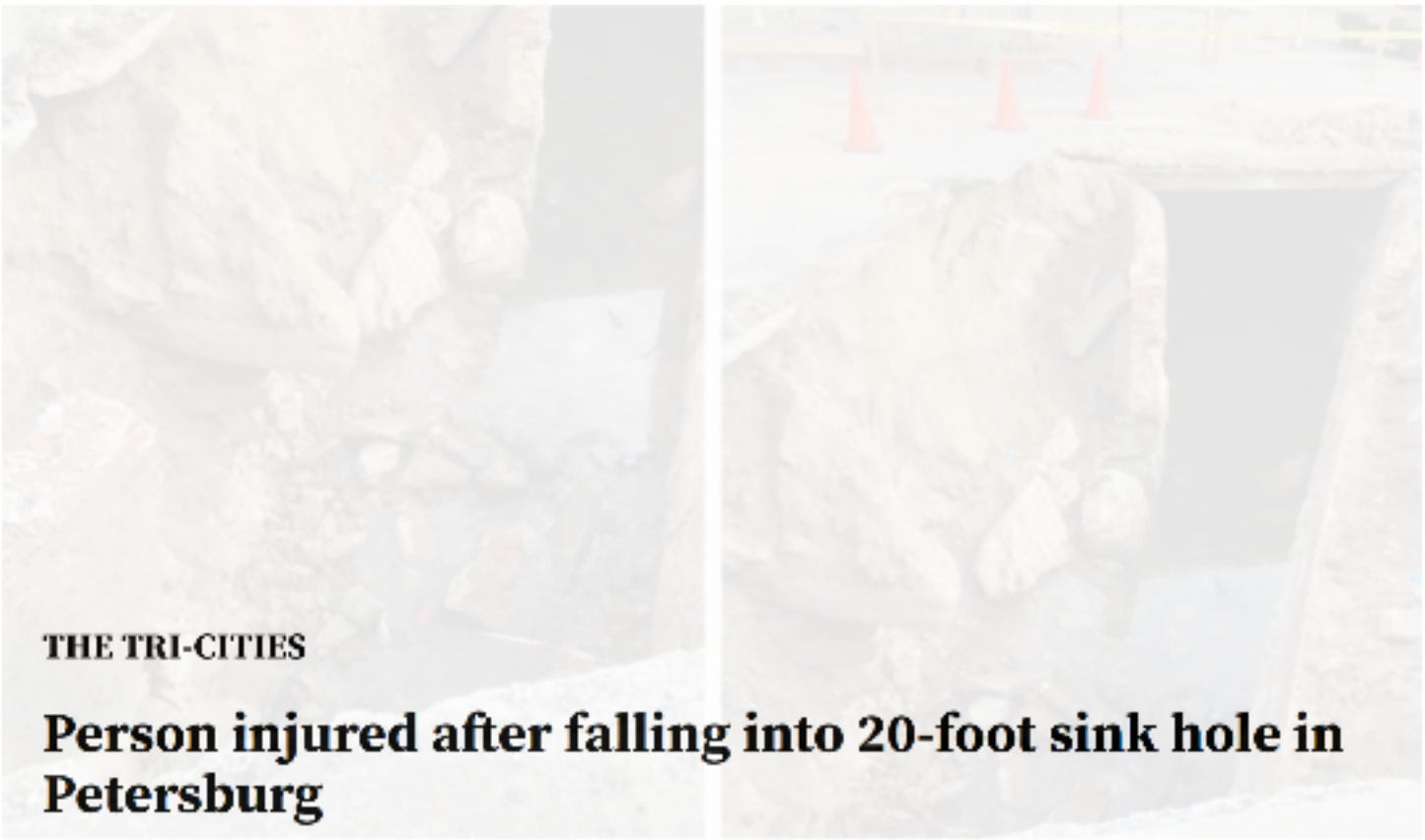
Community Flood Preparedness Fund & Resilient Virginia Revolving Loan Fund
Detailed Budget Narrative

Project Name:	Bank Street Repair Phase 2: Property Acquisition and Floodplain Restoration
Applicant Name:	City of Petersburg
Period of Performance:	2025 through 2028
Submission Date:	1/24/2025

Grand Total State Funding Request	$ 4,370,000.00
Grand Total Local Share of Project	$ 230,000.00
Federal Funding (if available)	$ -
Project Grand Total	$ 4,600,000.00
Locality Cost Match	10%

\

Breakout by Cost Type	Personnel	Fringe	Travel	Equipment	Supplies	Contracts	Indirect Costs	Other Costs	Total
Federal Share (if applicable)									$ -
Local Share						$ 230,000.00			$ 230,000.00
State Share - CFPF Grant						$ 4,370,000.00			$ 4,370,000.00
State Share - RVRF Match Loan									$ -
Pre-Award/Startup									$ -
Maintenance									$ -
Total	$ -	$ -	$ -	$ -	$ -	$ 4,600,000.00	$ -	$ -	$ 4,600,000.00



THE TRI-CITIES

Person injured after falling into 20-foot sink hole in Petersburg

by: Emma North
Posted: Nov 1, 2021 / 04:32 PM EDT
Updated: Nov 1, 2021 / 04:33 PM EDT

SHARE

PETERSBURG, Va. (WRIC) — The Petersburg Fire Department rescued someone from a 20-foot sink hole on East Bank Street Monday afternoon.

The fire department shared information about the rescue on Facebook.

Two shootings, hours apart on same street in Petersburg ›

Fire firefighters and medics were called to the scene. The person who fell in the hole was in need of treatment and was successfully removed from the hole.

Photos of the sink hole show that the area was rocky and partially underwater.

The Progress-Index

NEWS

Storms likely caused part of old downtown Petersburg DMV building to collapse, officials say

Bill Atkinson
Petersburg Progress-Index

Published 2:05 p.m. ET Aug. 30, 2024 | **Updated 6:37 p.m. ET Aug. 30, 2024**

PETERSBURG – City officials say weather is likely to blame for the partial collapse of the former Department of Motor Vehicles building in downtown Petersburg.

City spokesperson Joanne Williams told The Progress-Index that the debris fell into Brickhouse Run, one of the many streams that meander through and below Petersburg. The stream had been exposed to the elements ever since a portion of the building's former parking lot caved in three years ago.

"The structural engineer determined that the building was unsafe and that debris needed to be removed immediately," Williams said. A contractor will remain onsite throughout the evening to clear out Brickhouse Run.

An aqueduct that carries Brickhouse Run below Bank Street was inspected and found to have no damage as a result of either the weather or the building collapse.

The old DMV building has been vacant for many years. A private owner bought it a few years ago and was in the process of doing some excavation work around the front of it when part of the parking lot collapsed. The site has been closed off to pedestrians since 2021 when a woman fell into the sinkhole.

No one was injured in the most recent collapse.

Bank Street between North Sycamore and North Market streets was closed to vehicular traffic while crews worked to clear the collapsed debris.

Deluge in centuries-old stormwater tunnel causes building to partially collapse in Old Towne Petersburg

Wayne Covil

Deluge in centuries-old stormwater tunnel causes Old Towne Petersburg building to partially collapse

PETERSBURG, Va. — Part of a building collapsed in Old Towne Petersburg after storms brought a deluge of water to the historic city Thursday night.

All of the water coming downstream had to pass through a portion of Brickhouse Run, a centuries-old stormwater tunnel that is partially exposed.

“The first layer of the tunnel is from the late 1700s,” Dean McCray, the building’s former owner, said. “Then 4 foot was built higher in the 1800s as stormwater increased. In the 1900s they

built 4 foot higher.”

WTVR

Flooding from the storm exposed a section of the tunnel and eroded the structural integrity of what is known as the old DMV building, which dates back to the 1970s.

The exposed section of tunnel has been out in the open since the fall of 2021.

WATCH: Look how much rain fell in Central Virginia Thursday

Look how much rain fell in Central Virginia Thursday

“We finally got our permit issued last Friday,” McCray said. “Our construction team [was] set up to start Tuesday, the day after Labor Day.”

City leaders and firefighters surveyed the damage Friday morning.

The delay in fixing the problem comes after multiple federal, state and city agencies were involved in the planning process.

WTVR

Now McCray said there is a good chance this building will have to come down due to the damage.

For property and business owners on Bank Street, the ongoing issue with the exposed section of the storm water tunnel is a concern.

“I don’t know how bad the erosion will affect everything, especially the street and all that because it doesn’t go direct under my building but it’s not too far from it,” Spiro Georgogianis said.

WTVR

Susan Steward, who owns the Apothic Company, said this has been going on for years and not just a few months.

“So why aren’t things already fixed?” Steward asked.

Petersburg City Manager March Altman acknowledged there are "few hoops that had to be jumped through from a regulatory perspective with DCR, FEMA, DEQ, EPA.”

WTVR

Now the goal is to remove the debris from the exposed section of the tunnel because of more rain in the forecast Sunday.

“We want to make sure there’s nothing that creates a damming effect, so if that water comes we can handle it,” Altman said.

The sidewalk on Bank Street is closed to the public as a safety precaution. Part of the street may also be closed Sunday because of the potential for more heavy rain.

CBS 6 is committed to sharing community voices on this important topic. Email your thoughts to the CBS 6 Newsroom**.**

Every day CBS 6 is giving a voice to the stories happening in your community. If you have a story idea, email our team at NewsTips@wtvr.com or click here to submit a tip.

Sign up for the Headlines Newsletter and receive up to date information.

LOCAL NEWS

Petersburg street reopens after old stormwater tunnel caused sinkhole, building collapse: 'It's roped off now'

Petersburg street reopens after old stormwater tunnel caused sinkhole, building collapse

By: Wayne Covil

Posted 3:33 PM, Sep 05, 2024 and last updated 5:13 PM, Sep 05, 2024

PETERSBURG, Va. — One week after floodwaters caused part of a tunnel and building to partially collapse in Petersburg, Bank Street has reopened.

At Salon Bliss, business continued while the street in front of the shop had remained blocked.

“The last week has been pretty crazy,” Megan Weaver with Salon Bliss said.

Flood waters from a storm on Aug. 29 had to pass through a section of a centuries-old tunnel that became exposed. That led to a partial collapse of the former DMV building.

“It is very close to here, yes, it’s right across the street,” Weaver said.

WTVR

The city spent much of the past week working to make sure Bank Street did not collapse and cause damage to other buildings.

“[We] put in standard riprap, which is maybe volleyball size,” Petersburg Public Works Director Jerry Byerly explained. “Then came back in yesterday and put in large pieces of riprap that will hopefully withstand the rush of water if there is another large storm. So we have essentially stabilized this bank and got the water back into the channel where it ought to be.”

City officials said they have the problem stabilized, but the street closure is another issue for neighbors.

“A lot of people come through here to get to the other side of Petersburg or get to downtown Petersburg, so there’s a lot of traffic through here,” Gloria Hill, who lives and works on Bank Street, said.

WTVR

The old DMV building, which partially collapsed during the storm, has been condemned by Petersburg building officials.

And there is another sinkhole near the initial site of the collapse.

“It’s roped off now,” Byerly said. “We’ve had the engineers look at it and waiting for a report from them.”

Officials are also waiting on a final report to determine if the tunnel gets closed back up or will remain open.

“There’s discussion about leaving the channel, once it’s dug out and repaired,” Byerly said. “By leaving it open, making a park. There’s all kinds of discussions.”

While there have been no decisions about how Brickhouse Run Creek will look in the future, the report from engineers is expected to be back in 60 to 90 days.

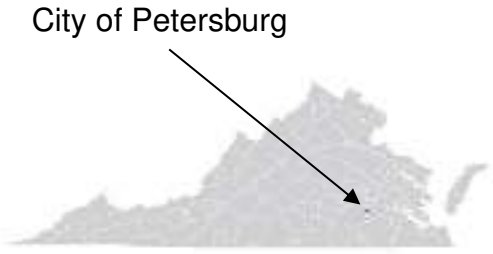
WATCH: Deluge in centuries-old stormwater tunnel causes Old Towne Petersburg building to partially collapse

CBS 6 is committed to sharing community voices on this important topic. Email your thoughts to the CBS 6 Newsroom**.**

FLOOD INSURANCE STUDY

FEDERAL EMERGENCY MANAGEMENT AGENCY

VOLUME 1 OF 1



CITY OF PETERSBURG, VIRGINIA

INDEPENDENT CITY

COMMUNITY NAME	COMMUNITY NUMBER
PETERSBURG, CITY OF	510112

FEMA

Reprinted with corrections on June 8, 2023

REVISED:

December 15, 2022

FLOOD INSURANCE STUDY NUMBER
510112V000B
Version Number 2.6.4.6

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FLOOD INSURANCE STUDY REPORT
CITY OF PETERSBURG, VIRGINIA

SECTION 1.0 – INTRODUCTION

1.1 The National Flood Insurance Program

The National Flood Insurance Program (NFIP) is a voluntary Federal program that enables property owners in participating communities to purchase insurance protection against losses from flooding. This insurance is designed to provide an alternative to disaster assistance to meet the escalating costs of repairing damage to buildings and their contents caused by floods.

For decades, the national response to flood disasters was generally limited to constructing flood-control works such as dams, levees, sea-walls, and the like, and providing disaster relief to flood victims. This approach did not reduce losses nor did it discourage unwise development. In some instances, it may have actually encouraged additional development. To compound the problem, the public generally could not buy flood coverage from insurance companies, and building techniques to reduce flood damage were often overlooked.

In the face of mounting flood losses and escalating costs of disaster relief to the general taxpayers, the U.S. Congress created the NFIP. The intent was to reduce future flood damage through community floodplain management ordinances, and provide protection for property owners against potential losses through an insurance mechanism that requires a premium to be paid for the protection.

The U.S. Congress established the NFIP on August 1, 1968, with the passage of the National Flood Insurance Act of 1968. The NFIP was broadened and modified with the passage of the Flood Disaster Protection Act of 1973 and other legislative measures. It was further modified by the National Flood Insurance Reform Act of 1994 and the Flood Insurance Reform Act of 2004. The NFIP is administered by the Federal Emergency Management Agency (FEMA), which is a component of the Department of Homeland Security (DHS).

Participation in the NFIP is based on an agreement between local communities and the Federal Government. If a community adopts and enforces floodplain management regulations to reduce future flood risks to new construction and substantially improved structures in Special Flood Hazard Areas (SFHAs), the Federal Government will make flood insurance available within the community as a financial protection against flood losses. The community's floodplain management regulations must meet or exceed criteria established in accordance with Title 44 Code of Federal Regulations (CFR) Part 60, *Criteria for Land Management and Use*.

SFHAs are delineated on the community's Flood Insurance Rate Maps (FIRMs). Under the NFIP, buildings that were built before the flood hazard was identified on the community's FIRMs are generally referred to as "Pre-FIRM" buildings. When the NFIP was created, the U.S. Congress recognized that insurance for Pre-FIRM buildings would be prohibitively expensive if the premiums were not subsidized by the Federal Government. Congress also recognized that most of these floodprone buildings were built

by individuals who did not have sufficient knowledge of the flood hazard to make informed decisions. The NFIP requires that full actuarial rates reflecting the complete flood risk be charged on all buildings constructed or substantially improved on or after the effective date of the initial FIRM for the community or after December 31, 1974, whichever is later. These buildings are generally referred to as “Post-FIRM” buildings.

1.2 Purpose of this Flood Insurance Study Report

This Flood Insurance Study (FIS) Report revises and updates information on the existence and severity of flood hazards for the study area. The studies described in this report developed flood hazard data that will be used to establish actuarial flood insurance rates and to assist communities in efforts to implement sound floodplain management.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive than the minimum Federal requirements. Contact your State NFIP Coordinator to ensure that any higher State standards are included in the community’s regulations.

1.3 Jurisdictions Included in the Flood Insurance Study Project

This FIS Report covers the entire geographic area of the City of Petersburg, Virginia.

The jurisdictions that are included in this project area, along with the Community Identification Number (CID) for each community and the United States Geological Survey (USGS) 8-digit Hydrologic Unit Code (HUC-8) sub-basins affecting each, are shown in Table 1. The FIRM panel numbers that affect each community are listed. If the flood hazard data for the community is not included in this FIS Report, the location of that data is identified.

Table 1: Listing of NFIP Jurisdictions

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s)	If Not Included, Location of Flood Hazard Data
Petersburg, City of	510112	02080207, 03010201, 03010202	5101120002D, 5101120004D, 5101120006D, 5101120007D, 5101120008D, 5101120009D, 5101120015D[1], 5101120020D, 5101120026D, 5101120028D, 5101120029D, 5101120036D, 5101120037D	

[1] Panel Not Printed

1.4 Considerations for using this Flood Insurance Study Report

The NFIP encourages State and local governments to implement sound floodplain management programs. To assist in this endeavor, each FIS Report provides floodplain data, which may include a combination of the following: 10-, 4-, 2-, 1-, and 0.2-percent annual chance flood elevations (the 1-percent-annual-chance flood elevation is also referred to as the Base Flood Elevation (BFE)); delineations of the 1-percent-annual-chance and 0.2-percent-annual-chance floodplains; and 1-percent-annual-chance floodway. This information is presented on the FIRM and/or in many components of the FIS Report, including Flood Profiles, Floodway Data tables, Summary of Non-Coastal Stillwater Elevations tables, and Coastal Transect Parameters tables (not all components may be provided for a specific FIS).

This section presents important considerations for using the information contained in this FIS Report and the FIRM, including changes in format and content. Figures 1, 2, and 3 present information that applies to using the FIRM with the FIS Report.

- Part or all of this FIS Report may be revised and republished at any time. In addition, part of this FIS Report may be revised by a Letter of Map Revision (LOMR), which does not involve republication or redistribution of the FIS Report. Refer to Section 6.5 of this FIS Report for information about the process to revise the FIS Report and/or FIRM.

  It is, therefore, the responsibility of the user to consult with community officials by contacting the community repository to obtain the most current FIS Report components. Communities participating in the NFIP have established repositories of flood hazard data for floodplain management and flood insurance purposes. Community map repository addresses are provided in Table 30, "Map Repositories," within this FIS Report.

- This FIS report was reissued on June 8, 2023 to make a correction. See the Notice-to User letter that accompanied this correction for details. This version replaces any previous versions.

- New FIS Reports are frequently developed for multiple communities, such as entire counties. A countywide FIS Report incorporates previous FIS Reports for individual communities and the unincorporated area of the county (if not jurisdictional) into a single document and supersedes those documents for the purposes of the NFIP.

  The initial FIS Report for the City of Petersburg became effective on September 16, 1980. The initial FIRM for the City of Petersburg is dated March 16, 1981. Refer to Table 27 for information about subsequent revisions to the FIRMs.

- FEMA has developed a *Guide to Flood Maps* (FEMA 258) and online tutorials to assist users in accessing the information contained on the FIRM. These include how to read panels and step-by-step instructions to obtain specific information. To obtain this guide and other assistance in using the FIRM, visit the FEMA Web site at www.fema.gov/online-tutorials.

The FIRM Index in Figure 1 shows the overall FIRM panel layout within the City of Petersburg, and also displays the panel number and effective date for each FIRM panel in the county. Other information shown on the FIRM Index includes community boundaries, flooding sources, watershed boundaries, and USGS HUC-8 codes.

Figure 1:FIRM Index

CITY OF
COLONIAL
HEIGHTS

CHESTERFIELD COUNTY

*0001D | 0002D 12/15/2022 | 0006D 12/15/2022 | 0026D 12/15/2022 | *0027D | *0035D

HUC8 02080207
Appomattox Watershed

CITY OF
PETERSBURG
510112

*0003D | 0004D 12/15/2022 | 0008D 12/15/2022 | 0009D 12/15/2022 | 0028D 12/15/2022 | 0029D 12/15/2022

**0015D | 0020D 12/15/2022 | 0036D 12/15/2022 | 0037D 12/15/2022 | *0045D

HUC8 03010201
Nottoway Watershed

DINWIDDIE COUNTY

PRINCE GEORGE COUNTY

HUC8 03010202
Blackwater Watershed

*0038D | *0039D

Appomattox River
Navigation Channel
Appomattox River
RAILROAD
RAILROAD
RAILROAD
RAILROAD
RAILROAD
Lieutenant Run
Harrison Creek
Rohoic Creek
Brickhouse Run
Wilcox Lake
Blackwater Swamp
Unnamed Tributary 1
to Blackwater Swamp
Second Swamp
1
36
460B
301
460
301A
604
613
95
106
629

1 inch = 7,083 feet 1:85,000
feet
0 4,000 8,000 16,000

Map Projection:
State Plane Virginia South 4502 Feet
North American Datum of 1983

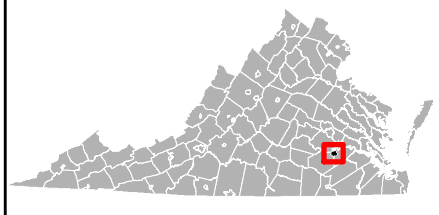
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT

HTTPS://MSC.FEMA.GOV

SEE FIS REPORT FOR ADDITIONAL INFORMATION

*PANEL NOT PRINTED -- AREA OUTSIDE COMMUNITY BOUNDARY
**PANEL NOT PRINTED -- NO SPECIAL FLOOD HAZARD AREAS

CITY LOCATOR



NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP INDEX

CITY OF PETERSBURG, VIRGINIA Independent City

PANELS PRINTED:
0002, 0004, 0006, 0007, 0008, 0009, 0020, 0026, 0028, 0029, 0036, 0037

FEMA

MAP NUMBER
510112IND0B

MAP REVISED
DECEMBER 15, 2022

Each FIRM panel may contain specific notes to the user that provide additional information regarding the flood hazard data shown on that map. However, the FIRM panel does not contain enough space to show all the notes that may be relevant in helping to better understand the information on the panel. Figure 2 contains the full list of these notes.

Figure 2: FIRM Notes to Users

NOTES TO USERS

For information and questions about this map, available products associated with this FIRM including historic versions of this FIRM, how to order products, or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Flood Map Service Center website at https://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Flood Map Service Center website or by calling the FEMA Map Information eXchange.

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Flood Map Service Center at the number listed above.

For community map dates, refer to Table 27 in this FIS Report.

To determine if flood insurance is available in the community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

The map is for use in administering the NFIP. It may not identify all areas subject to flooding, particularly from local drainage sources of small size. Consult the community map repository to find updated or additional flood hazard information.

BASE FLOOD ELEVATIONS: For more detailed information in areas where Base Flood Elevations (BFEs) and/or floodways have been determined, consult the Flood Profiles and Floodway Data and/or Summary of Non-Coastal Stillwater Elevations tables within this FIS Report. Use the flood elevation data within the FIS Report in conjunction with the FIRM for construction and/or floodplain management.

FLOODWAY INFORMATION: Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the FIS Report for this jurisdiction.

FLOOD CONTROL STRUCTURE INFORMATION: Certain areas not in Special Flood Hazard Areas may be protected by flood control structures. Refer to Section 4.3 "Non-Levee Flood Protection Measures" of this FIS Report for information on flood control structures for this jurisdiction.

PROJECTION INFORMATION: The projection used in the preparation of the map was State Plane Lambert Conformal Conic, Virginia South Zone 4502. The horizontal datum was the North American Datum of 1983 NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These

Figure 2. FIRM Notes to Users (continued)

differences do not affect the accuracy of the FIRM.

ELEVATION DATUM: Flood elevations on the FIRM are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at www.ngs.noaa.gov.

Local vertical monuments may have been used to create the map. To obtain current monument information, please contact the appropriate local community listed in Table 30 of this FIS Report.

BASE MAP INFORMATION: Base map information shown on the FIRM was provided by the United States Geological Survey (USGS). The following panels used base map information provided by the USGS that was derived from digital orthophotography at a 2-foot resolution, dated 2010. For information about base maps, refer to Section 6.2 “Base Map” in this FIS Report.

The map reflects more detailed and up-to-date stream channel configurations than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables may reflect stream channel distances that differ from what is shown on the map.

Corporate limits shown on the map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after the map was published, map users should contact appropriate community officials to verify current corporate limit locations.

NOTES FOR FIRM INDEX

REVISIONS TO INDEX: As new studies are performed and FIRM panels are updated within the City of Petersburg, Virginia, corresponding revisions to the FIRM Index will be incorporated within the FIS Report to reflect the effective dates of those panels. Please refer to Table 27 of this FIS Report to determine the most recent FIRM revision date for each community. The most recent FIRM panel effective date will correspond to the most recent index date.

Figure 2. FIRM Notes to Users (continued)

SPECIAL NOTES FOR SPECIFIC FIRM PANELS

This Notes to Users section was created specifically for the City of Petersburg, Virginia, effective December 15, 2022.

FLOOD RISK REPORT: A Flood Risk Report (FRR) may be available for many of the flooding sources and communities referenced in this FIS Report. The FRR is provided to increase public awareness of flood risk by helping communities identify the areas within their jurisdictions that have the greatest risks. Although non-regulatory, the information provided within the FRR can assist communities in assessing and evaluating mitigation opportunities to reduce these risks. It can also be used by communities developing or updating flood risk mitigation plans. These plans allow communities to identify and evaluate opportunities to reduce potential loss of life and property. However, the FRR is not intended to be the final authoritative source of all flood risk data for a project area; rather, it should be used with other data sources to paint a comprehensive picture of flood risk.

Each FIRM panel contains an abbreviated legend for the features shown on the maps. However, the FIRM panel does not contain enough space to show the legend for all map features. Figure 3 shows the full legend of all map features. Note that not all of these features may appear on the FIRM panels in the City of Petersburg.

Figure 3: Map Legend for FIRM

SPECIAL FLOOD HAZARD AREAS: The 1% annual chance flood, also known as the base flood or 100-year flood, has a 1% chance of happening or being exceeded each year. Special Flood Hazard Areas are subject to flooding by the 1% annual chance flood. The Base Flood Elevation is the water surface elevation of the 1% annual chance flood. The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights. See note for specific types. If the floodway is too narrow to be shown, a note is shown.

	Special Flood Hazard Areas subject to inundation by the 1% annual chance flood (Zones A, AE, AH, AO, AR, A99, V and VE)
Zone A	The flood insurance rate zone that corresponds to the 1% annual chance floodplains. No base (1% annual chance) flood elevations (BFEs) or depths are shown within this zone.
Zone AE	The flood insurance rate zone that corresponds to the 1% annual chance floodplains. Base flood elevations derived from the hydraulic analyses are shown within this zone.
Zone AH	The flood insurance rate zone that corresponds to the areas of 1% annual chance shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot BFEs derived from the hydraulic analyses are shown at selected intervals within this zone.
Zone AO	The flood insurance rate zone that corresponds to the areas of 1% annual chance shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average whole-foot depths derived from the hydraulic analyses are shown within this zone.
Zone AR	The flood insurance rate zone that corresponds to areas that were formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
Zone A99	The flood insurance rate zone that corresponds to areas of the 1% annual chance floodplain that will be protected by a Federal flood protection system where construction has reached specified statutory milestones. No base flood elevations or flood depths are shown within this zone.
Zone V	The flood insurance rate zone that corresponds to the 1% annual chance coastal floodplains that have additional hazards associated with storm waves. Base flood elevations are not shown within this zone.
Zone VE	Zone VE is the flood insurance rate zone that corresponds to the 1% annual chance coastal floodplains that have additional hazards associated with storm waves. Base flood elevations derived from the coastal analyses are shown within this zone as static whole-foot elevations that apply throughout the zone.
	Regulatory Floodway determined in Zone AE.

Figure 3: Map Legend for FIRM (continued)

OTHER AREAS OF FLOOD HAZARD

Shaded Zone X: Areas of 0.2% annual chance flood hazards and areas of 1% annual chance flood hazards with average depths of less than 1 foot or with drainage areas less than 1 square mile.

Future Conditions 1% Annual Chance Flood Hazard – Zone X: The flood insurance rate zone that corresponds to the 1% annual chance floodplains that are determined based on future-conditions hydrology. No base flood elevations or flood depths are shown within this zone.

Area with Reduced Flood Risk due to Levee: Areas where an accredited levee, dike, or other flood control structure has reduced the flood risk from the 1% annual chance flood.

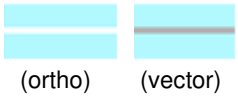
Area with Flood Risk due to Levee: Areas where a non-accredited levee, dike, or other flood control structure is shown as providing protection to less than the 1% annual chance flood.

OTHER AREAS

Zone D (Areas of Undetermined Flood Hazard): The flood insurance rate zone that corresponds to unstudied areas where flood hazards are undetermined, but possible.

Unshaded Zone X: Areas of minimal flood hazard.

FLOOD HAZARD AND OTHER BOUNDARY LINES



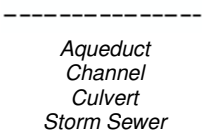
Flood Zone Boundary (white line on ortho-photography-based mapping; gray line on vector-based mapping)

Limit of Study

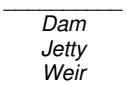
Jurisdiction Boundary

Limit of Moderate Wave Action (LiMWA): Indicates the inland limit of the area affected by waves greater than 1.5 feet

GENERAL STRUCTURES

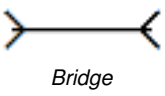


Channel, Culvert, Aqueduct, or Storm Sewer



Dam, Jetty, Weir

Levee, Dike, or Floodwall



Bridge

Figure 3: Map Legend for FIRM (continued)

REFERENCE MARKERS	
22.0	River mile Markers
CROSS SECTION & TRANSECT INFORMATION	
B 20.2	Lettered Cross Section with Regulatory Water Surface Elevation (BFE)
5280 21.1	Numbered Cross Section with Regulatory Water Surface Elevation (BFE)
17.5	Unlettered Cross Section with Regulatory Water Surface Elevation (BFE)
8	Coastal Transect
	Profile Baseline: Indicates the modeled flow path of a stream and is shown on FIRM panels for all valid studies with profiles or otherwise established base flood elevation.
	Coastal Transect Baseline: Used in the coastal flood hazard model to represent the 0.0-foot elevation contour and the starting point for the transect and the measuring point for the coastal mapping.
513	Base Flood Elevation Line
ZONE AE (EL 16)	Static Base Flood Elevation value (shown under zone label)
ZONE AO (DEPTH 2)	Zone designation with Depth
ZONE AO (DEPTH 2) (VEL 15 FPS)	Zone designation with Depth and Velocity
BASE MAP FEATURES	
Missouri Creek	River, Stream or Other Hydrographic Feature
234	Interstate Highway
234	U.S. Highway
234	State Highway
234	County Highway
MAPLE LANE	Street, Road, Avenue Name, or Private Drive if shown on Flood Profile
RAILROAD	Railroad

Figure 3: Map Legend for FIRM (continued)

_____	Horizontal Reference Grid Line
___	Horizontal Reference Grid Ticks
+	Secondary Grid Crosshairs
Land Grant	Name of Land Grant
7	Section Number
R. 43 W. T. 22 N.	Range, Township Number
^{42}**76**^{000m}**E**	Horizontal Reference Grid Coordinates (UTM)
365000 FT	Horizontal Reference Grid Coordinates (State Plane)
80° 16' 52.5"	Corner Coordinates (Latitude, Longitude)

SECTION 2.0 – FLOODPLAIN MANAGEMENT APPLICATIONS

2.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1-percent-annual-chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent-annual-chance (500-year) flood is employed to indicate additional areas of flood hazard in the community.

Each flooding source included in the project scope has been studied and mapped using professional engineering and mapping methodologies that were agreed upon by FEMA and the City of Petersburg as appropriate to the risk level. Flood risk is evaluated based on factors such as known flood hazards and projected impact on the built environment. Engineering analyses were performed for each studied flooding source to calculate its 1-percent-annual-chance flood elevations; elevations corresponding to other floods (e.g. 10-, 4-, 2-, 0.2-percent annual chance, etc.) may have also been computed for certain flooding sources. Engineering models and methods are described in detail in Section 5.0 of this FIS Report. The modeled elevations at cross sections were used to delineate the floodplain boundaries on the FIRM; between cross sections, the boundaries were interpolated using elevation data from various sources. More information on specific mapping methods is provided in Section 6.0 of this FIS Report.

Depending on the accuracy of available topographic data (Table 22), study methodologies employed (Section 5.0), and flood risk, certain flooding sources may be mapped to show both the 1-percent and 0.2-percent-annual-chance floodplain boundaries, regulatory water surface elevations (BFEs), and/or a regulatory floodway. Similarly, other flooding sources may be mapped to show only the 1-percent-annual-chance floodplain boundary on the FIRM, without published water surface elevations. In cases where the 1-percent and 0.2-percent-annual-chance floodplain boundaries are close together, only the 1-percent-annual-chance floodplain boundary is shown on the FIRM. Figure 3, “Map Legend for FIRM”, describes the flood zones that are used on the FIRMs to account for the varying levels of flood risk that exist along flooding sources within the project area. Table 2 and Table 3 indicate the flood zone designations for each flooding source and each community within the City of Petersburg, respectively.

Table 2, “Flooding Sources Included in this FIS Report,” lists each flooding source, including its study limits, affected communities, mapped zone on the FIRM, and the completion date of its engineering analysis from which the flood elevations on the FIRM and in the FIS Report were derived. Descriptions and dates for the latest hydrologic and hydraulic analyses of the flooding sources are shown in Table 12. Floodplain boundaries for these flooding sources are shown on the FIRM (published separately) using the symbology described in Figure 3. On the map, the 1-percent-annual-chance floodplain corresponds to the SFHAs. The 0.2-percent-annual-chance floodplain shows areas that, although out of the regulatory floodplain, are still subject to flood hazards.

Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data. The procedures to remove these areas from the SFHA are described in Section 6.5 of this FIS Report.

Table 2: Flooding Sources Included in this FIS Report

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
All Zone A Streams and Tributaries in HUC 02080207	Petersburg, City of	Various	Various	02080207	10.3	N	A	07/31/2019
All Zone A Streams and Tributaries in HUC 03010202	Petersburg, City of	Various	Various	03010202	4.0	N	A	07/31/2019
Appomattox River	Petersburg, City of	Approximately 3,000 feet downstream of Interstate 95	Approximately 0.5 miles upstream of confluence with Rohoic Creek	02080207	4.5	Y	AE	03/25/2020
Appomattox River Navigation Channel	Petersburg, City of	Convergence with the Appomattox River approximately 0.7 miles downstream of Interstate 95	Divergence from the Appomattox River approximately 200 feet downstream of U.S. Route 1	02080207	1.2	Y	AE	03/25/2020
Blackwater Swamp	Petersburg, City of	Approximately 500 feet downstream of U.S. Highway 460	Approximately 250 feet downstream of Retnag Road	03010202	3.5	Y	AE	03/25/2020
Brickhouse Run	Petersburg, City of	At confluence with Appomattox River	Approximately 370 feet downstream of Darby Drive	02080207	3.2	Y	AE	03/25/2020
Brickhouse Run Overland	Petersburg, City of	At Brown Street	Approximately 150 feet upstream of S South Street	02080207	0.2	Y	AE	03/25/2020
Harrison Creek	Petersburg, City of	At confluence with Appomattox River	Approximately 1,640 feet upstream of East Washington Street	02080207	1.4	Y	AE	03/25/2020

Table 2: Flooding Sources Included in this FIS Report (continued)

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Lieutenant Run	Petersburg, City of	At confluence with Appomattox River Navigation Channel	Approximately 1,300 feet upstream of Baylors Lane	02080207	3.1	Y	AE	03/25/2020
Poor Creek	Petersburg, City of	At confluence with Appomattox River Navigation Channel	Approximately 320 feet upstream of Pine Oak Drive	02080207	1.2	Y	AE	03/25/2020
Rohoic Creek	Petersburg, City of	At confluence with Appomattox River	Approximately 60 feet upstream of Boydton Plank Road	02080207	2.5	Y	AE	03/25/2020
Unnamed Tributary 1 to Blackwater Swamp	Petersburg, City of	At confluence with Blackwater Swamp	Approximately 500 feet upstream of U.S. Highway 301	03010202	0.8	Y	AE	03/25/2020
Unnamed Tributary 2 to Blackwater Swamp	Petersburg, City of	At Norfolk Southern Railroad	Approximately 1,200 feet upstream of Norfolk Southern Railroad	03010202	0.3	N	AE	03/25/2020

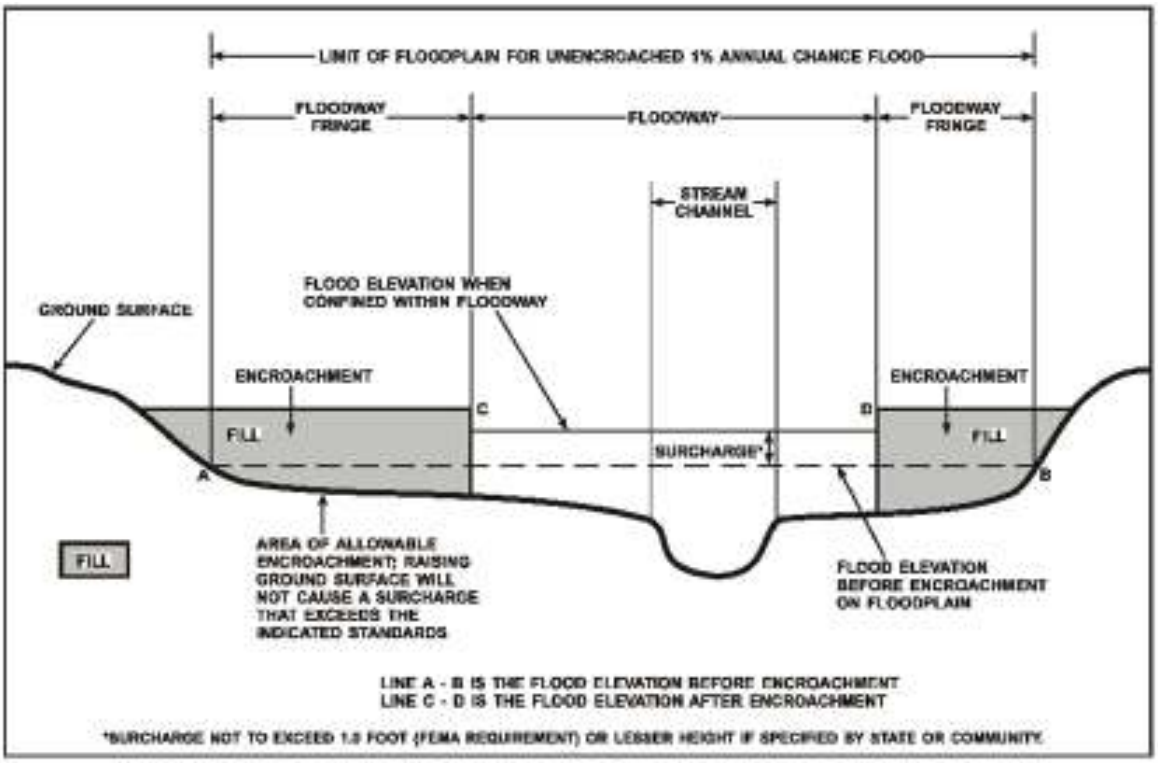
2.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard.

For purposes of the NFIP, a floodway is used as a tool to assist local communities in balancing floodplain development against increasing flood hazard. With this approach, the area of the 1-percent-annual-chance floodplain on a river is divided into a floodway and a floodway fringe based on hydraulic modeling. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment in order to carry the 1-percent-annual-chance flood. The floodway fringe is the area between the floodway and the 1-percent-annual-chance floodplain boundaries where encroachment is permitted. The floodway must be wide enough so that the floodway fringe could be completely obstructed without increasing the water surface elevation of the 1-percent-annual-chance flood more than 1 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 4.

To participate in the NFIP, Federal regulations require communities to limit increases caused by encroachment to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this project are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway projects.

Figure 4: Floodway Schematic



Floodway widths presented in this FIS Report and on the FIRM were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. For certain stream segments, floodways were adjusted so that the amount of floodwaters conveyed on each side of the floodplain would be reduced equally. The results of the floodway computations have been tabulated for selected cross sections and are shown in Table 23, "Floodway Data."

All floodways that were developed for this Flood Risk Project are shown on the FIRM using the symbology described in Figure 3. In cases where the floodway and 1-percent-annual-chance floodplain boundaries are either close together or collinear, only the floodway boundary has been shown on the FIRM. For information about the delineation of floodways on the FIRM, refer to Section 6.3.

2.3 Base Flood Elevations

The hydraulic characteristics of flooding sources were analyzed to provide estimates of the elevations of floods of the selected recurrence intervals. The BFE is the elevation of the 1-percent-annual-chance flood. These BFEs are most commonly rounded to the whole foot, as shown on the FIRM, but in certain circumstances or locations they may be rounded to 0.1 foot. Cross section lines shown on the FIRM may also be labeled with the BFE rounded to 0.1 foot. Whole-foot BFEs derived from engineering analyses that apply to coastal areas, areas of ponding, or other static areas with little elevation change may also be shown at selected intervals on the FIRM.

BFEs are primarily intended for flood insurance rating purposes. Cross sections with BFEs shown on the FIRM correspond to the cross sections shown in the Floodway Data table and Flood Profiles in this FIS Report. For construction and/or floodplain management purposes, users are cautioned to use the flood elevation data presented in this FIS Report in conjunction with the data shown on the FIRM. For example, the user may use the FIRM to determine the stream station of a location of interest and then use the profile to determine the 1-percent annual chance elevation at that location. Because only selected cross sections may be shown on the FIRM for riverine areas, the profile should be used to obtain the flood elevation between mapped cross sections. Additionally, for riverine areas, whole-foot elevations shown on the FIRM may not exactly reflect the elevations derived from the hydraulic analyses; therefore, elevations obtained from the profile may more accurately reflect the results of the hydraulic analysis.

2.4 Non-Encroachment Zones

This section is not applicable to this Flood Risk Project.

2.5 Coastal Flood Hazard Areas

This section is not applicable to this Flood Risk Project.

2.5.1 Water Elevations and the Effects of Waves

This section is not applicable to this Flood Risk Project.

Figure 5: Wave Runup Transect Schematic

[Not applicable to this Flood Risk Project.]

2.5.2 Floodplain Boundaries and BFEs for Coastal Areas

This section is not applicable to this Flood Risk Project.

2.5.3 Coastal High Hazard Areas

This section is not applicable to this Flood Risk Project.

Figure 6: Coastal Transect Schematic

[Not applicable to this Flood Risk Project.]

2.5.4 Limit of Moderate Wave Action

This section is not applicable to this Flood Risk Project.

SECTION 3.0 – INSURANCE APPLICATIONS

3.1 National Flood Insurance Program Insurance Zones

For flood insurance applications, the FIRM designates flood insurance rate zones as described in Figure 3, “Map Legend for FIRM.” Flood insurance zone designations are assigned to flooding sources based on the results of the hydraulic or coastal analyses. Insurance agents use the zones shown on the FIRM and depths and base flood elevations in this FIS Report in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

The 1-percent-annual-chance floodplain boundary corresponds to the boundary of the areas of special flood hazards (e.g. Zones A, AE, V, VE, etc.), and the 0.2-percent-annual-chance floodplain boundary corresponds to the boundary of areas of additional flood hazards.

Table 3 lists the flood insurance zones in the City of Petersburg.

Table 3: Flood Zone Designations by Community

Community	Flood Zone(s)
Petersburg, City of	A, AE, X

SECTION 4.0 – AREA STUDIED

4.1 Basin Description

Table 4 contains a description of the characteristics of the HUC-8 sub-basins within which each community falls. The table includes the main flooding sources within each basin, a

brief description of the basin, and its drainage area.

Table 4: Basin Characteristics

HUC-8 Sub-Basin Name	HUC-8 Sub-Basin Number	Primary Flooding Source	Description of Affected Area	Drainage Area (square miles)
Appomattox	02080207	Appomattox River	Drains the northwestern two-thirds of the City of Petersburg.	1,610
Blackwater	03010202	Blackwater River	Drains the southeastern third of the City of Petersburg.	740
Nottoway	03010201	Nottoway River	Drains a small southwestern portion of the City of Petersburg.	1,723

4.2 Principal Flood Problems

Table 5 contains a description of the principal flood problems that have been noted for the City of Petersburg by flooding source.

Table 5: Principal Flood Problems

Flooding Source	Description of Flood Problems
Appomattox River	The Appomattox River is the source of most major flood problems in the City of Petersburg. The Appomattox River can flood any time of the year, typically from prolonged winter and spring storms or tropical storms that pass overthe area in late summer and fall. Due to the hydrologic nature of the Appomattox River drainage basin, flood events typically last for several days. Three of the five largest floods in Petersburg were recorded between October 1971- 1972. Petersburg recorded highest peaks (cfs) of 40,800,28,000,22,800,21,100,18,800 in 1972,1940,1971,1970,1937 with recurrence intervals of 110,40,25,20 and 15 years respectively (FIS 2011)
Blackwater Swamp	Major flooding along Blackwater Swamp has been the result of summer thunderstorms, hurricanes, and snowmelt. (FIS 2011)
Brickhouse Run, Harrison Creek, Lieutenant Run, Poor Creek, and Rohoic Creek	Downstream sections of these reaches are impacted by the backwater from Appomattox river and susceptible to flooding. Brickhouse and Lieutenant Run flow through highly urban areas, while Harrison Poor and Rohoic Creek flow through commercial/industrial development and many of their structures are inadequate and creating ponding. (FIS 2011)

Table 6 contains information about historic flood elevations in the communities within the City of Petersburg.

Table 6: Historic Flooding Elevations

[Not applicable to this Flood Risk Project.]

4.3 Non-Levee Flood Protection Measures

Table 7 contains information about non-levee flood protection measures within the City of Petersburg such as dams, jetties, and or dikes. Levees are addressed in Section 4.4 of this FIS Report.

Table 7: Non-Levee Flood Protection Measures

[Not applicable to this Flood Risk Project.]

4.4 Levees

This section is not applicable to this Flood Risk Project.

Table 8: Levees

[Not applicable to this Flood Risk Project.]

SECTION 5.0 – ENGINEERING METHODS

For the flooding sources in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that are expected to be equaled or exceeded at least once on the average during any 10-, 25-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 25-, 50-, 100-, and 500-year floods, have a 10-, 4-, 2-, 1-, and 0.2-percent-annual-chance, respectively, of being equaled or exceeded during any year.

Although the recurrence interval represents the long-term, average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood that equals or exceeds the 100-year flood (1-percent chance of annual exceedance) during the term of a 30-year mortgage is approximately 26 percent (about 3 in 10); for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

In addition to these flood events, the “1-percent-plus”, or “1%+”, annual chance flood elevation has been modeled and included on the flood profile for certain flooding sources in this FIS Report. While not used for regulatory or insurance purposes, this flood event has been calculated to help illustrate the variability range that exists between the regulatory 1-percent-annual-chance flood elevation and a 1-percent-annual-chance elevation that has taken into account an additional amount of uncertainty in the flood discharges (thus, the 1% “plus”). For flooding sources whose discharges were estimated using regression equations, the 1%+ flood elevations are derived by taking the 1-percent-annual-chance flood discharges and increasing the modeled discharges by a percentage equal to the average predictive error for the regression equation. For flooding sources with

gage- or rainfall-runoff-based discharge estimates, the upper 84-percent confidence limit of the discharges is used to compute the 1%+ flood elevations.

5.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak elevation-frequency relationships for floods of the selected recurrence intervals for each flooding source studied. Hydrologic analyses are typically performed at the watershed level. Depending on factors such as watershed size and shape, land use and urbanization, and natural or man-made storage, various models or methodologies may be applied. A summary of the hydrologic methods applied to develop the discharges used in the hydraulic analyses for each stream is provided in Table 12. Greater detail (including assumptions, analysis, and results) is available in the archived project documentation.

A summary of the discharges is provided in Table 9. Note: Discharges for flooding sources designated as Zone A on the FIRM are not shown in Table 9 of this FIS report, however, discharge values are included in the FIRM database in the S_NODES and L_SUMMARY_DISCHARGES feature classes. Stream gage information is provided in Table 11.

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Appomattox River	Upstream of the confluence with Brickhouse Run	1,357	19,707	26,101	31,503	37,462	53,881
Appomattox River	Upstream of the confluence with Fleets Branch	1,356	19,690	26,078	31,475	37,429	53,834
Appomattox River	Upstream of the confluence with Rohoic Creek	1,345	19,525	25,859	31,212	37,115	53,382
Blackwater Swamp	Approximately 1,000 feet upstream of County Road	4.8	590	809	831	1,172	1,616
Blackwater Swamp	Approximately 1,800 feet downstream of Country Drive	2.9	850	1,231	1,246	1,880	2,723
Blackwater Swamp	Upstream of Wagner Road	1.8	492	717	722	1,094	1,580
Brickhouse Run	At the confluence with Appomattox River	2.3	1,711	2,328	2,910	3,536	5,186
Brickhouse Run	Approximately 700 feet upstream of S West St	1.2	638	847	1,035	1,242	1,804
Brickhouse Run	Approximately 550 feet upstream of Elm Street	0.4	336	477	567	709	1,092
Harrison Creek	At the confluence with Appomattox River	2.9	782	1,119	1,368	1,634	2,228
Harrison Creek	Upstream of Norfolk Southern Railroad	1.8	332	562	770	1,004	1,504
Harrison Creek	Downstream of Hickory Hill Road	0.6	226	354	464	586	898

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Lieutenant Run	At the confluence with Appomattox River Navigation Channel	5.6	2,525	3,197	3,637	4,079	5,091
Lieutenant Run	Upstream of Johnson Road	3.3	1,046	1,495	1,919	2,407	3,711
Lieutenant Run	Downstream of East Washington Street	5.3	2,252	2,874	3,281	3,662	4,367
Poor Creek	At the confluence with Appomattox River Navigation Channel	2.6	1,075	1,189	1,276	1,449	1,863
Poor Creek	At East Washington Street	2.4	1,572	2,266	2,912	3,635	5,194
Poor Creek	Approximately 5,000 feet upstream of East Washington Street	1.9	1,643	2,378	3,040	3,750	4,907
Rohoic Creek	At the confluence with Appomattox River	9.6	1,792	2,636	3,383	4,267	8,571
Rohoic Creek	Upstream of Cattail Creek	4.9	990	1,475	1,929	2,405	4,550
Rohoic Creek	Upstream of Route 142	3.9	805	1,208	1,591	1,974	3,688

Figure 7: Frequency Discharge-Drainage Area Curves

[Not applicable to this Flood Risk Project.]

Table 10: Summary of Non-Coastal Stillwater Elevations

Flooding Source	Location	Elevations (feet NAVD 88)				
		10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Unnamed tributary 2 to Blackwater Swamp	Upstream of Norfolk Southern Railroad	140.1	140.5	140.5	141.2	142

Table 11: Stream Gage Information used to Determine Discharges

Flooding Source	Gage Identifier	Agency that Maintains Gage	Site Name	Drainage Area (Square Miles)	Period of Record	
					From	To
Appomattox River	02041650	USGS	Appomattox River at Matoaca	1,342	04/04/1970	12/26/2015

5.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals. Base flood elevations on the FIRM represent the elevations shown on the Flood Profiles and in the Floodway Data tables in the FIS Report. Rounded whole-foot elevations may be shown on the FIRM in coastal areas, areas of ponding, and other areas with static base flood elevations. These whole-foot elevations may not exactly reflect the elevations derived from the hydraulic analyses. Flood elevations shown on the FIRM are primarily intended for flood insurance rating purposes. For construction and/or floodplain management purposes, users are cautioned to use the flood elevation data presented in this FIS Report in conjunction with the data shown on the FIRM. The hydraulic analyses for this FIS were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

For streams for which hydraulic analyses were based on cross sections, locations of selected cross sections are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 6.3), selected cross sections are also listed in Table 23, “Floodway Data.”

A summary of the methods used in hydraulic analyses performed for this project is provided in Table 12. Roughness coefficients are provided in Table 13. Roughness coefficients are values representing the frictional resistance water experiences when passing overland or through a channel. They are used in the calculations to determine water surface elevations. Greater detail (including assumptions, analysis, and results) is available in the archived project documentation.

Table 12: Summary of Hydrologic and Hydraulic Analyses

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
All Zone A Streams and Tributaries in HUC 02080207	Various	Various	Regression Equations	HEC-RAS 5.0.5	07/31/2019	A	Effects of hydraulic structures were not considered in the model.
All Zone A Streams and Tributaries in HUC 03010202	Various	Various	Regression Equations	HEC-RAS 5.0.5	07/31/2019	A	Effects of hydraulic structures were not considered in the model.
Appomattox River	Approximately 3,000 feet downstream of Interstate 95	Approximately 0.5 miles upstream of confluence with Rohoic Creek	Regression Equations	HEC-RAS 5.0.5	03/25/2020	AE w/ Floodway	Gage No. 02041650 was used in hydrologic analysis. Hydraulic models incorporated field measured bridge and culvert data. Modeling incorporates split flow through Interstate 95.
Appomattox River Navigation Channel	Convergence with the Appomattox River approximately 0.7 miles downstream of Interstate 95	Divergence from the Appomattox River approximately 200 feet downstream of U.S. Route 1	Regression Equations	HEC-RAS 5.0.5	03/25/2020	AE w/ Floodway	Gage No. 02041650 was used in hydrologic analysis. Hydraulic models incorporated field measured bridge and culvert data. Modeling incorporates split flow through Interstate 95.
Blackwater Swamp	Approximately 500 feet downstream of U.S. Highway 460	Approximately 250 feet downstream of Retnag Road	HEC-HMS 4.3	HEC-RAS 5.0.5	03/25/2020	AE w/ Floodway	Hydraulic model incorporated field measured bridge and culvert data.
Brickhouse Run	At confluence with Appomattox River	Approximately 370 feet downstream of Darby Drive	HEC-HMS 4.3	HEC-RAS 5.0.5	03/25/2020	AE w/ Floodway	Hydraulics models incorporated field measured bridge and culvert data. A culvert extends from S. South Street to Brown Street. The overland flow for this reach has been modeled separately.
Brickhouse Run Overland	At Brown Street	Approximately 150 feet upstream of S. South Street	HEC-HMS 4.3	HEC-RAS 5.0.5	03/25/2020	AE w/ Floodway	A culvert extends from S. South Street to Brown Street. The overland flow for this reach has been modeled separately.
Harrison Creek	At confluence with Appomattox River	Approximately 1,640 feet upstream of East Washington Street	HEC-HMS 4.3	HEC-RAS 5.0.5	03/25/2020	AE w/ Floodway	Hydraulic model incorporated field measured bridge and culvert data.

Table 12: Summary of Hydrologic and Hydraulic Analyses (continued)

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Lieutenant Run	At confluence with Appomattox River Navigation Channel	Approximately 1,300 feet upstream of Baylors Lane	HEC-HMS 4.3	HEC-RAS 5.0.5	03/25/2020	AE w/ Floodway	Hydraulic model incorporated field measured bridge and culvert data.
Poor Creek	At confluence with Appomattox River Navigation Channel	Approximately 320 feet upstream of Pine Oak Drive	HEC-HMS 4.3	HEC-RAS 5.0.5	03/25/2020	AE w/ Floodway	Hydraulic model incorporated field measured bridge and culvert data.
Rohoic Creek	At confluence with Appomattox River	Approximately 60 feet upstream of Boydton Plank Road	Regression Equations	HEC-RAS 5.0.5	03/25/2020	AE w/ Floodway	Hydraulic model incorporated field measured bridge and culvert data.
Unnamed Tributary 1 to Blackwater Swamp	At confluence with Blackwater Swamp	Approximately 500 feet upstream of U.S. Highway 301	HEC-HMS 4.3	HEC-RAS 5.0.5	03/25/2020	AE w/ Floodway	Hydraulic model incorporated field measured bridge and culvert data.
Unnamed Tributary 2 to Blackwater Swamp	At Norfolk Southern Railroad	Approximately 1,200 feet upstream of Norfolk Southern Railroad	HEC-HMS 4.3	N/A	03/25/2020	AE	Static elevation mapped based on the hydrologic analysis of the storage area.

Table 13: Roughness Coefficients

Flooding Source	Channel “n”	Overbank “n”
Appomattox River	0.045 - 0.055	0.045 - 0.120
Appomattox River Navigation Channel	0.045 - 0.055	0.045 - 0.120
Blackwater Swamp	0.045 - 0.050	0.040 - 0.082
Brickhouse Run	0.035 - 0.045	0.035 - 0.120
Brickhouse Run Overland Flow	0.048 - 0.100	0.048 - 0.100
Harrison Creek	0.040	0.060 - 0.100
Lieutenant Run	0.040 - 0.045	0.060 - 0.120
Poor Creek	0.040	0.055 - 0.080
Rohoic Creek	0.045 - 0.050	0.040 - 0.120

5.3 Coastal Analyses

This section is not applicable to this Flood Risk Project.

Table 14: Summary of Coastal Analyses
[Not applicable to this Flood Risk Project.]

5.3.1 Total Stillwater Elevations

This section is not applicable to this Flood Risk Project.

Figure 8: 1% Annual Chance Total Stillwater Elevations for Coastal Areas
[Not applicable to this Flood Risk Project.]

Table 15: Tide Gage Analysis Specifics
[Not applicable to this Flood Risk Project.]

5.3.2 Waves

This section is not applicable to this Flood Risk Project.

5.3.3 Coastal Erosion

This section is not applicable to this Flood Risk Project.

5.3.4 Wave Hazard Analyses

This section is not applicable to this Flood Risk Project.

Table 16: Coastal Transect Parameters

[Not applicable to this Flood Risk Project.]

Figure 9: Transect Location Map

[Not applicable to this Flood Risk Project.]

5.4 Alluvial Fan Analyses

This section is not applicable to this Flood Risk Project.

Table 17: Summary of Alluvial Fan Analyses

[Not applicable to this Flood Risk Project.]

Table 18: Results of Alluvial Fan Analyses

[Not applicable to this Flood Risk Project.]

SECTION 6.0 – MAPPING METHODS

6.1 Vertical and Horizontal Control

All FIS Reports and FIRMs are referenced to a specific vertical datum. The vertical datum provides a starting point against which flood, ground, and structure elevations can be referenced and compared. Until recently, the standard vertical datum used for newly created or revised FIS Reports and FIRMs was the National Geodetic Vertical Datum of 1929 (NGVD29). With the completion of the North American Vertical Datum of 1988 (NAVD88), many FIS Reports and FIRMs are now prepared using NAVD88 as the referenced vertical datum.

Flood elevations shown in this FIS Report and on the FIRMs are referenced to NAVD88. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between NGVD29 and NAVD88 or other datum conversion, visit the National Geodetic Survey website at www.ngs.noaa.gov.

Temporary vertical monuments are often established during the preparation of a flood hazard analysis for the purpose of establishing local vertical control. Although these monuments are not shown on the FIRM, they may be found in the archived project documentation associated with the FIS Report and the FIRMs for this community. Interested individuals may contact FEMA to access these data.

To obtain current elevation, description, and/or location information for benchmarks in the area, please visit the NGS website at www.ngs.noaa.gov.

The datum conversion locations and values that were calculated for the City of Petersburg are provided in Table 19.

Table 19: Vertical Datum Conversion

Quadrangle Name	Quadrangle Corner	Latitude	Longitude	Conversion
Carson	NE	37.125	-77.375	-1.122
Charles City	SE	37.250	-77.000	-0.990
Charles City	VA	37.250	-77.000	-0.990
Disputanta North	NE	37.250	-77.125	-1.132
Petersburg	NE	37.250	-77.375	-1.168
Petersburg	NE	37.250	-77.375	-1.168
Petersburg	NE	37.250	-77.375	-1.168
Prince George	NE	37.250	-77.250	-1.158
Prince George	NE	37.250	-77.250	-1.158
Savedge	NE	37.250	-77.000	-0.991
Templeton	NE	37.125	-77.250	-1.099
Average Conversion from NGVD29 to NAVD88 = -1.104 Feet				

Table 20: Stream-Based Vertical Datum Conversion

[Not applicable to this Flood Risk Project.]

6.2 Base Map

The FIRMs and FIS Report for this project have been produced in a digital format. The flood hazard information was converted to a Geographic Information System (GIS) format that meets FEMA's FIRM Database specifications and geographic information standards. This information is provided in a digital format so that it can be incorporated into a local GIS and be accessed more easily by the community. The FIRM Database includes most of the tabular information contained in the FIS Report in such a way that the data can be associated with pertinent spatial features. For example, the information contained in the Floodway Data table and Flood Profiles can be linked to the cross sections that are shown on the FIRMs. Additional information about the FIRM Database and its contents can be found in FEMA's *Guidelines and Standards for Flood Risk Analysis and Mapping*, www.fema.gov/media-library/resources-documents/collections/361.

Base map information shown on the FIRM was derived from the sources described in Table 21.

Table 21: Base Map Sources

Data Type	Data Provider	Data Date	Data Scale	Data Description
City of Petersburg Ortho Imagery	USDA FSA Aerial Photography Field Office	2016	N/A	NAIP Ortho Imagery for City of Petersburg, VA (USDA 2016)

Data Type	Data Provider	Data Date	Data Scale	Data Description
NHD Data	United States Geological Survey	2017	N/A	NHD data for City of Petersburg, VA (USGS 2017)
TIGER Roads and Rail Data	U.S. Census Bureau	2016	N/A	Road and Rail data for City of Petersburg, VA (U.S. Census 2016)
Virginia Administrative Boundaries	Virginia Geographic Information Network	2018	N/A	VGIN City of Petersburg, VA boundary (VGIN 2018)

6.3 Floodplain and Floodway Delineation

The FIRM shows tints, screens, and symbols to indicate floodplains and floodways as well as the locations of selected cross sections used in the hydraulic analyses and floodway computations.

For riverine flooding sources, the mapped floodplain boundaries shown on the FIRM have been delineated using the flood elevations determined at each cross section; between cross sections, the boundaries were interpolated using the topographic elevation data described in Table 22.

In cases where the 1-percent and 0.2-percent-annual-chance floodplain boundaries are close together, only the 1-percent-annual-chance floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

The floodway widths presented in this FIS Report and on the FIRM were computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. Table 2 indicates the flooding sources for which floodways have been determined. The results of the floodway computations for those flooding sources have been tabulated for selected cross sections and are shown in Table 23, “Floodway Data.”

Table 22: Summary of Topographic Elevation Data used in Mapping

Community	Flooding Source	Source for Topographic Elevation Data			
		Description	Vertical Accuracy	Horizontal Accuracy	Citation
Petersburg, City of	All flooding sources in City of Petersburg	USGS VA NRCS SANDY 2014 United States Geological Survey	18.7 cm CVA	N/A	USGS 2014

BFEs shown at cross sections on the FIRM represent the 1-percent-annual-chance water surface elevations shown on the Flood Profiles and in the Floodway Data tables in the FIS Report.

Table 23: Floodway Data

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH[3] (Feet)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET / SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	54,787	1,080/116	14,824	2.5	14.6	14.6	14.8	0.2
B[2]	58,550	247/0	4,989	4.9	15.3	15.3	15.3	0.0
C	60,934	238/0	4,368	5.6	16.3	16.3	16.6	0.3
D	63,227	527/375	7,559	5.0	17.3	17.3	17.8	0.5
E	65,531	538/489	8,640	4.3	19.5	19.5	19.9	0.4
F	66,773	248/238	2,630	14.2	26.4	26.4	27.4	1.0
G	67,046	376/229	6,696	5.6	35.2	35.2	36.1	0.9
H	69,078	570/426	6,105	6.1	38.1	38.1	38.4	0.3
I	72,340	706/307	6,650	5.6	44.5	44.5	44.6	0.1
J	74,804	655/362	6,189	6.0	50.6	50.6	50.8	0.2

[1] Feet Above Confluence With James River

[2] Cross section is outside of this community and is located in the City of Colonial Heights

[3] Total floodway width/width within jurisdiction

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, VIRGINIA

INDEPENDENT CITY

FLOODWAY DATA

FLOODING SOURCE: APPOMATTOX RIVER

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (Feet)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET / SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	1,943	361	6,040	2.2	15.3	15.3	15.4	0.1
B	4,684	272	4,029	3.4	15.8	15.8	15.8	0.0

[1] Stream Distance in Feet Above Confluence with Appomattox River

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY
CITY OF PETERSBURG, VIRGINIA
INDEPENDENT CITY

FLOODWAY DATA

FLOODING SOURCE: APPOMATTOX RIVER NAVIGATION CHANNEL

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (Feet)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET / SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	93,449	670	1,825	1.3	121.1	121.1	121.5	0.4
B	94,411	792	4,423	0.6	125.1	125.1	125.4	0.3
C	97,430	519	1,545	0.8	125.6	125.6	125.9	0.3
D	99,198	261	737	1.5	127.8	127.8	128.0	0.2
E	99,385	1,260	7,015	0.8	133.1	133.1	133.3	0.2
F	100,045	976	6,874	0.2	135.2	135.2	135.2	0.0
G	101,169	765	5,610	0.2	135.2	135.2	135.2	0.0
H	101,718	641	1,713	0.7	135.2	135.2	135.2	0.0
I	101,889	903	2,401	0.5	135.2	135.2	135.3	0.1
J	103,219	923	2,480	0.6	135.3	135.3	135.4	0.1
K	103,757	860	3,618	0.4	137.7	137.7	137.7	0.0
L	106,861	440	1,422	0.5	138.0	138.0	138.1	0.1
M	108,140	265	637	1.2	138.7	138.7	138.9	0.2
N	109,113	95	377	2.0	142.8	142.8	142.8	0.0
O	109,921	193	732	0.7	143.0	143.0	143.0	0.0
P	110,426	89	283	1.9	143.3	143.3	143.3	0.0
Q	111,247	30	103	5.1	145.8	145.8	146.0	0.2

[1] Feet Above Confluence With Blackwater River

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, VIRGINIA

INDEPENDENT CITY

FLOODWAY DATA

FLOODING SOURCE: BLACKWATER SWAMP

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (Feet)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET / SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	994	94	414	8.6	23.6	23.6	23.6	0.0
B	1,522	65	400	8.8	28.7	28.7	29.7	1.0
C	1,958	30	397	8.9	37.7	37.7	38.1	0.4
D	2,280	84	813	4.3	40.5	40.5	41.4	0.9
E	2,544	99	810	4.4	41.0	41.0	41.9	0.9
F	2,785	57	379	9.3	41.1	41.1	42.1	1.0
G	3,242	81	598	5.9	45.6	45.6	46.1	0.5
H	3,782	115	665	5.3	50.6	50.6	51.1	0.5
I	4,270	133	774	4.6	51.7	51.7	52.1	0.4
J	4,932	78	676	5.2	58.7	58.7	59.7	1.0
K	5,356	75	575	6.1	59.6	59.6	60.5	0.9
L	6,925	95	454	4.6	65.8	65.8	66.1	0.3
M	7,421	94	484	2.9	68.5	68.5	69.0	0.5
N	7,857	59	275	5.1	69.4	69.4	70.2	0.8
O	8,791	124	982	1.4	78.8	78.8	79.2	0.4
P	9,761	308	2,578	0.3	86.0	86.0	86.4	0.4
Q	10,895	185	1,079	0.8	89.0	89.0	89.4	0.4
R	11,760	45	172	1.8	89.6	89.6	89.8	0.2
S	12,573	478	1,564	0.3	94.7	94.7	94.7	0.0
T	13,291	50	159	4.4	96.5	96.5	96.6	0.1
U	13,576	65	233	3.0	98.4	98.4	99.1	0.7
V	14,259	76	214	3.3	102.6	102.6	103.5	0.9
W	14,833	65	119	6.0	107.2	107.2	107.4	0.2
X	16,226	25	122	5.8	120.5	120.5	120.8	0.3
Y	16,852	44	115	6.2	124.8	124.8	124.8	0.0

[1] Feet Above Confluence With Appomattox River

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, VIRGINIA

INDEPENDENT CITY

FLOODWAY DATA

FLOODING SOURCE: BRICKHOUSE RUN

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (Feet)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET / SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	263	190	900	1.6	61.2	61.2	61.7	0.5
B	680	145	231	6.3	63.3	63.3	63.4	0.1
C	1,060	135	562	2.6	65.1	65.1	65.6	0.5

[1] Feet Above Convergence With Brickhouse Run

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, VIRGINIA

INDEPENDENT CITY

FLOODWAY DATA

FLOODING SOURCE: BRICKHOUSE RUN OVERLAND

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH[2] (Feet)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET / SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	659	157/146	645	2.5	14.4	6.1[3]	6.3	0.2
B	1,914	55/16	214	7.6	14.7	14.7	15.5	0.8
C	2,494	31/15	221	5.5	21.0	21.0	21.2	0.2
D	2,978	250/62	2,300	0.5	25.7	25.7	26.0	0.3
E	3,694	305/133	2,032	0.6	25.7	25.7	26.1	0.4
F	4,240	245/209	1,131	0.9	25.9	25.9	26.2	0.3
G	4,711	218/32	1,205	0.8	31.2	31.2	31.2	0.0
H	5,815	130/12	453	2.2	32.7	32.7	32.8	0.1
I	6,536	80/13	285	3.5	36.1	36.1	36.9	0.8
J	7,200	151/0	447	2.2	38.6	38.6	39.2	0.6

[1] Feet Above Confluence with Appomattox River

[2] Total floodway width/width within jurisdiction

[3] Elevation Computed Without Consideration of Backwater Effects from Appomattox River

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, VIRGINIA

INDEPENDENT CITY

FLOODWAY DATA

FLOODING SOURCE: HARRISON CREEK

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (Feet)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET / SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	484	180	1,416	2.9	17.9	17.9	17.9	0.0
B	654	192	1,389	2.9	18.1	18.1	18.2	0.1
C	1,171	114	919	4.4	18.6	18.6	18.7	0.1
D	2,580	103	1,122	3.3	27.3	27.3	27.5	0.2
E	2,933	145	1,625	2.3	27.8	27.8	28.1	0.3
F	4,620	160	493	6.5	30.1	30.1	30.2	0.1
G	5,073	105	682	4.7	33.3	33.3	34.1	0.8
H	5,443	28	225	14.3	35.2	35.2	35.3	0.1
I	6,176	64	417	7.7	44.8	44.8	45.1	0.3
J	7,222	72	478	6.7	49.2	49.2	49.4	0.2
K	7,557	111	762	4.2	51.5	51.5	52.4	0.9
L	8,963	108	428	5.1	54.4	54.4	55.0	0.6
M	9,852	441	5,207	2.0	67.8	67.8	68.3	0.5
N	10,739	944	7,962	0.3	68.4	68.4	68.6	0.2
O	11,886	322	1,389	1.5	68.8	68.8	69.1	0.3
P	12,431	276	699	3.4	70.8	70.8	70.9	0.1
Q	13,346	179	850	1.6	83.7	83.7	83.7	0.0
R	14,078	125	585	1.9	83.8	83.8	83.8	0.0
S	14,815	29	139	8.0	86.0	86.0	86.1	0.1
T	15,259	55	471	2.3	96.8	96.8	97.3	0.5
U	15,983	55	244	4.5	98.2	98.2	98.4	0.2
V	16,517	27	111	10.0	100.9	100.9	100.9	0.0

[1] Feet Above Confluence With Appomattox River Navigation Channel

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, VIRGINIA

INDEPENDENT CITY

FLOODWAY DATA

FLOODING SOURCE: LIEUTENANT RUN

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (Feet)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET / SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	546	382	172	10.2	15.3	5.6[2]	6.0	0.4
B	1,066	190	3,341	0.5	25.9	25.9	25.9	0.0
C	1,613	232	3,713	0.4	25.9	25.9	25.9	0.0
D	2,511	287	2,993	0.5	25.9	25.9	25.9	0.0
E	3,206	37	155	10.2	26.0	26.0	26.0	0.0
F	4,949	129	275	4.9	31.8	31.8	31.9	0.1
G	5,866	45	250	5.4	38.2	38.2	38.2	0.0
H	6,456	55	173	7.9	40.9	40.9	41.0	0.1

[1] Feet Above Confluence With Appomattox River Navigation Channel

[2] Computed Without Consideration of Backwater Effects From Appomattox River Navigation Channel

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, VIRGINIA

INDEPENDENT CITY

FLOODWAY DATA

FLOODING SOURCE: POOR CREEK

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (Feet)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET / SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	557	120	492	8.7	50.7	46.0[3]	46.5	0.5
B	872	81	2,283	1.9	73.2	73.2	73.2	0.0
C	1,582	128	2,193	1.9	73.3	73.3	73.3	0.0
D	2,004	137	1,186	3.6	74.0	74.0	74.0	0.0
E	2,670	110	983	4.3	74.6	74.6	74.7	0.1
F	3,371	88	817	5.2	75.8	75.8	75.8	0.0
G	3,795	79	640	6.7	78.1	78.1	78.2	0.1
H	4,248	140/0[2]	1,338	3.2	80.7	80.7	80.7	0.0
I	5,845	80/0[2]	695	6.1	82.7	82.7	82.9	0.2
J	7,728	120/0[2]	573	4.2	86.3	86.3	86.8	0.5
K	9,454	137/0[2]	717	3.4	92.7	92.7	92.8	0.1
L	10,349	97/0[2]	905	2.7	98.9	98.9	99.6	0.7
M	11,356	159	1,150	1.9	101.9	101.9	102.2	0.3
N	12,945	50	322	6.3	105.3	105.3	105.5	0.2
O	13,269	118	907	2.2	106.9	106.9	107.2	0.3

[1] Feet Above Confluence With Appomattox River

[2] Total floodway width/width within jurisdiction

[3] Elevation Computed Without Consideration of Backwater Effects From Appomattox River

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, VIRGINIA

INDEPENDENT CITY

FLOODWAY DATA

FLOODING SOURCE: ROHOIC CREEK

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (Feet)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET / SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	1,766	322	844	1.8	139.4	139.4	139.5	0.1
B	3,580	98	381	3.2	143.6	143.6	143.7	0.1
C	4,460	180	1,111	1.1	146.4	146.4	147.3	0.9

[1] Feet above Confluence With Blackwater Swamp

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY
CITY OF PETERSBURG, VIRGINIA
INDEPENDENT CITY

FLOODWAY DATA

FLOODING SOURCE: UNNAMED TRIBUTARY 1 TO BLACKWATER SWAMP

Table 24: Flood Hazard and Non-Encroachment Data for Selected Streams

[Not applicable to this Flood Risk Project.]

6.4 Coastal Flood Hazard Mapping

This section is not applicable to this Flood Risk Project.

Table 25: Summary of Coastal Transect Mapping Considerations

[Not applicable to this Flood Risk Project.]

6.5 FIRM Revisions

This FIS Report and the FIRM are based on the most up-to-date information available to FEMA at the time of its publication; however, flood hazard conditions change over time. Communities or private parties may request flood map revisions at any time. Certain types of requests require submission of supporting data. FEMA may also initiate a revision. Revisions may take several forms, including Letters of Map Amendment (LOMAs), Letters of Map Revision Based on Fill (LOMR-Fs), Letters of Map Revision (LOMRs) (referred to collectively as Letters of Map Change (LOMCs)), Physical Map Revisions (PMRs), and FEMA-contracted restudies. These types of revisions are further described below. Some of these types of revisions do not result in the republishing of the FIS Report. To assure that any user is aware of all revisions, it is advisable to contact the community repository of flood-hazard data (shown in Table 30, "Map Repositories").

6.5.1 Letters of Map Amendment

A LOMA is an official revision by letter to an effective NFIP map. A LOMA results from an administrative process that involves the review of scientific or technical data submitted by the owner or lessee of property who believes the property has incorrectly been included in a designated SFHA. A LOMA amends the currently effective FEMA map and establishes that a specific property is not located in a SFHA.

To obtain an application for a LOMA, visit www.fema.gov/letter-map-amendment-loma and download the form "MT-1 Application Forms and Instructions for Conditional and Final Letters of Map Amendment and Letters of Map Revision Based on Fill". Visit the "Flood Map-Related Fees" section to determine the cost, if any, of applying for a LOMA.

FEMA offers a tutorial on how to apply for a LOMA. The LOMA Tutorial Series can be accessed at www.fema.gov/online-tutorials.

For more information about how to apply for a LOMA, call the FEMA Map Information eXchange; toll free, at 1-877-FEMA MAP (1-877-336-2627).

6.5.2 Letters of Map Revision Based on Fill

A LOMR-F is an official revision by letter to an effective NFIP map. A LOMR-F states FEMA's determination concerning whether a structure or parcel has been elevated on fill above the base flood elevation and is, therefore, excluded from the SFHA.

Information about obtaining an application for a LOMR-F can be obtained in the same manner as that for a LOMA, by visiting www.fema.gov/letter-map-amendment-loma for the "MT-1 Application Forms and Instructions for Conditional and Final Letters of Map Amendment and Letters of Map Revision Based on Fill" or by calling the FEMA Map Information eXchange, toll free, at 1-877-FEMA MAP (1-877-336-2627). Fees for applying for a LOMR-F, if any, are listed in the "Flood Map-Related Fees" section.

A tutorial for LOMR-F is available at www.fema.gov/online-tutorials.

6.5.3 Letters of Map Revision

A LOMR is an official revision to the currently effective FEMA map. It is used to change flood zones, floodplain and floodway delineations, flood elevations and planimetric features. All requests for LOMRs should be made to FEMA through the chief executive officer of the community, since it is the community that must adopt any changes and revisions to the map. If the request for a LOMR is not submitted through the chief executive officer of the community, evidence must be submitted that the community has been notified of the request.

To obtain an application for a LOMR, visit www.fema.gov/media-library/assets/documents/1343 and download the form "MT-2 Application Forms and Instructions for Conditional Letters of Map Revision and Letters of Map Revision". Visit the "Flood Map-Related Fees" section to determine the cost of applying for a LOMR. For more information about how to apply for a LOMR, call the FEMA Map Information eXchange; toll free, at 1-877-FEMA MAP (1-877-336-2627) to speak to a Map Specialist.

Previously issued mappable LOMCs (including LOMRs) that have been incorporated into the City of Petersburg FIRM are listed in Table 26.

Table 26: Incorporated Letters of Map Change

[Not applicable to this Flood Risk Project.]

6.5.4 Physical Map Revisions

A Physical Map Revisions (PMR) is an official republication of a community's NFIP map to effect changes to base flood elevations, floodplain boundary delineations, regulatory floodways and planimetric features. These changes typically occur as a result of structural works or improvements, annexations resulting in additional flood hazard areas or correction to base flood elevations or SFHAs.

The community's chief executive officer must submit scientific and technical data to FEMA to support the request for a PMR. The data will be analyzed and the map will be revised if warranted. The community is provided with copies of the revised information and is afforded a review period. When the base flood elevations are changed, a 90-day appeal period is provided. A 6-month adoption period for formal approval of the revised map(s) is also provided.

For more information about the PMR process, please visit www.fema.gov and visit the "Flood Map Revision Processes" section.

6.5.5 Contracted Restudies

The NFIP provides for a periodic review and restudy of flood hazards within a given community. FEMA accomplishes this through a national watershed-based mapping needs assessment strategy, known as the Coordinated Needs Management Strategy (CNMS). The CNMS is used by FEMA to assign priorities and allocate funding for new flood hazard analyses used to update the FIS Report and FIRM. The goal of CNMS is to define the validity of the engineering study data within a mapped inventory. The CNMS is used to track the assessment process, document engineering gaps and their resolution, and aid in prioritization for using flood risk as a key factor for areas identified for flood map updates. Visit www.fema.gov to learn more about the CNMS or contact the FEMA Regional Office listed in Section 8 of this FIS Report.

6.5.6 Community Map History

The current FIRM presents flooding information for the entire geographic area of the City of Petersburg. Previously, separate FIRMs, Flood Hazard Boundary Maps (FHBMs) and/or Flood Boundary and Floodway Maps (FBFMs) may have been prepared for the community that had identified SFHAs. Current and historical data relating to the maps prepared for the project area are presented in Table 27, "Community Map History." A description of each of the column headings and the source of the date is also listed below.

- *Community Name* includes communities falling within the geographic area shown on the FIRM, including those that fall on the boundary line, nonparticipating communities, and communities with maps that have been rescinded. Communities with No Special Flood Hazards are indicated by a footnote. If all maps (FHBM, FBFM, and FIRM) were rescinded for a community, it is not listed in this table unless SFHAs have been identified in this community.

- *Initial Identification Date (First NFIP Map Published)* is the date of the first NFIP map that identified flood hazards in the community. If the FHBM has been converted to a FIRM, the initial FHBM date is shown. If the community has never been mapped, the upcoming effective date or "pending" (for Preliminary FIS Reports) is shown. If the community is listed in Table 27 but not identified on the map, the community is treated as if it were unmapped.

- *Initial FHBM Effective Date* is the effective date of the first FHBM. This date may be the same date as the Initial NFIP Map Date.

- *FHBM Revision Date(s)* is the date(s) that the FHBM was revised, if applicable.

- *Initial FIRM Effective Date* is the date of the first effective FIRM for the community.

- *FIRM Revision Date(s)* is the date(s) the FIRM was revised, if applicable. This is the revised date that is shown on the FIRM panel, if applicable. As single-jurisdiction studies are completed or revised, the community should have its FIRM dates updated accordingly to reflect the date of the single-jurisdiction study. Once the FIRMs exist in single-jurisdiction format, as PMRs of FIRM panels within the county are completed, the FIRM Revision Dates in the table for each community affected by the PMR are updated with the date of the PMR, even if the PMR did not revise all the panels within that community.

The initial effective date for the City of Petersburg FIRMs was 03/16/1981.

Table 27: Community Map History

Community Name	Initial Identification Date	Initial FHBM Effective Date	FHBM Revision Date(s)	Initial FIRM Effective Date	FIRM Revision Date(s)
Petersburg, City of	05/31/1974	05/31/1974	07/30/1976	03/16/1981	12/15/2022 02/04/2011

SECTION 7.0 – CONTRACTED STUDIES AND COMMUNITY COORDINATION

7.1 Contracted Studies

Table 28 provides a summary of the contracted studies, by flooding source, that are included in this FIS Report.

Table 28: Summary of Contracted Studies Included in this FIS Report

Flooding Source	FIS Report Dated	Contractor	Number	Work Completed Date	Affected Communities
All Zone A Streams and Tributaries in HUC 02080207	12/15/2022	STARR II	HSFE60-15-D-0005	07/31/2019	Petersburg, City of
All Zone A Streams and Tributaries in HUC 03010202	12/15/2022	STARR II	HSFE60-15-D-0005	07/31/2019	Petersburg, City of
Appomattox River	12/15/2022	STARR II	HSFE60-15-D-0005	03/25/2020	Petersburg, City of
Appomattox River Navigation Channel	12/15/2022	STARR II	HSFE60-15-D-0005	03/25/2020	Petersburg, City of
Blackwater Swamp	12/15/2022	STARR II	HSFE60-15-D-0005	03/25/2020	Petersburg, City of
Brickhouse Run	12/15/2022	STARR II	HSFE60-15-D-0005	03/25/2020	Petersburg, City of
Brickhouse Run Overland	12/15/2022	STARR II	HSFE60-15-D-0005	03/25/2020	Petersburg, City of
Harrison Creek	12/15/2022	STARR II	HSFE60-15-D-0005	03/25/2020	Petersburg, City of
Lieutenant Run	12/15/2022	STARR II	HSFE60-15-D-0005	03/25/2020	Petersburg, City of
Poor Creek	12/15/2022	STARR II	HSFE60-15-D-0005	03/25/2020	Petersburg, City of

Table 28: Summary of Contracted Studies Included in this FIS Report (continued)

Flooding Source	FIS Report Dated	Contractor	Number	Work Completed Date	Affected Communities
Rohoic Creek	12/15/2022	STARR II	HSFE60-15-D-0005	03/25/2020	Petersburg, City of
Unnamed Tributary 1 to Blackwater Swamp	12/15/2022	STARR II	HSFE60-15-D-0005	03/25/2020	Petersburg, City of

7.2 Community Meetings

The dates of the community meetings held for this Flood Risk Project and previous Flood Risk Projects are shown in Table 29. These meetings may have previously been referred to by a variety of names (Community Coordination Officer (CCO), Scoping, Discovery, etc.), but all meetings represent opportunities for FEMA, community officials, study contractors, and other invited guests to discuss the planning for and results of the project.

Table 29: Community Meetings

Community	FIS Report Dated	Date of Meeting	Meeting Type	Attended By
Petersburg, City of	12/15/2022	08/25/2016	Project Discovery	FEMA, Compass, City of Petersburg.
		04/28/2020	Flood Risk Review	FEMA, STARR II, City of Petersburg, Virginia Department of Conservation and Recreation, Crater Planning District Commission.
		03/25/2021	Final CCO Meeting	FEMA, STARR II, City of Petersburg, Virginia Department of Conservation and Recreation, Crater Planning District Commission.

SECTION 8.0 – ADDITIONAL INFORMATION

Information concerning the pertinent data used in the preparation of this FIS Report can be obtained by submitting an order with any required payment to the FEMA Engineering Library. For more information on this process, see www.fema.gov.

Table 30 is a list of the locations where FIRMs for the City of Petersburg can be viewed. Please note that the maps at these locations are for reference only and are not for distribution. Also, please note that only the maps for the community listed in the table are available at that particular repository. A user may need to visit another repository to view maps from an adjacent community.

Table 30: Map Repositories

Community	Address	City	State	Zip Code
Petersburg, City of	City Hall 135 North Union Street	Petersburg	VA	23803

The National Flood Hazard Layer (NFHL) dataset is a compilation of effective FIRM Databases and LOMCs. Together they create a GIS data layer for a State or Territory. The NFHL is updated as studies become effective and extracts are made available to the public monthly. NFHL data can be viewed or ordered from the website shown in Table 31.

Table 31 contains useful contact information regarding the FIS Report, the FIRM, and other relevant flood hazard and GIS data. In addition, information about the State NFIP Coordinator and GIS Coordinator is shown in this table. At the request of FEMA, each Governor has designated an agency of State or territorial government to coordinate that State's or territory's NFIP activities. These agencies often assist communities in developing and adopting necessary floodplain management measures. State GIS Coordinators are knowledgeable about the availability and location of State and local GIS data in their state.

Table 31: Additional Information

FEMA and the NFIP	
FEMA and FEMA Engineering Library website	www.fema.gov/national-flood-insurance-program-flood-hazard-mapping/engineering-library
NFIP website	www.fema.gov/national-flood-insurance-program
NFHL Dataset	msc.fema.gov
FEMA Region III	Federal Emergency Management Agency One Independence Mall 615 Chestnut Street, 6th Floor Philadelphia, PA 19106-4404 (215) 931-5500
Other Federal Agencies	
USGS website	www.usgs.gov
Hydraulic Engineering Center website	www.hec.usace.army.mil
State Agencies and Organizations	
State NFIP Coordinator	Angela Davis, Floodplain Program Planner Virginia Department of Conservation & Recreation 600 East Main Street, 24th Floor Richmond, V.A. 23219 Phone: (804) 371-6135 angela.davis@dcr.virginia.gov
State GIS Coordinator	Stuart Blankenship, Geospatial Projects Manager Integrated Services Program VITA, Virginia Geographic Information Network (VGIN) 11751 Meadowville Lane Chester, VA 23836 Phone: (804) 416-6208 stuart.blankship@vita.virginia.gov

SECTION 9.0 – BIBLIOGRAPHY AND REFERENCES

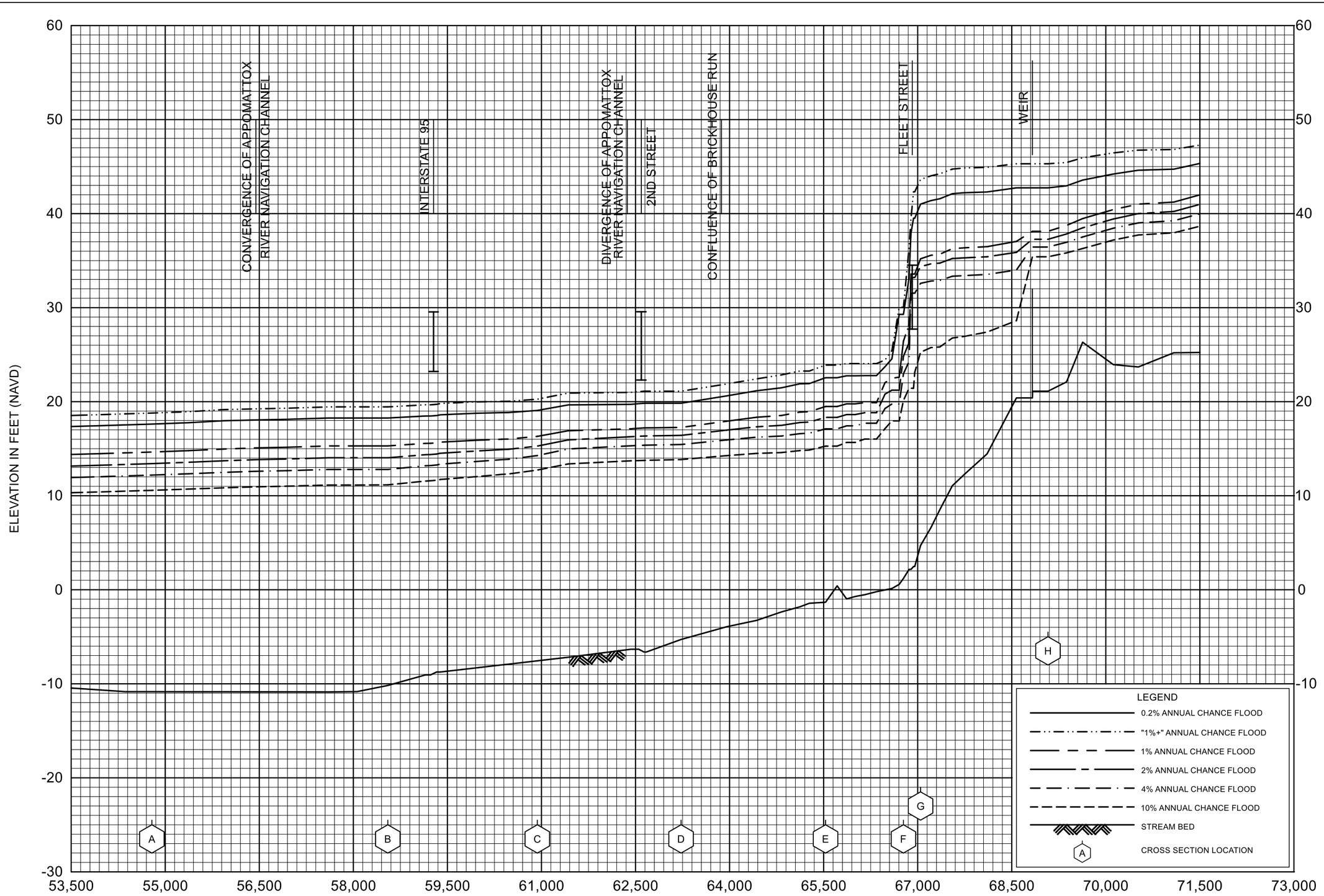
Table 32 includes sources used in the preparation of and cited in this FIS Report as well as additional studies that have been conducted in the study area.

Table 32: Bibliography and References

Citation in this FIS	Publisher/ Issuer	*Publication Title,* "Article," Volume, Number, etc.	Author/Editor	Place of Publication	Publication Date/ Date of Issuance	Link
FEMA 2011	Federal Emergency Management Agency	National Flood Hazard Layer Data	Federal Emergency Management Agency	Washington, D.C.	02/04/2011	https://msc.fema.gov/portal
FEMA 2018	Federal Emergency Management Agency	Lower James Watershed Hydrology Study	STARR II	Washington, D.C.	08/01/2018	http://hazards.fema.gov
FEMA 2019a	Federal Emergency Management Agency	Lower James: Brickhouse Run Hydrology Study	STARR II	Washington, D.C.	12/01/2019	http://hazards.fema.gov
FEMA 2019b	Federal Emergency Management Agency	Lower James: Lieutenant Hydrology Study	STARR II	Washington, D.C.	12/01/2019	http://hazards.fema.gov
FEMA 2019c	Federal Emergency Management Agency	Lower James: Poor Creek Hydrology Study	STARR II	Washington, D.C.	12/01/2019	http://hazards.fema.gov
FEMA 2019d	Federal Emergency Management Agency	Hydrology: Prince Georges County, Lower James	STARR II	Washington, D.C.	12/01/2019	http://hazards.fema.gov
FEMA 2020a	Federal Emergency Management Agency	Lower James Watershed Hydraulic Analysis	STARR II	Washington, D.C.	03/25/2020	http://hazards.fema.gov

Citation in this FIS	Publisher/ Issuer	*Publication Title,* "Article," Volume, Number, etc.	Author/Editor	Place of Publication	Publication Date/ Date of Issuance	Link
USACE 2005	United States Army Corps of Engineers	Hec-GeoRAS; GIS Tools for Support of HEC-RAS using ArcGIS	Ackerman, C.T.	Davis, C.A.	01/01/2005	
USACE 2016	US Army Corps of Engineers, Hydrologic Engineering Center	*HEC-RAS River Analysis System, Version 5.0.5*	US Army Corps of Engineers	Davis, CA	02/1/2016	
USACE 2018	United States Army Corps of Engineers	HEC-HMS 4.3	USACE, Hydrologic Engineering Center	Davis, C.A.	09/01/2018	
US Census 2016	U.S. Census Bureau	TIGER Roads and Rail Data	U.S. Census Bureau	Washington, D.C.	08/19/2016	https://www.census.gov/geo/maps-data/data/tiger-line.html
USDA 2016	USDA FSA Aerial Photography Field Office	City of Petersburg Ortho Imagery	USDA FSA Aerial Photography Field Office	Salt Lake City, U.T.	09/15/2016	https://nrcs.app.box.com/v/naip
USGS 2011	United States Geological Survey	U.S. Geological Survey Scientific Investigations Report 2011 – 5144: Peak Flow Characteristics of Virginia Streams	Samuel H. Austin, Jennifer L. Krstolic, and Ute Wiegand	Reston, V.A.	01/01/2011	https://pubs.usgs.gov/sir/2011/5144/
USGS 2014	United States Geological Survey	USGS VA NRCS SANDY 2014	United States Geological Survey	Reston, V.A.	08/27/2015	
USGS 2017	United States Geological Survey	NHD Data	United States Geological Survey	Reston, V.A.	04/26/2017	https://viewer.nationalmap.gov/basic/?basemap=b1&category=nhd&title=NHD%20View

Citation in this FIS	Publisher/ Issuer	*Publication Title,* "Article," Volume, Number, etc.	Author/Editor	Place of Publication	Publication Date/ Date of Issuance	Link
VGIN 2018	Virginia Geographic Information Network	Virginia Administrative Boundaries	Virginia Geographic Information Network	Chester, V.A.	01/01/2018	https://vgin.maps.arcgis.com/home/item.html?id=777890ecdb634d18a02eec604db522c6



FLOOD PROFILES

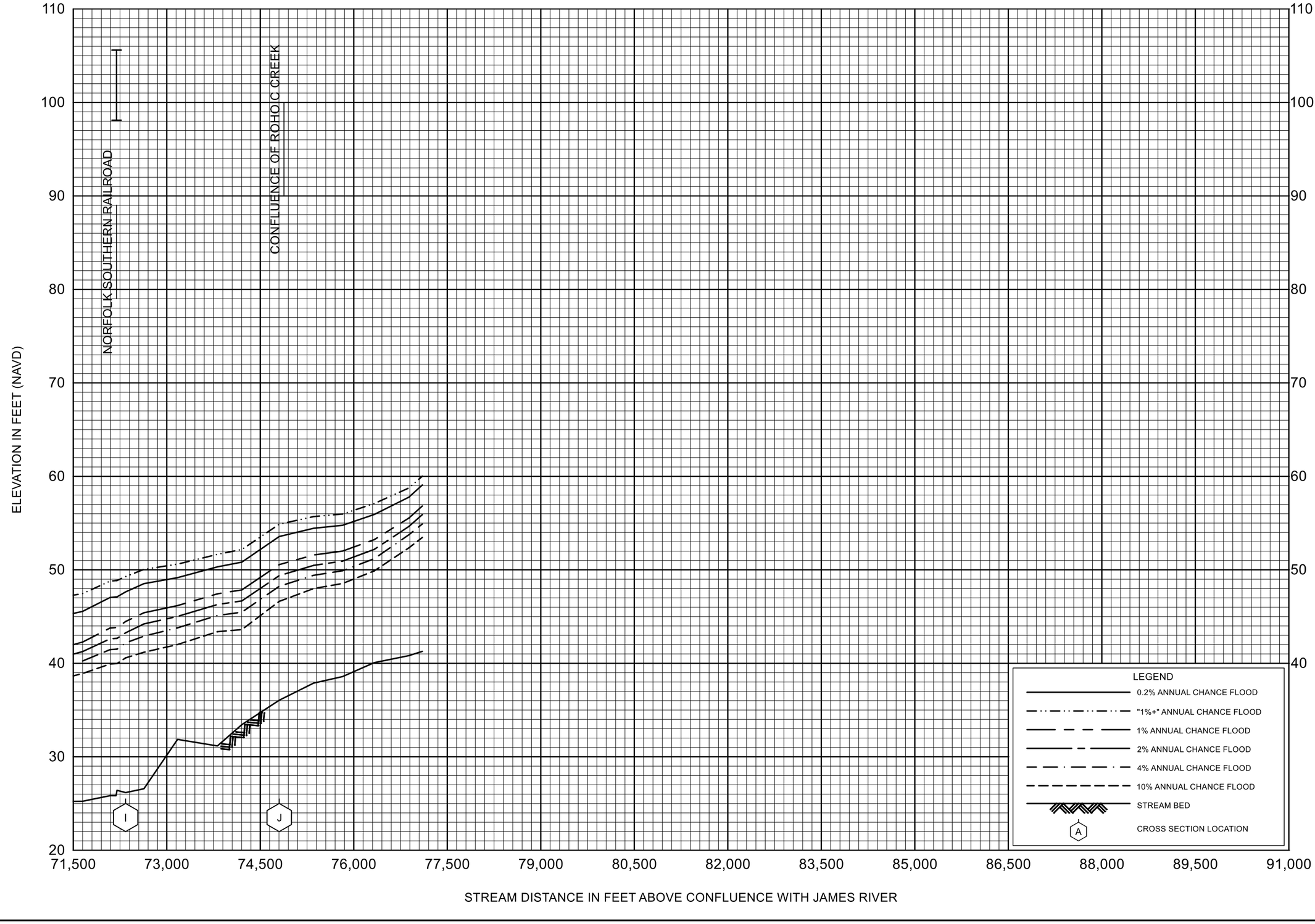
APPOMATTOX RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, VA

INDEPENDENT CITY

01P



FLOOD PROFILES

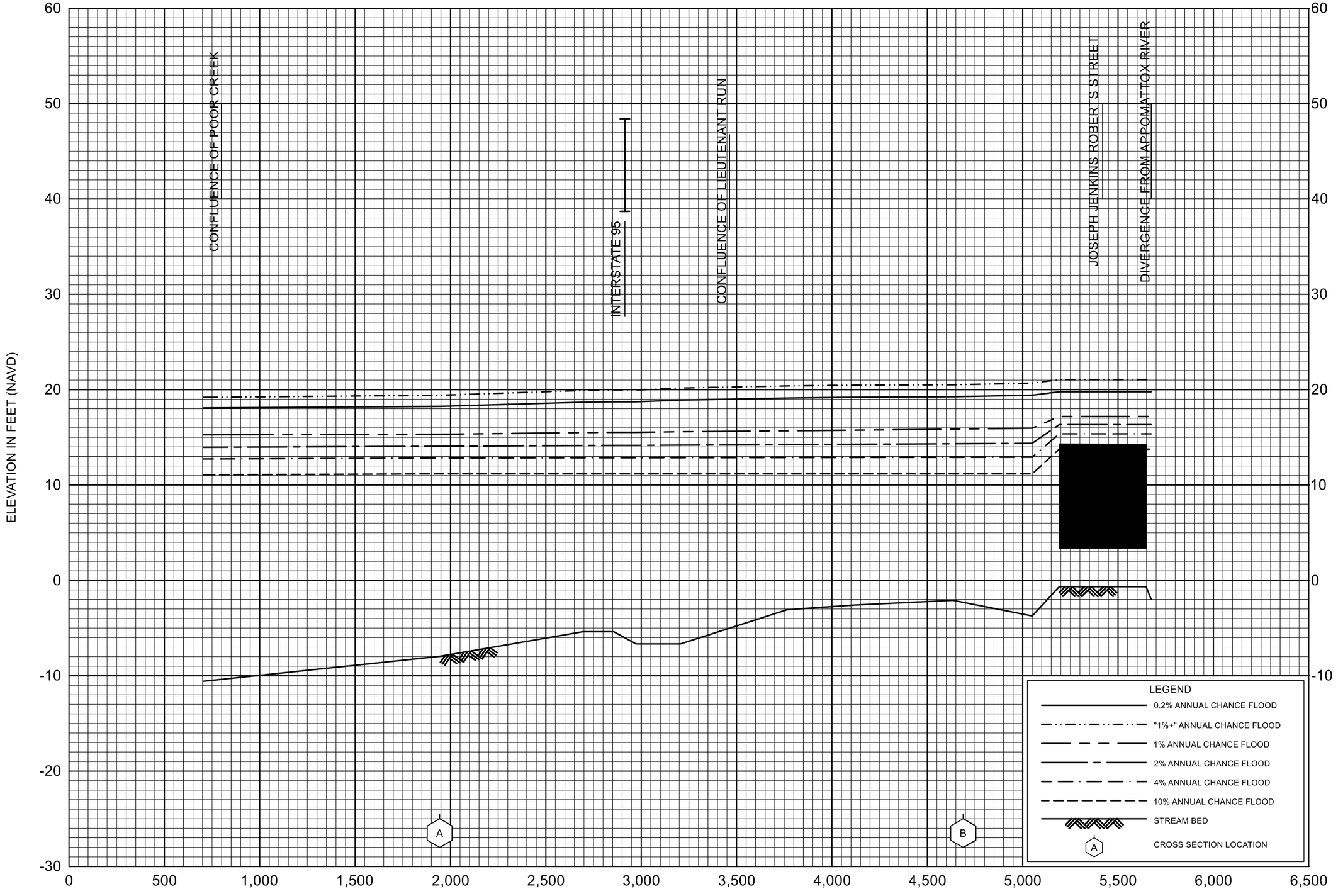
APPOMATTOX RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, VA

INDEPENDENT CITY

02P



FLOOD PROFILES

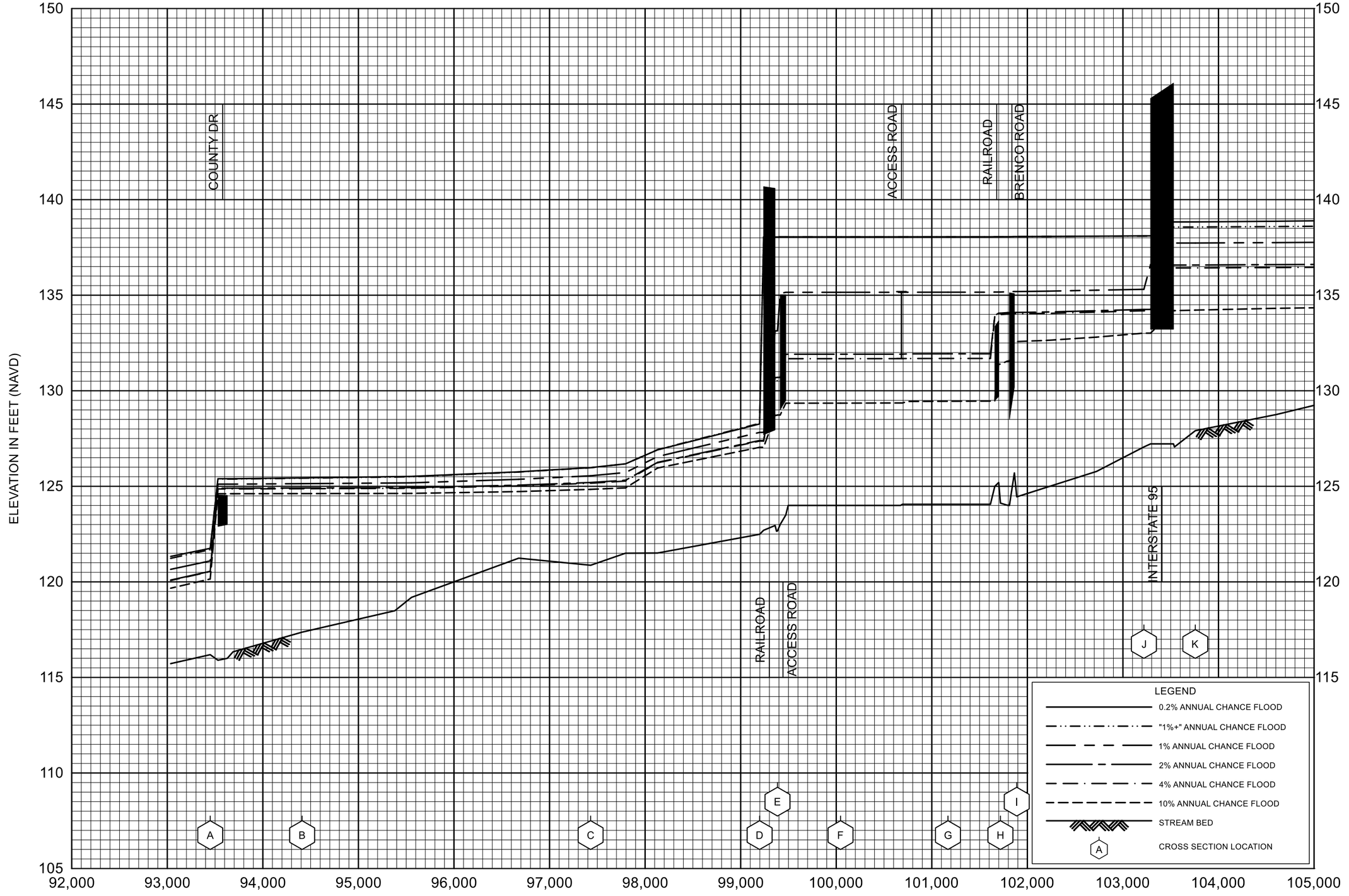
APPOMATTOX RIVER NAVIGATION CHANNEL

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, VA

INDEPENDENT CITY

03P



FLOOD PROFILES

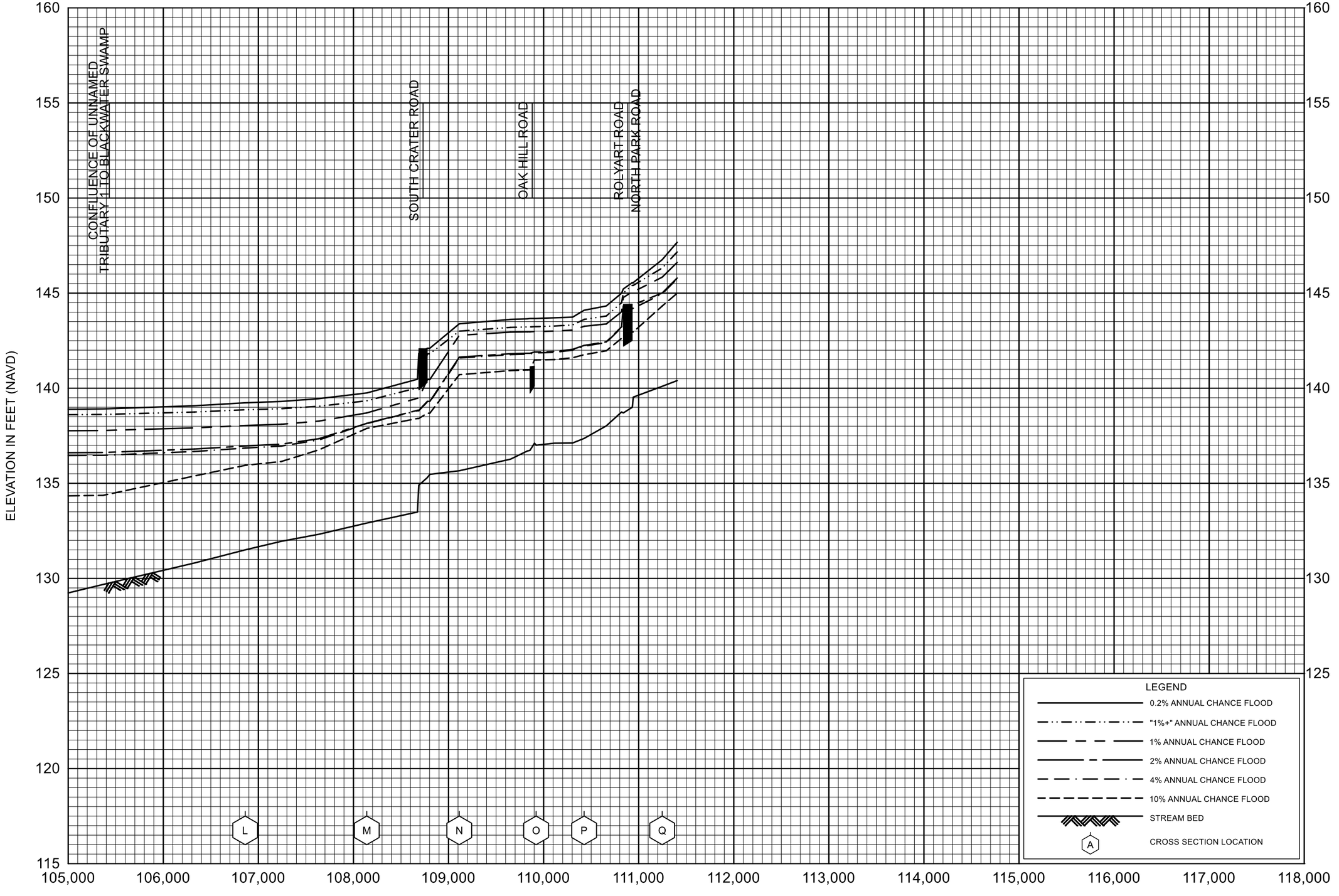
BLACKWATER SWAMP

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, VA

INDEPENDENT CITY

04P



FLOOD PROFILES

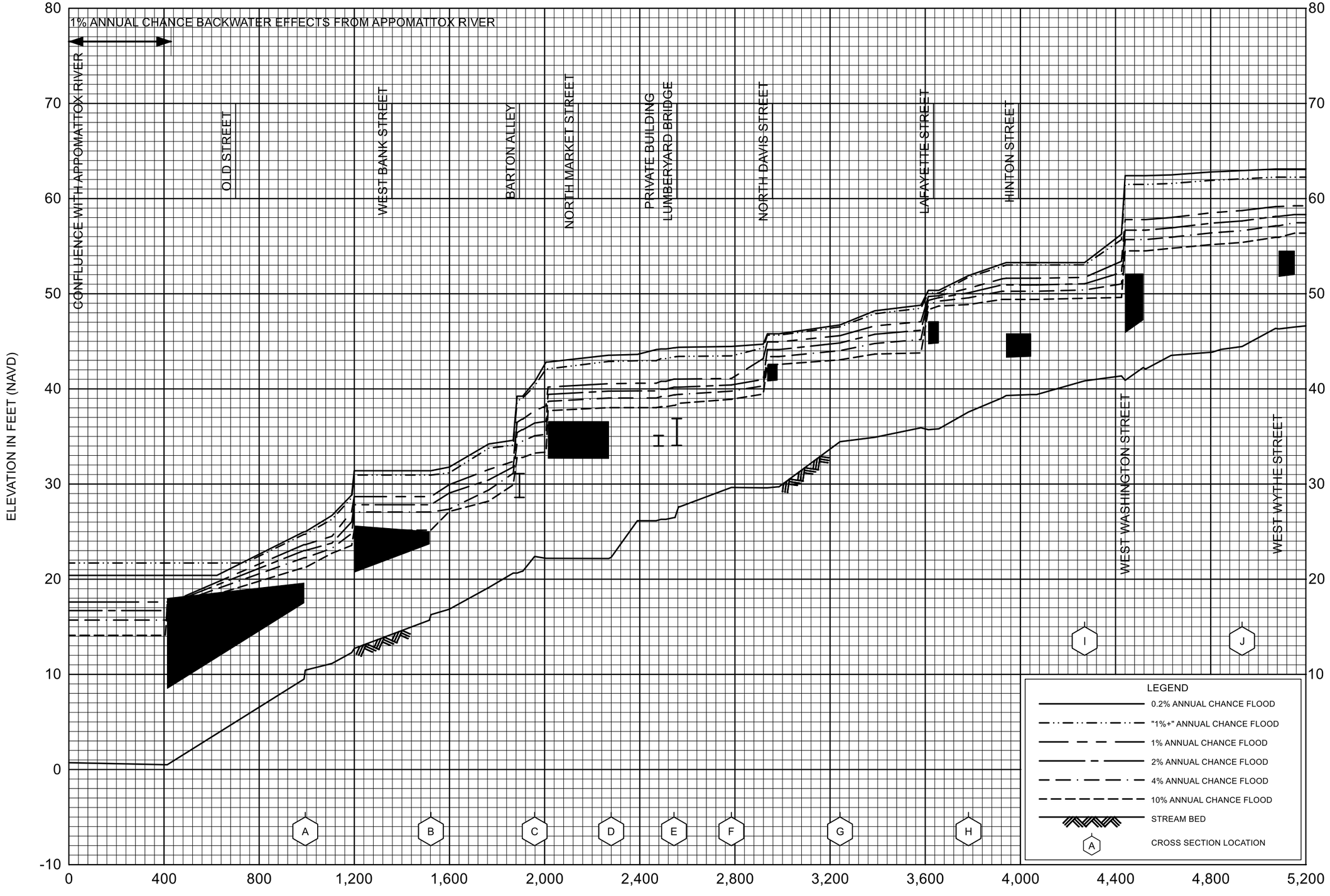
BLACKWATER SWAMP

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, VA

INDEPENDENT CITY

05P



FLOOD PROFILES

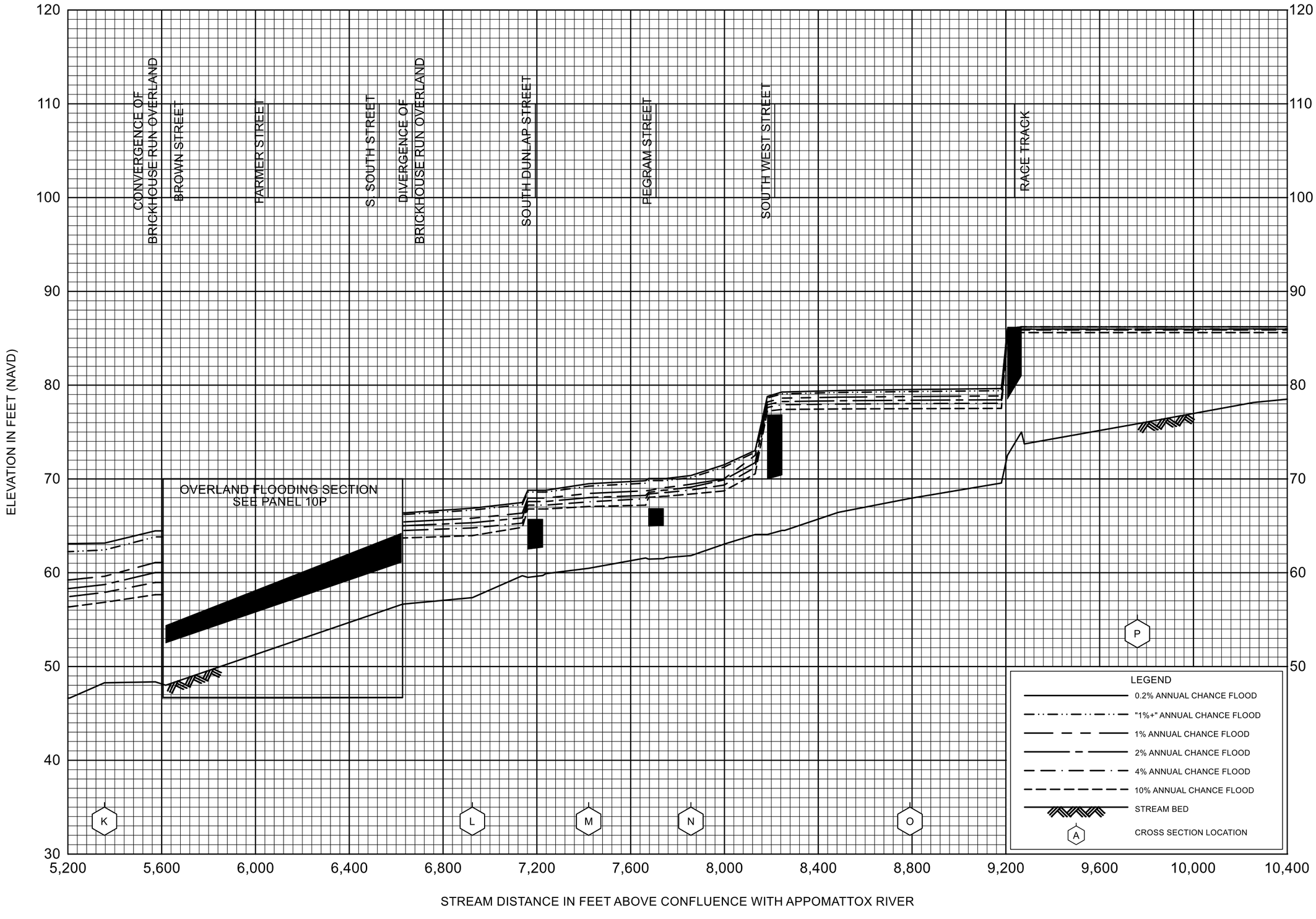
BRICKHOUSE RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, VA

INDEPENDENT CITY

06P



FLOOD PROFILES

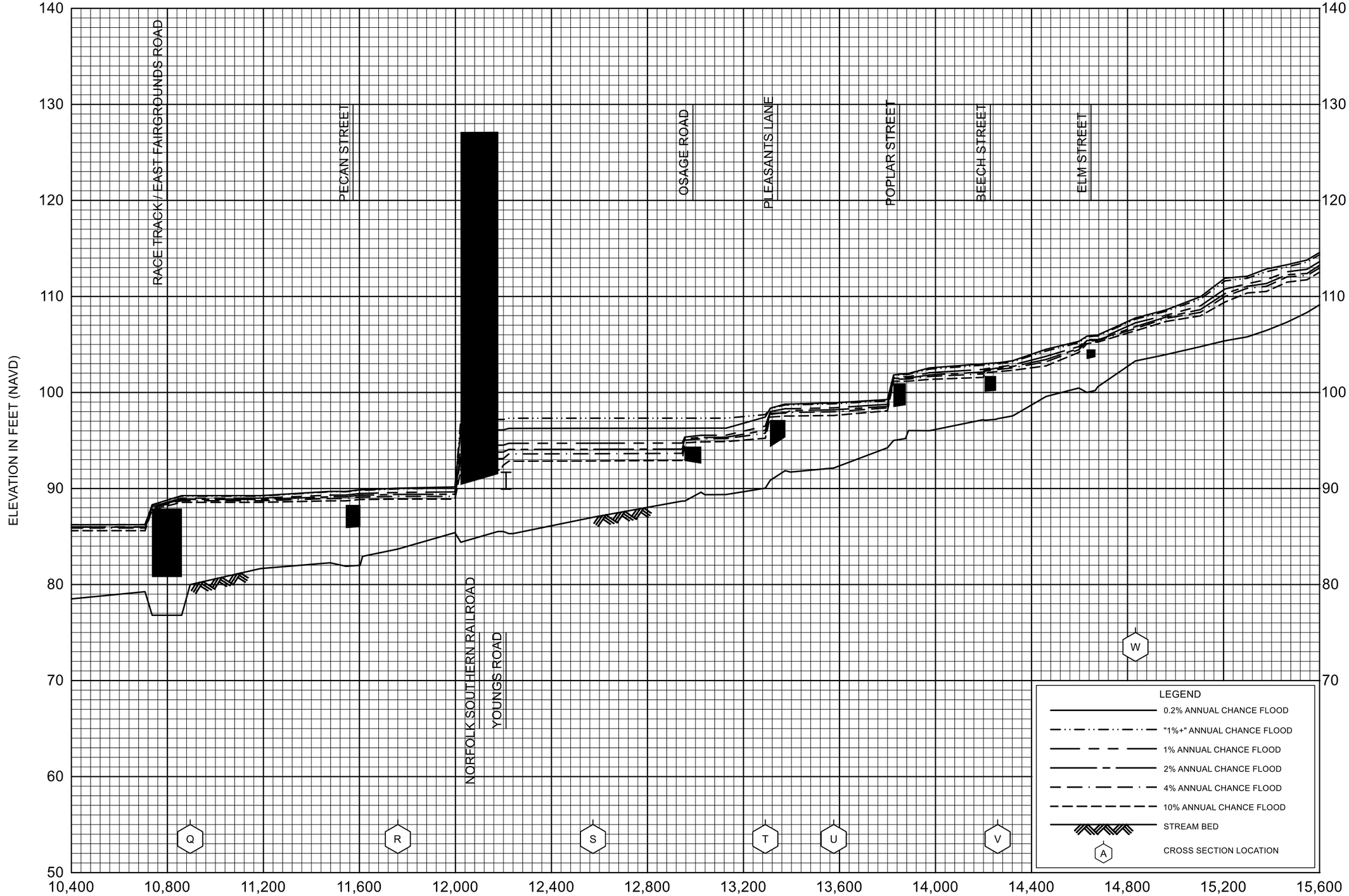
BRICKHOUSE RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, VA

INDEPENDENT CITY

07P



FLOOD PROFILES

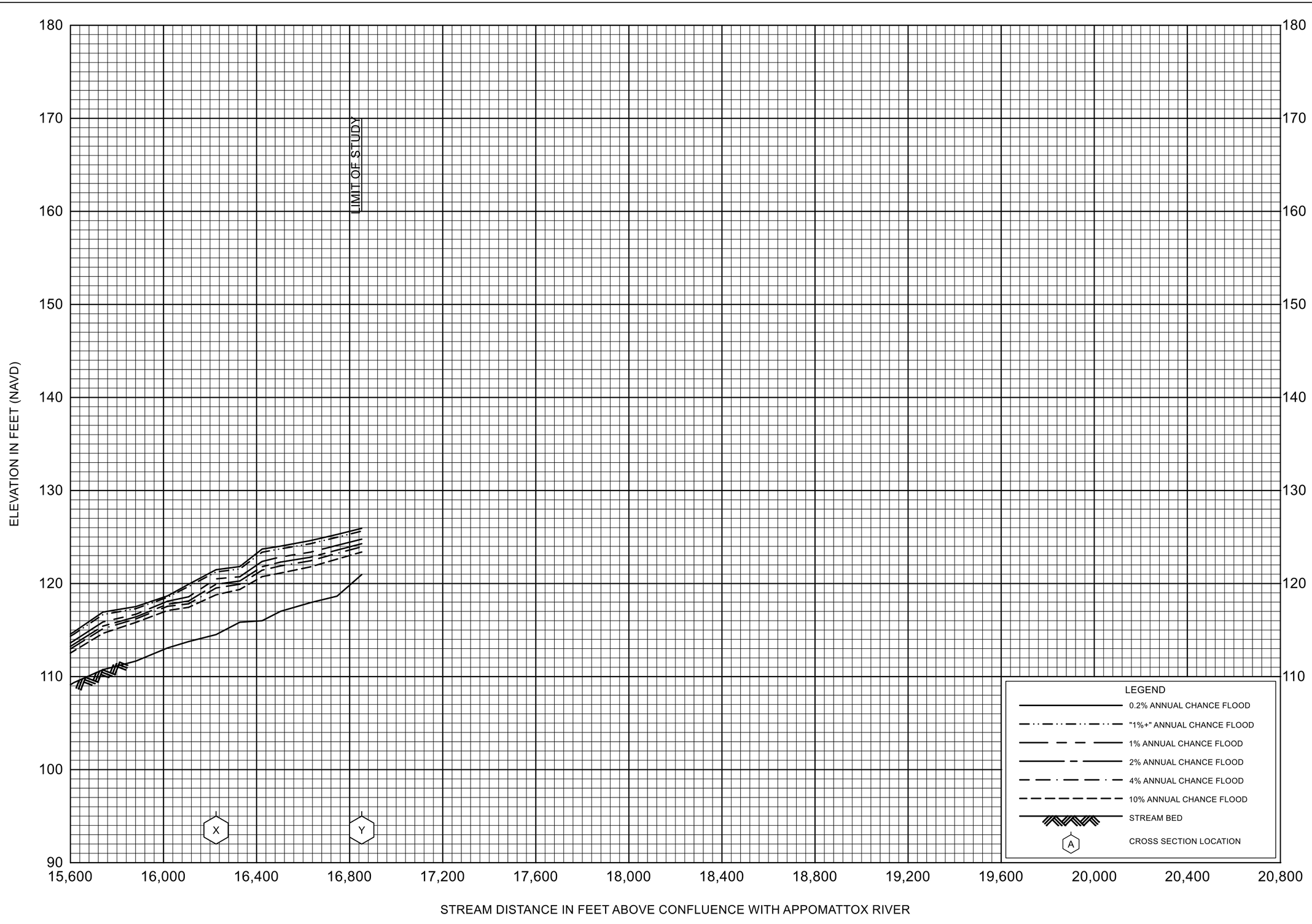
BRICKHOUSE RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, VA

INDEPENDENT CITY

08P



FLOOD PROFILES

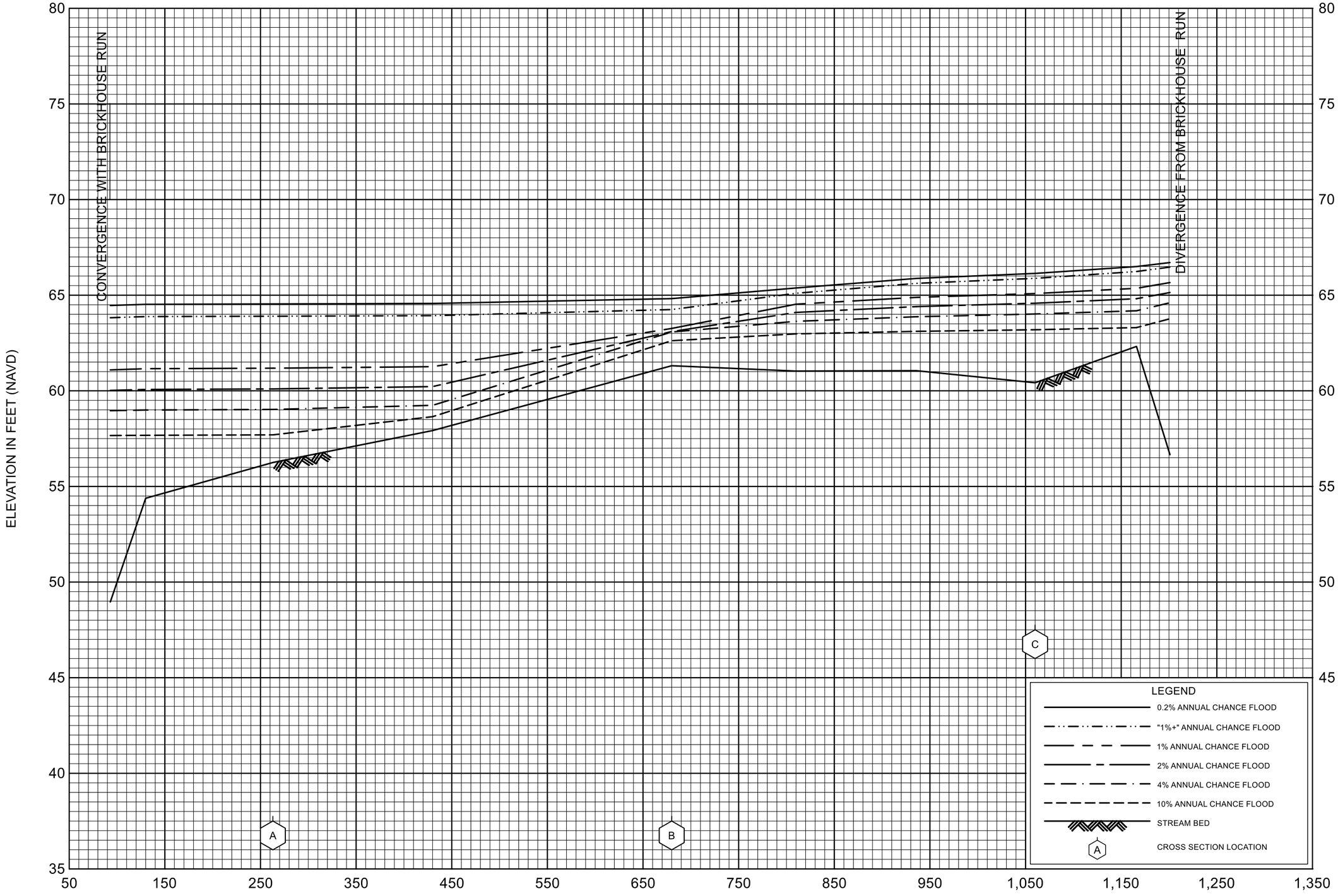
BRICKHOUSE RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, VA

INDEPENDENT CITY

09P



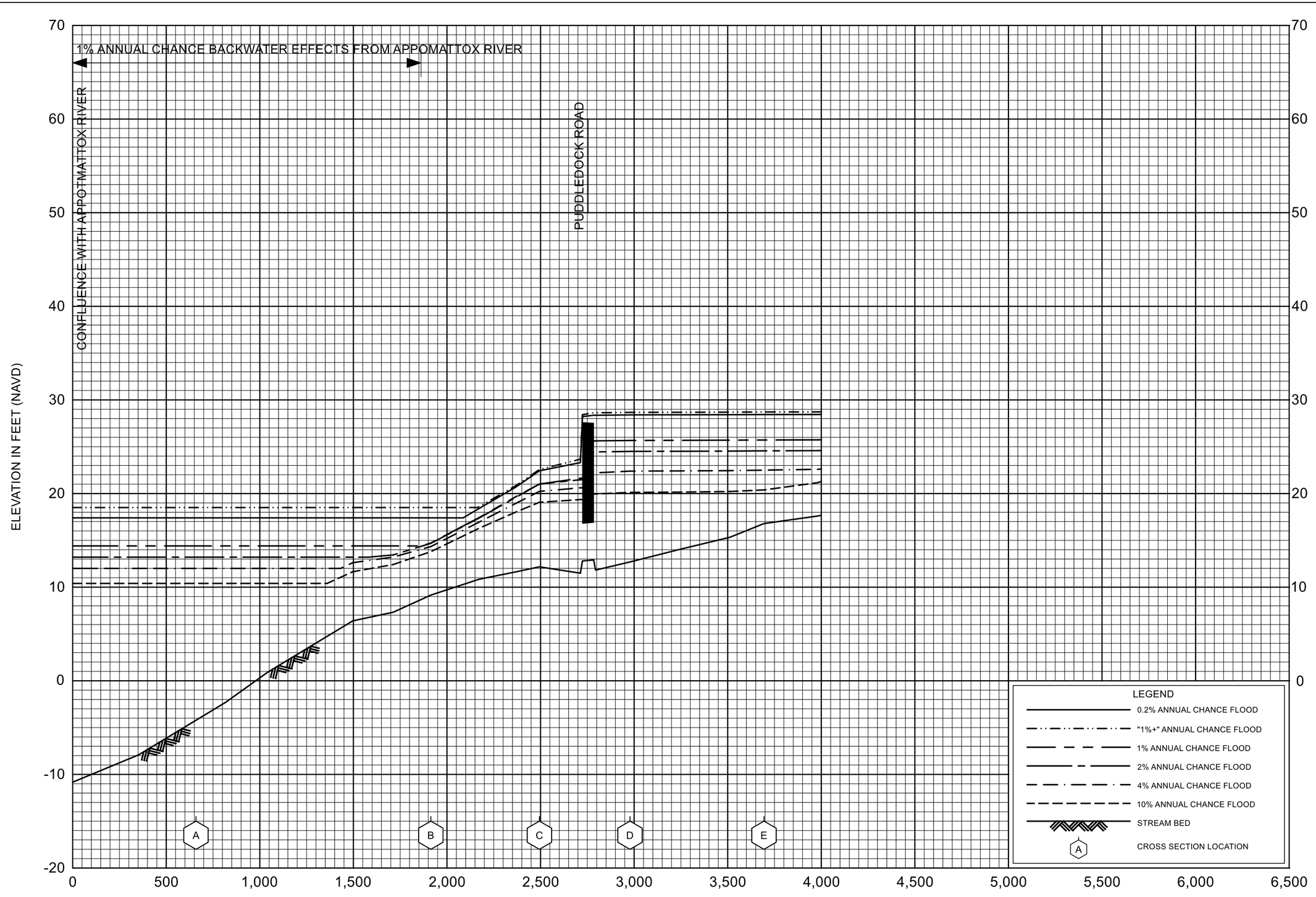
FLOOD PROFILES

BRICKHOUSE RUN OVERLAND

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, VA

INDEPENDENT CITY



FLOOD PROFILES

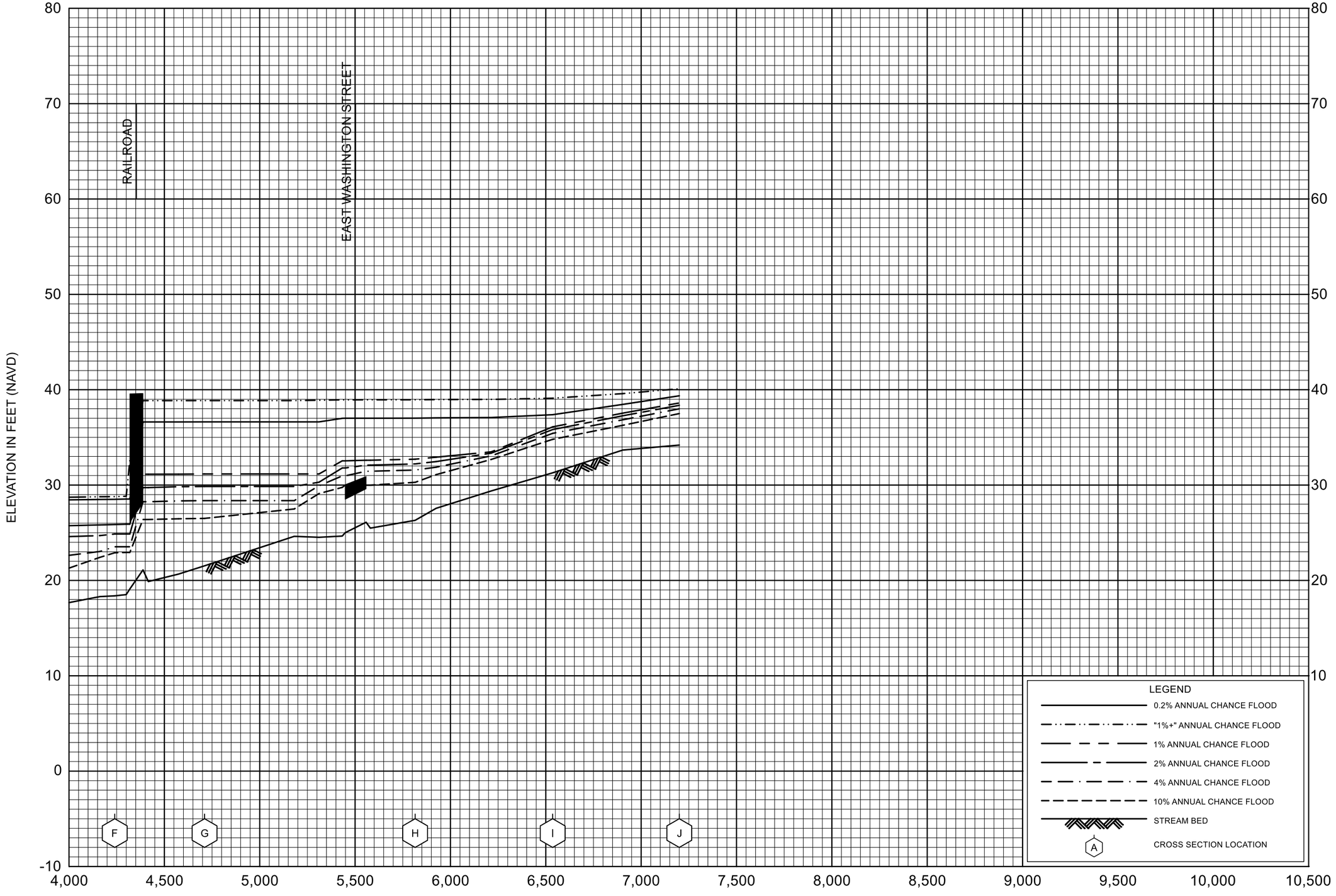
HARRISON CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, VA

INDEPENDENT CITY

11P



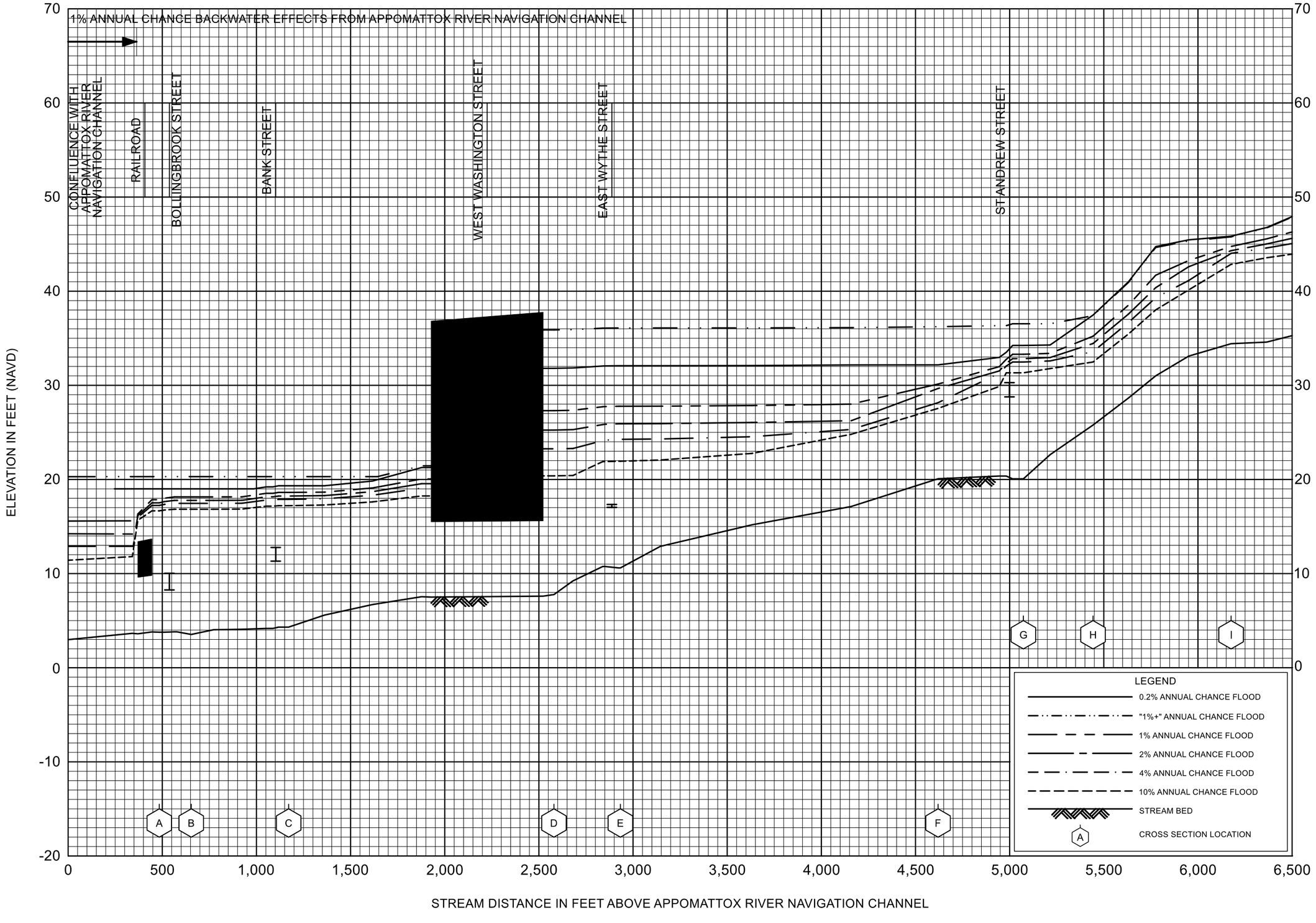
FLOOD PROFILES

HARRISON CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, VA

INDEPENDENT CITY



FLOOD PROFILES

LIEUTENANT RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, VA

INDEPENDENT CITY

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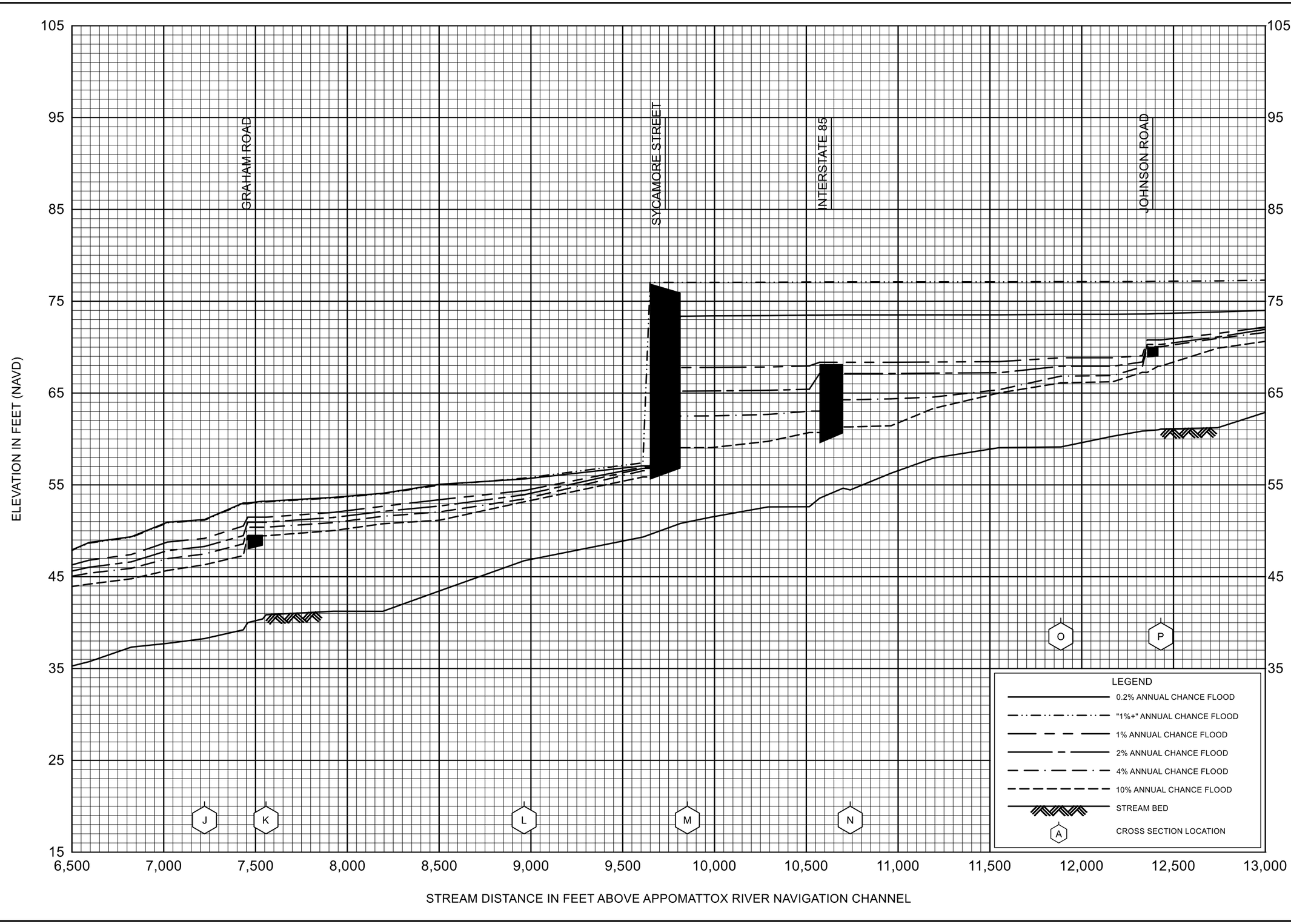


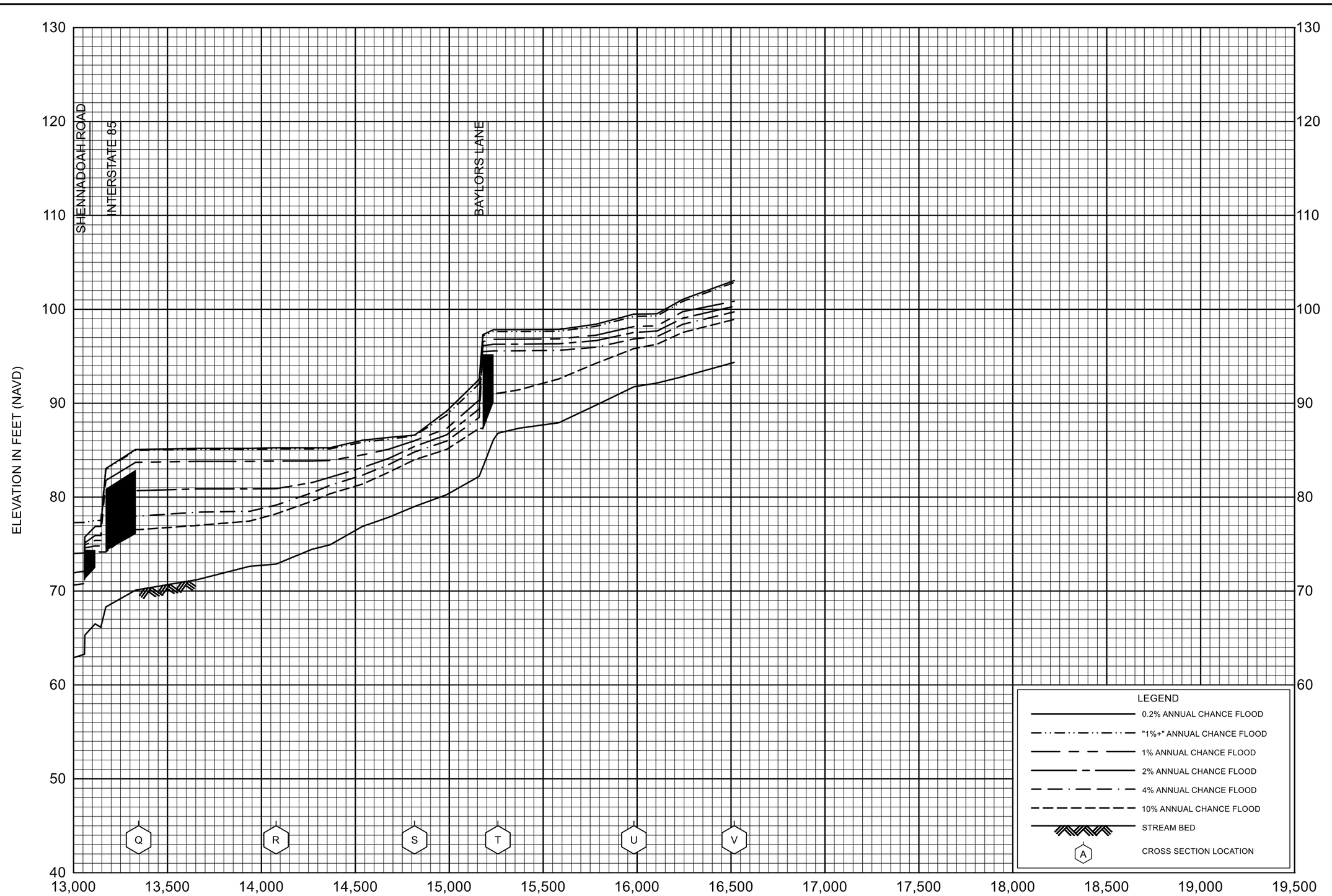
FLOOD PROFILES

LIEUTENANT RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, VA

INDEPENDENT CITY



FLOOD PROFILES

LIEUTENANT RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, VA

INDEPENDENT CITY

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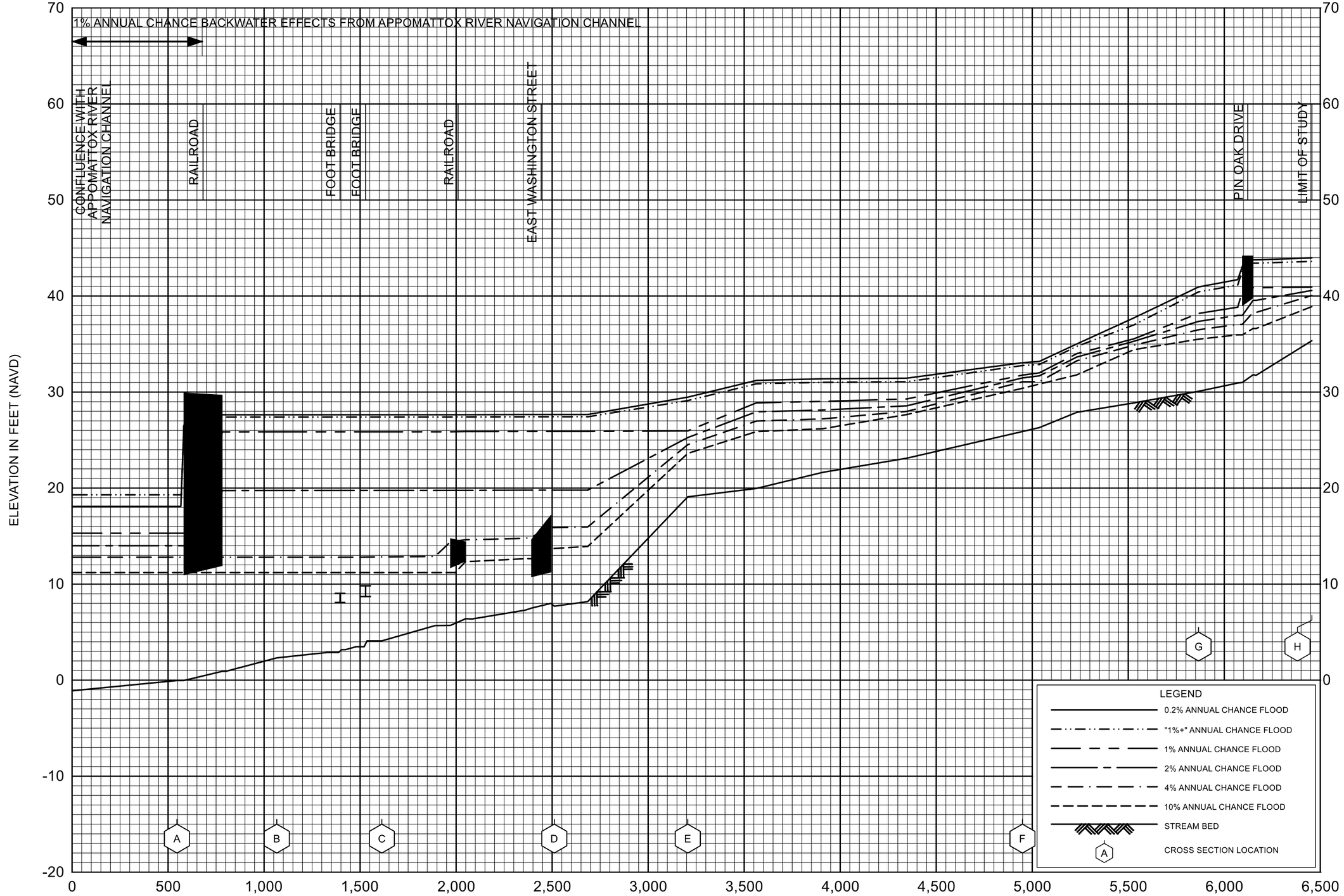

FLOOD PROFILES

POOR CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, VA

INDEPENDENT CITY

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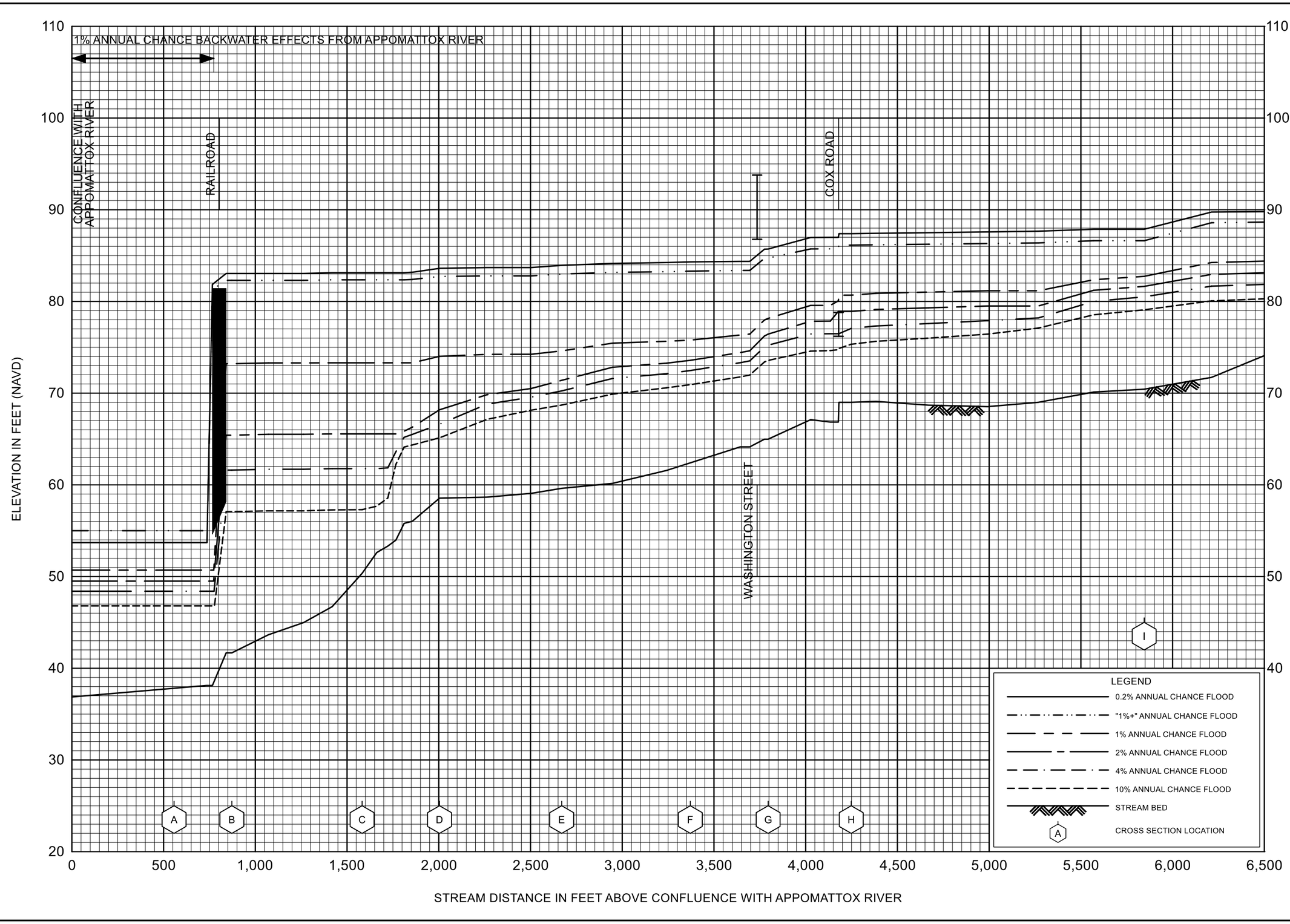

FLOOD PROFILES

ROHOIC CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, VA

INDEPENDENT CITY

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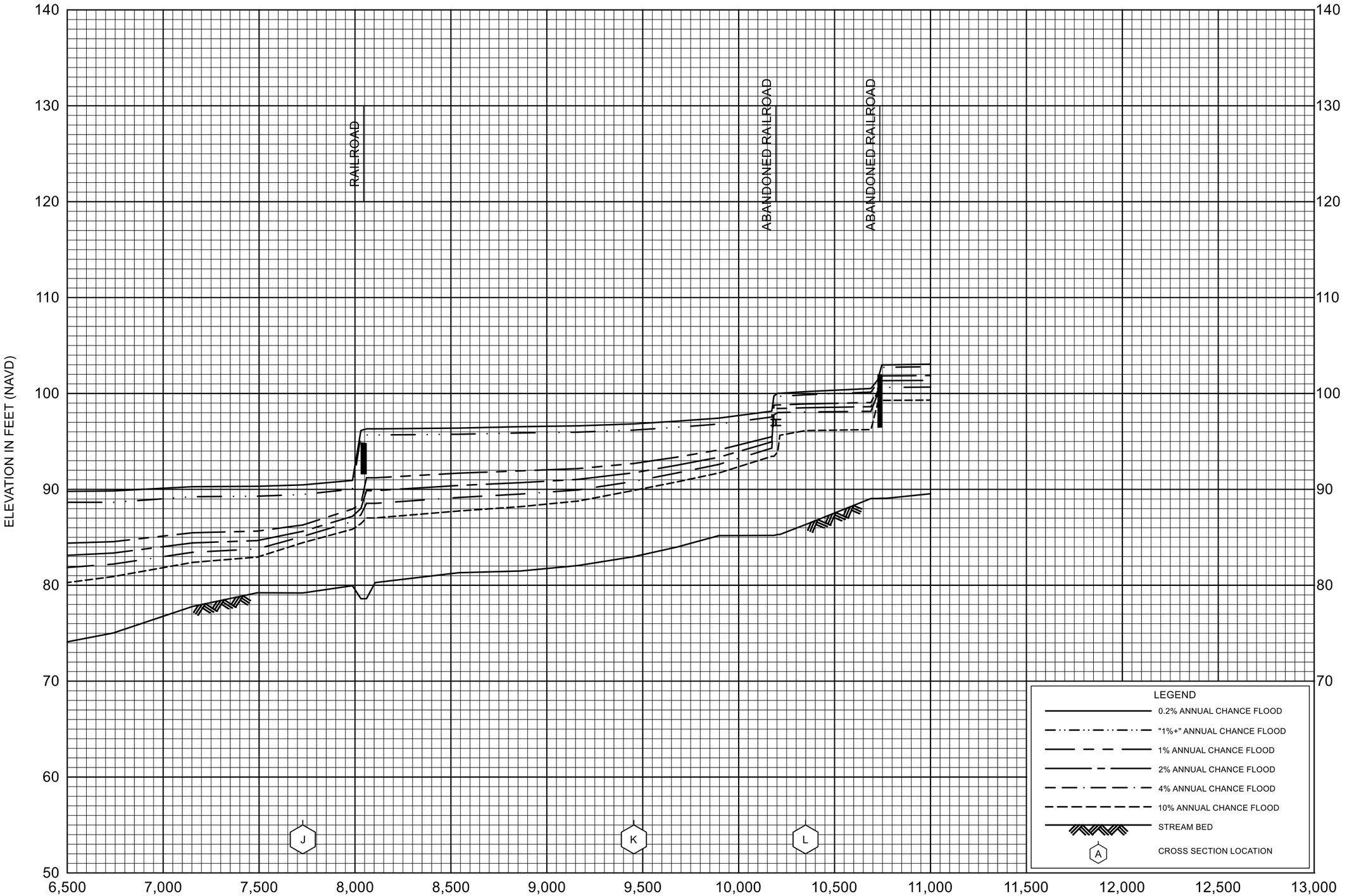


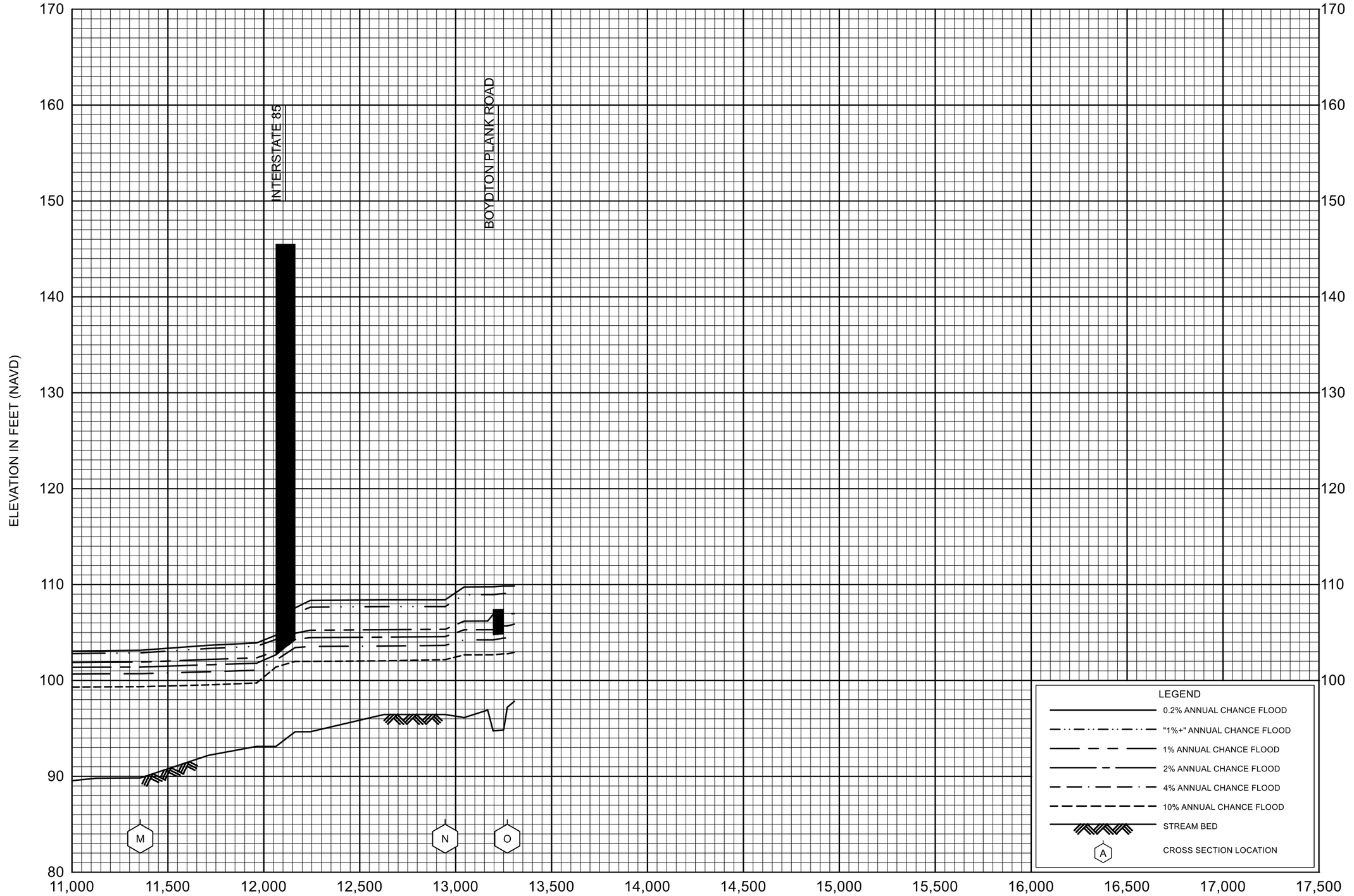
FLOOD PROFILES

ROHOIC CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, VA

INDEPENDENT CITY



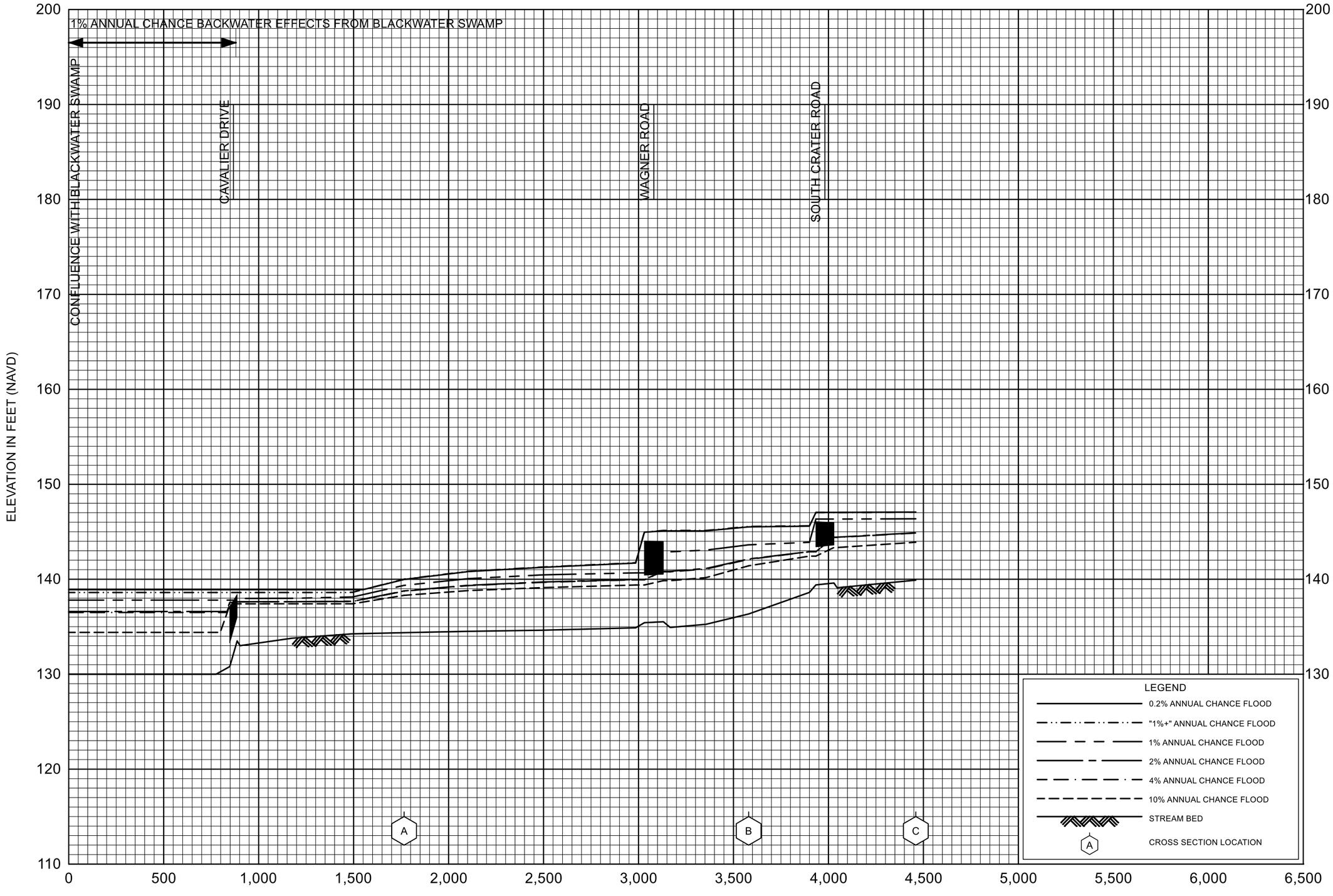
FLOOD PROFILES

ROHOIC CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, VA

INDEPENDENT CITY



FLOOD PROFILES

UNNAMED TRIBUTARY 1 TO BLACKWATER SWAMP

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, VA

INDEPENDENT CITY

No Adverse Impact

The acquisition and demolition of properties in the floodplain will actively remove obstructions that might worsen flooding in their area from the floodplain and will thus increase the floodplain's capacity to contain flow events without impacting adjacent properties. In addition, floodplain restoration work will further enable the open space to buffer the impacts of larger storms. Thus, the activities of this project will impose no adverse impact and will actually decrease flood vulnerabilities.

Ability of Local Government to Provide its Share of the Cost

The City is a low-income geographic area, as defined in the CFPF Grant Manual, as an area where the median household income ($50,741) is significantly less than 80% of the local median household income ($90,974 in VA), according to the US Census Data in 2024[1]. Further, several areas in the City are designated as Qualified Opportunity Zones, as presented in the supporting documentation. Given these constraints, the City Manager has respectfully requested a waiver to match funds and that the cost of this project be covered in its entirety by the Fund.

The following pages are excerpts from the City's FY24-25 Adopted Budget relating to Stormwater Funding. The full Report can be accessed here:
https://www.petersburgva.gov/DocumentCenter/View/8429/FY24-25-Adopted-v2?bidId=

[1] https://www.census.gov/quickfacts/fact/table/petersburgcityvirginia,VA/PST045222

ALL FUNDS BUDGET SUMMARY

The City's Budget is organized into separate funds, each of which are accounted for with a separate set of self-balancing accounts that comprise its revenues and expenditures where appropriate. The following section details the revenue and expenditures for the General Fund, Special Revenue Funds, and Enterprise Funds.

ALL FUNDS REVENUES

FUND	2021-2022 ACTUALS	2022-2023 ACTUALS	2023-2024 ADOPTED	2023-2024 AMENDED	2024-2025 ADOPTED
General Fund	88,643,098	97,517,309	84,202,469	88,083,817	94,384,922
Grants Fund	(9,341,739)	2,171,796	1,829,951	1,829,951	10,746,733
Streets Fund	6,262,816	7,179,748	6,756,606	6,756,606	7,973,243
CDBG Fund	801,995	846,971	583,253	583,253	582,410
Utilities Fund	12,347,358	16,531,266	15,000,000	15,000,000	15,134,073
Stormwater Fund	1,511,484	1,386,174	1,322,156	1,322,156	1,452,283
Golf Fund	1,112,170	1,319,043	1,104,550	1,104,550	1,197,550
Transit Fund	5,108,188	4,929,052	6,472,267	6,472,267	7,478,965
TOTAL	**106,445,370**	**131,881,359**	**117,271,252**	**121,152,600**	**138,950,179**

ALL FUNDS EXPENDITURES

FUND	2021-2022 ACTUALS	2022-2023 ACTUALS	2023-2024 ADOPTED	2023-2024 AMENDED	2024-2025 ADOPTED
General Fund	69,120,534	76,298,967	84,202,469	88,083,817	94,384,922
Grants Fund	974,611	3,209,446	1,829,951	1,829,951	10,746,733
Streets Fund	5,846,490	5,315,603	6,756,606	6,756,606	7,973,243
CDBG Fund	393,055	1,007,935	583,253	583,253	582,410
Utilities Fund	9,828,383	11,674,476	15,000,000	15,000,000	15,134,073
Stormwater Fund	579,529	388,084	1,322,156	1,322,156	1,452,283
Golf Fund	846,602	1,116,282	1,104,550	1,104,550	1,197,550
Transit Fund	5,330,299	5,789,279	6,472,267	6,472,267	7,478,965
TOTAL	**92,919,504**	**104,800,071**	**117,271,252**	**121,152,600**	**138,950,179**

SPECIAL REVENUE FUNDS

GRANTS

The Grants Fund was created to centralize the grants received from local, state, and federal sources. The City's major grant programs are: Victim Witness and Community Corrections. For other grants, City Council adopted a grant policy that requires departments to present grants to Council for their approval prior to acceptance. Consultation with Budget and Finance is also required to ensure any required local match is sustainable. This policy is meant to deter departments from accepting grant funds which may incur an unsustainable financial obligation. This Budget includes only the programs that are consistently funded by the Commonwealth and the Federal Government. The remaining grant programs will be taken before Council for appropriation once the award letters have been received.

STREETS

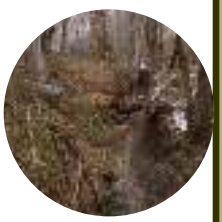
The Streets Fund was created to isolate the Virginia Department of Transportation Urban Allocation funds. VDOT allocated funds to municipalities based on a set rate for every lane mile within their jurisdictions. Funds are dispersed quarterly and can only be used for VDOT authorized activities such as street repairs and maintenance, snow and ice control, structure maintenance and specified equipment and materials for these functions.

CDBG

The Community Development Block Grant (CDBG) Fund is a federal program that provides annual grants on a formula basis to entitled cities and counties. This grant is used to develop viable urban communities through improving housing environments and expanding economic opportunities. The CDBG fund has specific purposes for which municipalities are authorized to expend. For example, the acquisition of land, relocation and demolition, rehabilitation of residential and non-residential structures and activities related to energy conservation and renewable energy resources. In Petersburg, the specific projects are brought before the City Council for approval once the funding has been identified.

STORMWATER

The Stormwater Fund is used for the management of the stormwater infrastructure. Revenue is received from each parcel containing impervious surfaces included in utility bills. Unmanaged stormwater can cause erosion, flooding and can carry excess nutrients, sediment and other contaminants into rivers and streams. Properly managed stormwater can recharge groundwater and protect land and streams from erosion, flooding and pollutants.



SPECIAL REVENUE FUNDS

STREETS REVENUES	2021-2022 ACTUALS	2022-2023 ACTUALS	2023-2024 ADOPTED	2023-2024 AMENDED	2024-2025 ADOPTED
State Grant Revenue	6,224,206	7,189,543	6,756,606	6,756,606	7,973,243
TOTAL STREETS FUND REVENUES	**6,224,206**	**7,189,543**	**6,756,606**	**6,756,606**	**7,973,243**
STREETS EXPENDITURES	**2021-2022 ACTUALS**	**2022-2023 ACTUALS**	**2023-2024 ADOPTED**	**2023-2024 AMENDED**	**2024-2025 ADOPTED**
STREETS EXPENDITURES	5,846,490	5,315,603	6,756,606	6,756,606	7,973,243
TOTAL STREETS FUND EXPENDITURES	**5,846,490**	**5,315,603**	**6,756,606**	**6,756,606**	**7,973,243**

State Grant Revenue is the revenue provided by the Virginia Department of Transportation (Urban Maintenance Program) to maintain the interstate system highways and secondary system of state highways for the City's street maintenance. These funds are dispersed in quarterly payments and amount to about $6 million annually.

STORMWATER REVENUES	2021-2022 ACTUALS	2022-2023 ACTUALS	2023-2024 ADOPTED	2023-2024 AMENDED	2024-2025 ADOPTED
Stormwater Fee Charges	1,511,484	1,386,174	1,322,156	1,322,156	1,452,283
TOTAL STORMWATER REVENUES	**1,511,484**	**1,386,174**	**1,322,156**	**1,322,156**	**1,452,283**
STORMWATER EXPENDITURES	**2021-2022 ACTUALS**	**2022-2023 ACTUALS**	**2023-2024 ADOPTED**	**2023-2024 AMENDED**	**2024-2025 ADOPTED**
Stormwater Operations	579,529	388,084	1,322,156	1,322,156	1,452,283
TOTAL STORMWATER EXPENDITURES	**579,529**	**388,084**	**1,322,156**	**1,322,156**	**1,452,283**

Stormwater Fee Charges are billed to residential and non-residential customers that use the City's stormwater collection systems. The City is responsible for compliance with State and Federal regulations that are not funded. In order to install and maintain storm drains, inlets, ditches and erosion and sediment control these fees are charged. For residential customers a standard $3.75 per month charge is added, for non-residential customers it is $3.75 per ERU a month. ERU is the total impervious area of the property divided by 2,116 SF. These fees are added onto the utility bill and are due at the beginning of the month.

STORMWATER OPERATIONS

Stormwater Operations is primarily responsible for ensuring all environmental impacts related to stormwater runoff is minimized and regulated in accordance with federal, state, and local requirements. These stormwater impacts include both stormwater pollution (due to phosphorus, nitrogen, and sediment) as well as erosion and flooding (due to excessive velocity and volume of runoff). This primary task is accomplished by engaging internal departments, land developers, businesses, citizens, and external state and local partners to ensure that these requirements are followed and that compliance efforts are documented and reported appropriately.

Stormwater Management regulates all development within the City through its Stormwater Management and Erosion and Sediment Control Programs. These programs include administrative, plan review, inspection, and enforcement components to ensure compliance with federal, state, and local requirements – specifically the City's SWM and ESC Ordinances. In some sites, where applicable, development must also be regulated in accordance with the City's Chesapeake Bay Ordinance to ensure that the more stringent requirements in Chesapeake Bay Preservation Areas are followed. Furthermore, development within or near Floodplain/Floodway area must be regulated in accordance with the City's Floodplain Management Ordinance in accordance with the requirements of the Federal Emergency Management Association (FEMA) and the Department of Conservation and Recreation (DCR). To accomplish these development responsibilities, the SWM Section regulates all land-disturbance activity in the City above the applicable minimum-threshold requirement set by state and local regulations.

Stormwater Management section is also ultimately responsible for administering the City's Stormwater Utility Funding Program originally approved by Council in 2013 to create a dedicated source of funding to comply with Virginia Department of Environmental Quality requirements. Stormwater Management verifies that the amount billed to residential and non-residential customers is correct and works to settle any billing disputes – including administering the formal appeals process through the City's Stormwater Utility Ordinance. Stormwater Management is also responsible for administering the Residential and Non-Residential Stormwater Utility Fee Credit Program – including verification of credit applications received, addressing any formal appeals, and following up on successful credit applications with the Utility Billing Section to ensure that credits are applied.

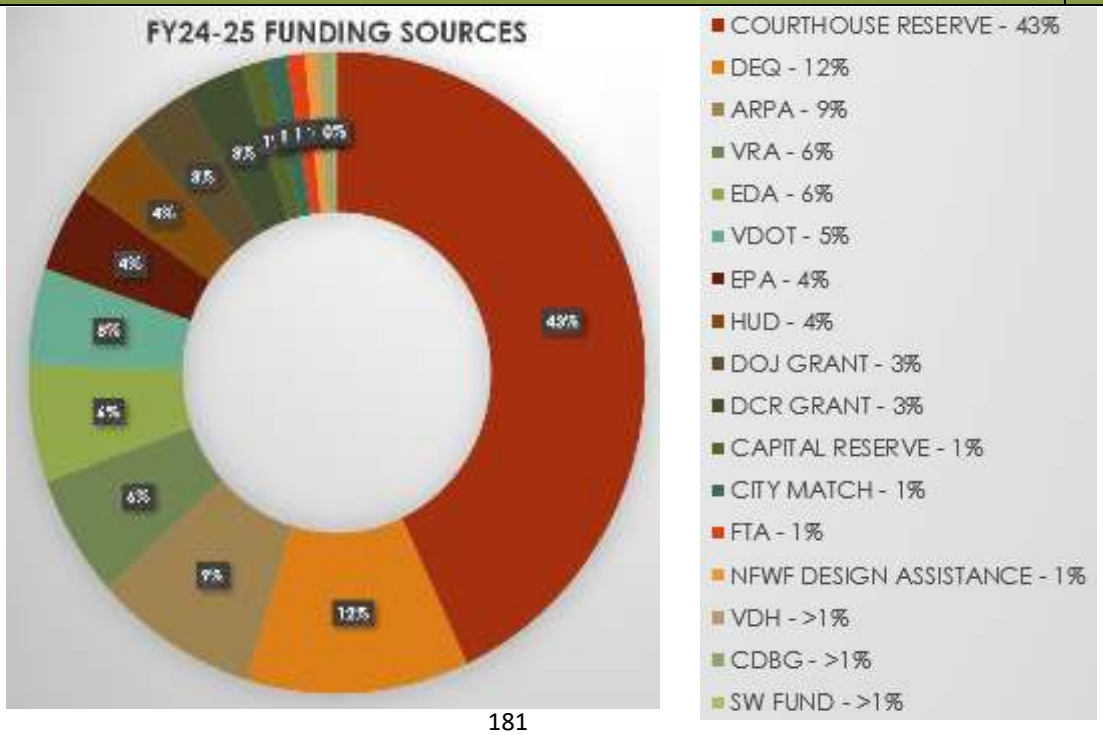
Stormwater Management is also responsible for overseeing the Stormwater Operating, Capital Improvement Projects and Utility Fund budgets to ensure appropriated funds are spent appropriately on stormwater CIP projects, compliance requirements, and program administration. Additional responsibilities include: overseeing any changes to the FEMA Flood Maps, applying for and administering all stormwater-related grants to enhance stormwater funding needs, and responding to internal departments and citizens regarding complex drainage issues that require a global solution involving neighborhood- or City-wide drainage improvements.

STORMWATER OPERATIONS

EXPENDITURES	2021-2022 ACTUALS	2022-2023 ACTUALS	2023-2024 ADOPTED	2023-2024 AMENDED	2024-2025 ADOPTED
Salaries & Wages Regular	272,888	187,939	405,853	405,853	405,853
FICA	20,167	12,251	31,048	31,048	31,048
VRS	31,011	22,448	49,798	49,798	49,798
Health Insurance	29,839	23,874	62,716	62,716	62,716
VRS Group Life	3,615	2,501	5,438	5,438	5,438
Other Contractual Services	213,017	122,406	654,660	654,660	784,787
Repairs - Vehicles	188	19	6,252	6,252	6,252
Advertising	-	-	1,020	1,020	1,020
Postal Services	73	53	110	110	110
Telecommunications	567	781	1,400	1,400	1,400
Lease/Rent of Equipment	-	2,582	-	-	-
Conference Travel & Training	949	-	2,550	2,550	2,550
Dues & Association Memberships	1,230	106	4,080	4,080	4,080
State Permits - Licenses	3,000	3,000	12,500	12,500	12,500
Office Supplies	2,542	2,352	5,000	5,000	5,000
Food Supplies	-	-	510	510	510
Vehicle and Powered Equipment Fuels	190	460	1,020	1,020	1,020
Uniforms & Wearing Apparel	252	54	1,020	1,020	1,020
Other Operating Supplies	-	9,482	-	-	100
First Aid Supplies	-	23	100	100	-
Computer Software under $5,000	-	355	5,694	5,694	5,694
Computer Hardware under $5,000	-	-	5,694	5,694	5,694
Computer Software over $5,000	-	-	5,693	5,693	5,693
Vehicles	-	-	60,000	60,000	60,000
Contingency	-	(2,600)	-	-	-
TOTAL STORMWATER	**579,529**	**388,084**	**1,322,156**	**1,322,156**	**1,452,283**

FY2024-25 CAPITAL REVENUE FUNDING SOURCES

REVENUE SOURCE	DESCRIPTION	AMOUNT
CAPITAL RESERVE	CITY CAPITAL RESEVE FUND	994,682
CDBG	COMMUNITY DEVELOPMENT BLOCK GRANT	239,000
VRA	VIRGINIA RESOURCE AUTHORITY REVENUE BONDS	4,665,197
COURTHOUSE RESERVE	CITY COURTHOUSE RESERVE FUND	32,750,000
DCR GRANT	DEPT OF CONSERVATION & RECREATION - DIVISION OF	2,361,164
DOJ GRANT	DEPT OF JUSTICE	2,593,528
ARPA	AMERICAN RESCUE PLAN ACT	6,566,331
NFWF DESIGN ASSISTANCE	NATIONAL FISH & WILDLIFE FOUNDATION GRANT	500,000
SW FUND	STORMWATER FUND	200,570
EDA	ECONOMIC DEVELOPMENT AUTHORITY GRANT	4,481,092
EPA	ENVIRONMENTAL PROTECTION AGENCY GRANT	3,359,752
DEQ	DEPT OF ENVIRONMENTAL QUALITY GRANT	8,843,998
HUD	HOUSING & URBAN DEVELOPMENT GRANT	2,865,225
VDH	VIRGINIA DEPT OF HEALTH GRANT	338,914
VDOT	VIRGINIA DEPT OF TRANSPORTATION	3,725,616
CITY MATCH	GENERAL FUND	828,128
FTA	FEDERAL TRANSIT AUTHORITY: FED(28%), STATE(68%) & LOCAL	724,138
FY25 TOTAL REVENUE FUNDING SOURCE		76,037,335



FY2024-25 CAPITAL PROJECTS

PROJECT	DESCRIPTION	FY2024-2025 AMOUNT	FUNDING SOURCE
FIRE			
Motorola Radio System Upgrades	System Upgrades	**2,697,936**	DOJ GRANT/ARPA
TRANSIT			
Property & Facilities	Engineering & Design of Maintenance Facility	500,000	FED STATE & LOCAL
Vehicle Support Equipment - Radios	Shop Equipment for PAT	24,138	FED STATE & LOCAL
HVAC System	Replace HVAC system	200,000	FED STATE & LOCAL
TRANSIT SUBTOTAL		**724,138**	
ECONOMIC DEVELOPMENT			
Economic Development Study	Economic Development Study	**23,687**	ARPA
STREETS			
Paving	Pave City streets assessed by Street Operations	**1,500,000**	VDOT
CEMETARIES			
Cemetaries	Cemetary Enhancement	**150,000**	ARPA
POLICE			
Training & Tourniquets	Tourniquets & associated training	10,000	ARPA
PPE/Supplies	Supplies & necessary personal protective equipment for Police Dept.	3,768	ARPA
POLICE SUBTOTAL		**13,768**	
TURF MANAGEMENT			
Turf Equipment & Rehab	Equipment for Turf Management	**367,051**	ARPA

FY2024-25 CAPITAL PROJECTS

PROJECT	DESCRIPTION	FY2024-2025 AMOUNT	FUNDING SOURCE
FACILTIES			
400 Farmer Street Building (Phase 2)	Phase II Renovations	2,463,292	ARPA
Southside Depot	Entails ongoing restoration of interiors and exteriors of the original depot building	424,250	ARPA
Animal Shelter Project	Funds set aside to help with building/upgrading animal shelter	100,000	CAP RESERVE/ARPA
Union Train Station	Station upgrade	350,000	CAP RESERVE
Downtown Master Plan	Plan for public and private decision makers regarding the future development of the City	10,320	ARPA
Parks & Recreation Rehabilitation	Rehabilitation of City parks and recreations areas	400,950	CAP RESERVE/ARPA
City Hall/Annex Renovations	Renovations of City Hall & Annex restrooms	300,000	CAP RESERVE
Fiscal Roof Replacement	Fiscal Management building roof replacement - Union St. side	100,000	CAP RESERVE
District Courthouse Construction	Design & construction of new courts complex	32,750,000	COURTHOUSE RESERVE
HVAC Replacements	HVAC replacements around the City	200,000	CAP RESERVE
FACILITIES SUBTOTAL		**37,098,812**	

FY2024-25 CAPITAL PROJECTS

PROJECT	DESCRIPTION	FY2024-2025 AMOUNT	FUNDING SOURCE
PUBLIC WORKS			
South Crater Road Traffic Signal Improvements (Phase I)	Rebuilding existing span wire signals; modernizing existing traffic signals; pedestrian accommodations; Replacing existing communication equipment at six intersection on South Crater Road	1,497,617	VDOT
South Sycamore St. Bridge Culvert Rehab (Phase I)	Concrete repairs; de-lamination of reinforced concrete box culvert ; replace downstream head walls	727,999	VDOT
PUBLIC WORKS SUBTOTAL		**2,225,616**	
STORMWATER			
Citywide Drainage Study	Evaluate existing and proposed drainage conditions and anticipated runoff flows throughout the City	1,000,000	DCR GRANT
Claremont Storm Drain Project	Address flooding issues on Claremont Street from a damaged and potentially undersized storm pipe	649,920	ARPA
N Whitehill Storm Drain Project - Phase 2	Address the N. Whitehill Dr. area within the Lakemont neighborhood that experiences flooding due to existing storm pipes under residential dwellings	1,200,000	DCR GRANT
Fleets Branch Stream Restoration Project	Restore the stream system due to erosion and natural forces	1,333,000	ARPA/NFWF DESIGN/ DEQ
Henrico St. Drainage & Improvements	Check drainage conditions & improve	498,405	DCR/ARPA/SW FUND
Shirley Ave Stream Restoration Project	Restoration & extension of stream	1,515,377	ARPA/DEQ
Wilcox Lake Dam Improvements	Improvements to dam	410,469	DCR/ARPA/SW FUND
MS4 Permit Compliance Tasks	Ensure a comprehensive stormwater management strategy for the City	100,000	SW FUND
STORMWATER SUBTOTAL		**6,707,171**	

Bank Street Phase 2 Benefit-Cost Analysis

The City of Petersburg is applying for Community Flood Preparedness Fund assistance to include the final design-build engineering plans and construction for the repair of the channel conveying Brickhouse Run located on the 110 W Bank St property. The existing drainage conveyance has segments of open channel and segments of block-type stone masonry construction which has failed, creating sink hole conditions for an existing structure on the property. The enclosed channel is believed to have been constructed in the 1800s and has been modified throughout the years. An emergency inspection of the channel and adjacent culvert identified conditions as poor and in need of immediate remediation. A DCR Site Visit also recommended mitigation measures be taken through mitigation to the parking lot as well as stabilization and reinforcement of Bank Street. The proposed work will daylight previously enclosed and failing sections of channel and convert the existing property into green space. The scope of work includes acquisition of the property which is currently privately owned. A schedule of benefits is provided below.

Property on Bank Street

Benefits

- Stabilization of underground conveyance will prevent sinkhole expansion on the property, safeguarding public safety and the usability of the space.
- Strategic retreat of existing land uses from areas vulnerable to flooding.
- Removal of impervious surfaces within the Resource Protection Area.
- Provide land cover change with the benefit of providing stormwater runoff pollutant reduction associated with the City's Chesapeake Bay TMDL Action Plan.
- Creation of open space for recreation use such as connection to existing trail systems.
- Habitat creation/ecological uplift associated with planting of vegetation within the Resource Protection Area.

These risk reduction benefits of the repair and construction of the channel and resulting benefits exceed the costs of the project. Therefore, the project is highly cost effective.

Figure 1. Photo depicting building collapse into exposed channel.

Repetitive Loss and/or Severe Repetitive Loss Properties

The City is working with DCR to obtain any repetitive loss and/or severe repetitive loss data for use in administering the requested funding application.

Work Plan

The Work Plan provided below details the major activities and tasks with the following sub-components identified for each task: (a) who is responsible for completing the activities and tasks, (b) the timeframe for accomplishing activities and tasks, (c) required partners to ensure success, and (d) deliverables, and (e) whether there is a maintenance plan tied to the identified viability of the project, and what the plan is for sustaining the project after the agreement if so.

1. Acquisition of the subject property.
    a. The Petersburg Department of Public Works is responsible for completing the activities.
    b. The task will be accomplished within the three-year grant agreement period.
    c. Required partners for the task will primarily include the City staff who must coordinate to complete property acquisition.
    d. Deliverables include the acquired property deed.
    e. This task will not require a maintenance plan.
2. The development of design-build bridging documents.
    a. The Petersburg Department of Public Works is responsible for securing an Engineer to completing the activities.
    b. The task will be accomplished within the three-year grant agreement period.
    c. Required partners for the task include engineering and surveying consultants to develop design-build documents, City staff to review and approve plans, and coordination for approval of plans with Virginia DCR staff, as necessary.
    d. Deliverables for the project will be completed and approved design-build plans to convert the parcel obtained into a green space park which reconnects the channel to its floodplain and provides an amenity for Petersburg City residents.
    e. This task will not require a maintenance plan.
3. Construction.
    a. The Petersburg Department of Public Works is responsible for securing a Contractor to complete the activities.
    b. This task will be achievable within the three-year grant agreement period.
    c. Required partners for the task include engineering, surveying, and construction consultants to complete the demolition, grading, and construction work necessary to build the design plans, City staff to inspect and review ongoing construction, and any coordination with Virginia DEQ staff as necessary.
    d. Deliverables for the project will be the completion of construction of the green space conversion project.
    e. A maintenance plan will be put in place to maintain and manage the green space park, to ensure that it remains a community amenity for years to come.
4. Regulatory permitting associated with the project.
    a. The Petersburg Department of Public Works is responsible for completing the activities.
    b. This task will be achievable within the three-year grant agreement period.
    c. Required partners for the task includes engineering consultants for the permitting of the proposed improvements and Virginia DCR for approval and coordination work.
    d. Deliverables for the task will be the completed permitting associated with the reconnection to the floodplain as necessary.
    e. This task will not require a maintenance plan.

Maintenance and Management Plan

June 2025 – June 2035

The City of Petersburg will use funds from the CFPF to enable the completion of the repair of the underground channel, the daylighting construction for the section of the channel which has collapsed, and the conversion of the parcel the work exists on to green space. The City is committed to regularly funding maintenance and improvements to continue to identify and mitigate structural risks from the aging channel, in order to ensure consistent functionality of the channel and of the roadways and structures it runs under.

Office of the City Manager
135 North Union Street
Petersburg, Virginia 23803

(804)-744-2301
Fax 732-9212
TDD 733-8003

January 8, 2025

Mr. Matthew Wells
Director of Dam Safety and Floodplain Management
Virginia Department of Conservation and Recreation
600 East Main Street, 24th Floor
Richmond, VA 23219

RE: Authorization of City of Petersburg CFPF Project Application ID 2679
Bank Street Repair – Phase 2

Dear Mr. Wells and Members of the CFPF Review Team:

The City of Petersburg has assembled the attached Project grant application to request Community Flood Preparedness Fund assistance for a project to repair and reconstruct the channel conveying Brickhouse Run located on the 110 W Bank St property, which has currently formed a sinkhole on the property. The existing drainage conveyance has segments of open channel and segments of block-type stone masonry construction; the enclosed channel originated in the 1800s and has been modified throughout the years. The proposed project is a nature-based solution which includes acquisition of property and/or structures to restore the floodplain. This work will daylight previously enclosed sections of channel and convert the existing property into green space. The project will result in immediate improvements that will protect the personal safety, connectivity, and economic prosperity of City of Petersburg citizens by ensuring the channel crossing under Bank Street is stable and reinforced, and by converting the 110 W Bank Street property into green space City residents will gain a beautified space downtown.

As Petersburg is a documented low-income geographic area, and the project site is also within a designated Qualified Opportunity Zone with a high social vulnerability index score, the City respectfully requests full funding and a waiver to match funds for this project. Please accept this letter as my authorization of the request for CFPF assistance to enable Petersburg to make significant progress toward Resilience.

Sincerely,

J. March Altman, Jr.
Petersburg City Manager

Adopted May 21, 2024

Comprehensive Plan 2044

PETERSBURG**NEXT**

2024-CPA-01
Adopted: 05/21/2024

AN ORDINANCE TO APPROVE REPEALING THE "CITY OF PETERSBURG PTB2040" COMPREHENSIVE PLAN AND ADOPTING THE "PETERSBURGNEXT, COMPREHENSIVE PLAN OF 2044" COMPREHENSIVE PLAN

WHEREAS, the Code of Virginia, 15.2-2223 requires that "The local planning commission shall prepare and recommend a comprehensive plan for the physical development of the territory within its jurisdiction and every governing body shall adopt a comprehensive plan for the territory under its jurisdiction"; and

WHEREAS, the Code of Virginia, 15.2-2223 also states that "The comprehensive plan shall be made with the purpose of guiding and accomplishing a coordinated, adjusted and harmonious development of the territory which will, in accordance with present and probable future needs and resources, best promote the health, safety, morals, order, convenience, prosperity and general welfare of the inhabitants, including the elderly and persons with disabilities"; and

WHEREAS, the City of Petersburg entered into contract with Berkley Group to consider the adoption of a new Comprehensive Plan, entitled "PetersburgNEXT, Comprehensive Plan 2044" to replace the current Comprehensive Plan entitled "City of Petersburg PTB2040," with updates to demographics, transportation improvements, land use, and other relevant information; and

WHEREAS, the "PetersburgNEXT" plan was drafted based on community engagement efforts, including community surveys, public workshops, and focus groups as well as coordination with the City Council and Planning Commission; and

WHEREAS, pursuant to the requirements of Title 15.2-2225 of the Code of Virginia, as amended, the plan was advertised and made available to the public and a public hearing before the City Planning Commission and Council was held in accordance with applicable laws.

NOW THEREFORE BE IT ORDAINED that the City Council does hereby recommend approval of an ordinance repealing the "City of Petersburg PTB2040" Comprehensive Plan and adopting the "PetersburgNEXT, Comprehensive Plan 2044" Comprehensive Plan per the Code of Virginia 15.2-2225.

Adopted by the City of Petersburg
Council of the City of Petersburg on:
05/21/2024

Mayor

Clerk of City Council

The City of Petersburg would like to recognize and thank the following for their contributions to this Comprehensive Plan.

ACKNOWLEDGEMENTS

City Council
Samuel Parham, Mayor
Darrin Hill, Vice-Mayor
W. Howard Myers
Marlow Jones
Arnold Westbrook, Jr.
Charles Cuthbert, Jr.
Annette Smith-Lee

Planning Commission
Tammy Alexander, Chair
Fenton Bland, Vice-Chair
Chioma Adaku
Candace Taylor
Marie Vargo
Thomas Hairston
James Norman
Michael Edwards
William Irvin

City Staff
John "March" Altman, Jr., City Manager
Joanne Williams, Director of Communications, Marketing, Tourism and Government Relations
Brian Moore, Director of Economic Development
Naomi Siodmok, AICP, Director of Planning and Community Development
Reginald Tabor, Planning Manager (former)
Sandra Robinson, Zoning Administrator (former)
Kate Sangregorio, Preservation Planner (former)

Technical Team
Berkley Group

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MAPS, FIGURES, + TABLES

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Feed from the Future

In twenty years, what story will our City tell?

Fortune 500 Company CEO
@fortune500company

I am proud to announce that my company is opening its second North American headquarters in Petersburg, Virginia. This will create hundreds of jobs for the community. Petersburg is a thriving City with a booming economy, strong tax incentives, and some of the best transportation infrastructure in Virginia.

09:45 A.M. | 05 January 2044

Housing Developer
@housingdeveloper

Homeownership in Petersburg is up by 15% thanks to new housing investments and local job opportunities!

6:50 A.M. | 12 April 2044

Petersburg High School Senior
@highschoolsenior

I'm excited to announce that after graduating from PHS, I'll be attending college on a full scholarship! All of the academic and extracurricular opportunities at PHS have helped me reach my goals! PHS has been the best! #gocrimsonwave

03:04 P.M. | 19 May 2044

Mom of Three
@lifelongresident

Petersburg is a great place to raise my three children. It is beautiful, safe, and there is so much for my kids to do! I rarely have to worry about how my kids will occupy their time because there are many recreation centers and parks with regular programming.

11:15 P.M. | 12 August 2044

Major News Network
@majornewsnetwork

JUST IN: Petersburg ranked in the top 25% of healthiest jurisdictions in Virginia. #breakingnews #petersburg

6:31 P.M. | 05 December 2044

01 ABOUT THE PLAN

Chapter 1 of PetersburgNEXT lays the groundwork for the development of the Comprehensive Plan. The chapter establishes the legal context for the Comprehensive Plan, describes the Plan's functional relationship to the City's other planning efforts and policy measures, and summarizes the community input process - a key component of drafting this Plan.

*Community Survey Question: What is **ONE WORD** you hope will describe the City of Petersburg twenty years from now?*

01

WHAT IS A COMPREHENSIVE PLAN?

PetersburgNEXT is the City of Petersburg's Comprehensive Plan. A Comprehensive Plan is an adopted, guiding policy document for the long-range planning and future development of a locality. The Plan addresses a wide range of topics related to development and land use, including housing and neighborhoods; parks and recreation; community facilities and infrastructure; and economic development. It describes the community's vision for where it wants to be in the next 20 years, along with strategies to achieve the community's goals. While it is not regulatory in nature, PetersburgNEXT is the City's guide to the future and will be used to inform City staff and elected officials as they make decisions regarding the City.

PLANNING JURISDICTION

The City of Petersburg's comprehensive planning jurisdiction includes all land within City boundaries (Map 1.1). However, responsible regionalism is important in effectively shaping the City's future. Development and employment trends in neighboring localities – the Counties of Dinwiddie, Chesterfield, and Prince George, as well as the independent cities of Colonial Heights and Hopewell – all influence quality of life and land use patterns in Petersburg. As such, the Comprehensive Plan recognizes and prioritizes collaboration with regional partners as a vital aspect of long-range planning.

While the City of Petersburg does not have control over decisions in its neighboring localities, it works as a partner of the Crater Planning District Commission (CPDC), a regional organization that provides planning services and technical assistance to its member jurisdictions. Much of the information in this Plan builds on existing regional studies and efforts, and many of the strategies will require regional coordination to realize the highest benefit to Petersburg.

ELEMENTS OF A COMPREHENSIVE PLAN

PLAN VISION
The aspirational statement describing the ideal future of Petersburg that serves as the foundation for the Plan.

↓

GOALS
The principles and values which will guide the City's actions to solve identified issues and opportunities.

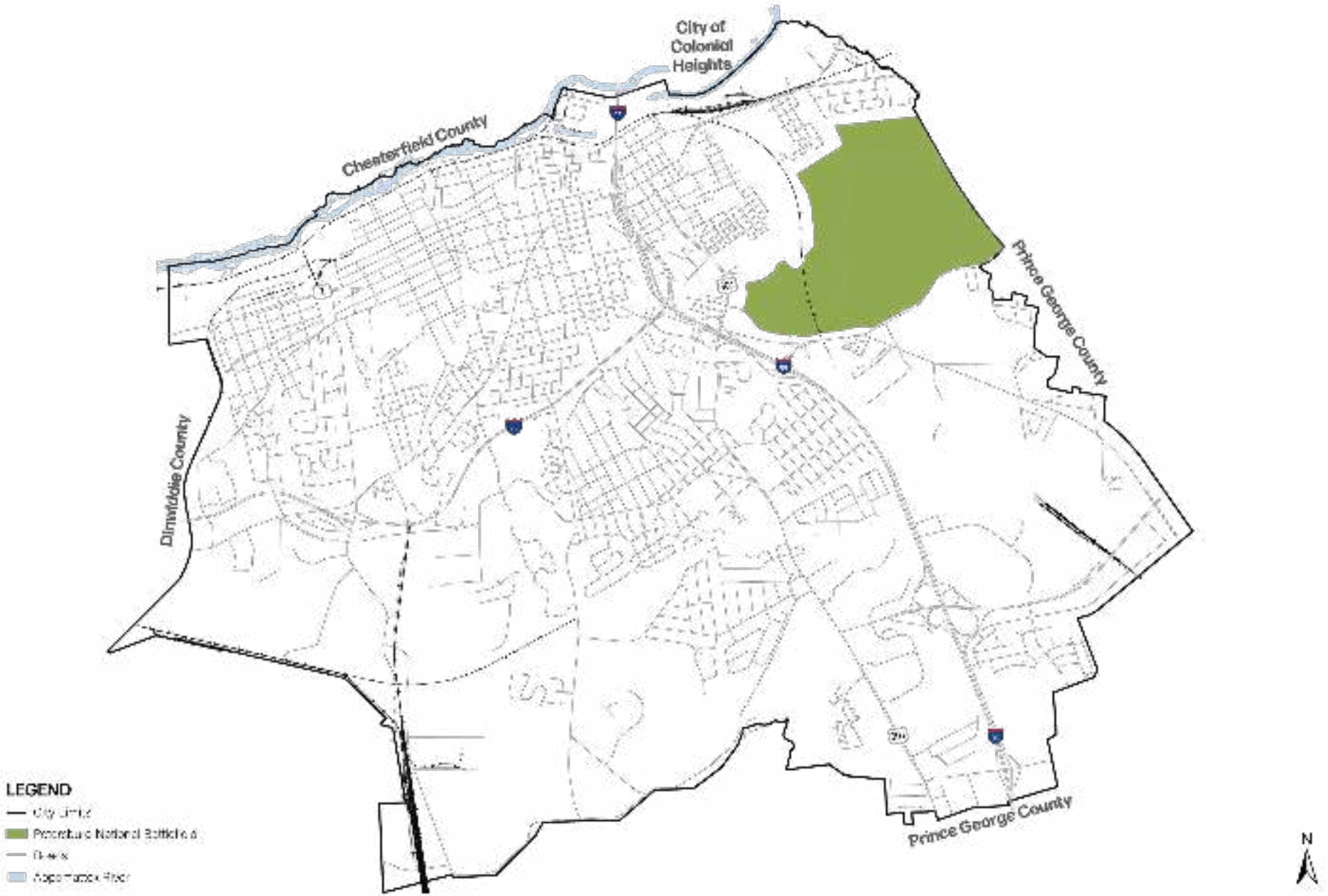
↓

ISSUES + OPPORTUNITIES
An overview of the relevant existing conditions, projections, and community input for each topic area.

↓

STRATEGIES
Specific, actionable items for the City to undertake as a means of reaching its defined goals.

MAP 1.1 | CITY OF PETERSBURG PLANNING JURISDICTION



CODE OF VIRGINIA

The Comprehensive Plan is the City of Petersburg's most important document regarding growth, development, and change. It establishes government policy to help guide public and private activities as they relate to land use and resource utilization. The Comprehensive Plan is the basis for land development regulations and decisions (e.g., rezonings); capital improvements related to community facilities, infrastructure, and transportation; and environmental and historic resource protection.

Every locality in Virginia is required by law to adopt a Comprehensive Plan. Code of Virginia Section 15.2-2223 states that the "Comprehensive Plan shall be made with the purpose of guiding and accomplishing a coordinated, adjusted and harmonious development of the territory which will, in accordance with present and probable future needs and resources, best promote the health, safety, morals, order, convenience, prosperity and general welfare of the inhabitants, including the elderly and persons with disabilities."

State requirements for Comprehensive Plans also recognize that community development is ongoing and ever changing. For this reason, Code of Virginia Section 15.3-2230 sets a requirement that all Comprehensive Plans be reviewed every five years and amended as needed.

RELATIONSHIP TO PLANS, POLICIES, AND ORDINANCES

PetersburgNEXT is intrinsically tied to past and present planning efforts, including related plans, policies, and ordinances. Data, ideas, and recommendations from these strategic documents are included and referenced throughout this Plan. The Comprehensive Plan, in turn, informs and influences future updates to all City land development regulations and decisions.

Zoning and Subdivision Ordinances

Petersburg's Zoning and Subdivision Ordinances are the primary tools used to implement the vision of the Comprehensive Plan. The Comprehensive Plan articulates the City's vision, goals, strategies, and objectives for land use and development, while the Zoning and Subdivision Ordinances regulate the location, form, and character of development. The Plan should therefore guide all updates to the Zoning and Subdivision Ordinances. These Ordinances should also be reviewed in their entirety on an annual basis to ensure that they align with the Comprehensive Plan. Additionally, when a development or rezoning application is submitted, the City Council and Planning Commission must ensure that the application meets Ordinance standards and contributes to the implementation of the Comprehensive Plan.

The Code of Virginia Sections 15.2-2223 and 15.2-2224, among others, outline the required and optional Plan elements and offer a general framework for Plan activities. These include, but are not limited to:

- **Future land use planning maps** and recommendations for development
- A comprehensive system of **transportation facilities**, including maps and cost estimates for improvements
- A system of **community service facilities**
- Areas and implementation measures for the construction, rehabilitation, and maintenance of **affordable housing**
- Strategies to provide **broadband infrastructure**

Petersburg Courthouse

Capital Improvements Program (CIP)

A Capital Improvements Program (CIP) is a short-term plan to fund capital project needs. The CIP is based on a five-year planning period. Every year, it is updated and extended an additional year into the future to ensure it remains a five-year program. The CIP prioritizes capital projects, estimates their costs and timeline, and determines the funding sources. City Council is then responsible for appropriating expenditures in either the annual operating budget or a separate capital budget.

The Comprehensive Plan informs the projects included in the CIP through including prioritization and assuming responsible parties for accomplishing each of the identified strategies. The community's goals and long-range vision for land use and investment are fully realized when the City ensures the priorities of the CIP align with the priorities of the Comprehensive Plan. Chapter 6 addresses capital projects and the need for a CIP in greater detail.

Other Plans, Studies, and Initiatives

Local, regional, and state plans, studies, and initiatives all inform Petersburg's comprehensive planning process, while the Comprehensive Plan informs the development of future planning initiatives. Some of the existing plans and studies considered in the development of this Plan are listed below; other individual plans and studies are referenced throughout the chapters.

- Virginia Department of Transportation (VDOT) Six-Year Improvement Plan (SYIP)
- Crater Planning District Commission Comprehensive Economic Strategy (CEDS)
- Crater Planning District Commission (CPDC) Richmond-Crater Hazard Mitigation Plan

USING PETERSBURG**NEXT**

Who uses the Comprehensive Plan and how do they use it?

- **Private citizens, business owners, and developers** use the Plan to better understand the community's assets, vision, and development goals.
- **City staff and the Planning Commission** use the Plan when reviewing land use applications and drafting ordinances, striving for consistency with the community's vision.
- **City Council** uses the Plan to guide decisions on budget priorities, capital projects, and ordinance amendments.
- **Regional partners** use the Plan to understand local priorities and advocate for grant funding and studies.

Comprehensive Plans are community documents used by a variety of individuals and stakeholders. The Comprehensive Plan best serves the community when it is actively used to make recommendations and decisions. Annual review of the Plan is also a best practice that helps bring the community's vision to fruition, as it allows for the Planning Commission to identify necessary amendments and track progress. The Implementation chapter of the Plan (Chapter 11) includes an implementation matrix and is a prime place to start the annual review. The implementation matrix should be analyzed and updated annually to measure achievements and reprioritize strategies, as needed to meet community goals.

Observing the Appomattox River

PETERSBURG**NEXT** COMMUNITY ENGAGEMENT

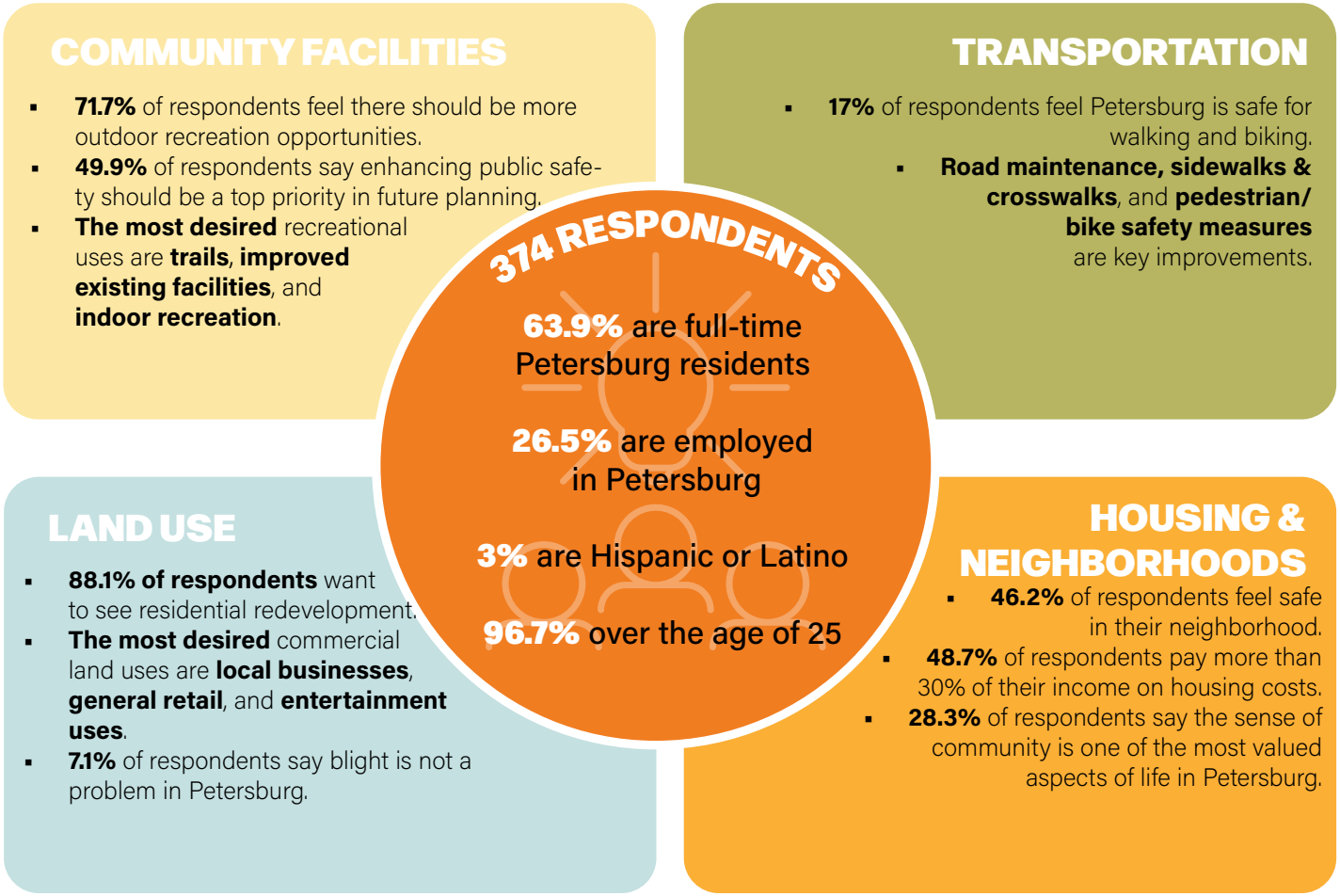
CREATING PETERSBURG**NEXT**

PetersburgNEXT is the culmination of nearly two years of research, data analysis, and most importantly, community input and engagement. Throughout the planning process, this Comprehensive Plan update has taken deliberate steps to guarantee that community voices define the City of Petersburg's vision and goals for today and tomorrow. The community will continue to be a vital part of the Comprehensive Plan's implementation over the next twenty years.

Participants engage at a PetersburgNEXT workshop

Community Survey

A community survey was available both online and in paper format from November 2022 to February 2023. The survey gathered input about community needs, strengths, concerns, and desires. 374 individuals took the survey, answering questions on topics such as housing, employment, recreation, and economic development. The general results of this survey are summarized here and are one critical component of the community engagement phase of Plan development. Where appropriate, specific survey results are noted throughout the Plan.



Public Workshops

The City conducted four public workshops to gather input from the community. Three in-person workshops were held on January 12, January 19, and January 26, 2023 at the Petersburg Public Library. An additional workshop was held virtually via Zoom on February 27, 2023. There were 42 community members who attended the in-person workshops, and 22 community members who attended the virtual workshop for a total of 64 public workshop participants.

Overall, attendees are passionate about their community and identified many assets that make the City a great place for them to call home. Attendees expressed a positive outlook for the future and see Petersburg's challenges not as liabilities but as untapped opportunities for growth and forward movement.

The following summarizes what the community sees as Petersburg's top strengths, weaknesses, and opportunities for the future.

Strengths and Assets

- Rich history and well-preserved inventory of historic sites
- Location at Interstates 95 and 85
- Historic and attractive downtown
- The people and the sense of community

Weaknesses

- Struggling public education system
- Lack of law enforcement to adequately address community needs
- Poorly maintained infrastructure and public spaces
- Blight

Opportunities and Goals for the Future

- Improvements for water, sewer, and broadband infrastructure
- Increased provision of affordable housing and associated opportunities for homeownership
- Investment in public education, activities, and opportunities for the City's youth
- Stricter zoning and code enforcement on blighted properties

Participants engage at a PetersburgNEXT workshop

Focus Groups

Community members, organization representatives, business owners, City department heads, and other regional experts participated in eight roundtable discussion sessions. Each session focused on a separate theme relevant to the Comprehensive Plan. In total, 54 people representing 45 organizations participated in the focus groups.

Similarly to public workshop attendees, focus group attendees viewed the City's challenges not as liabilities but as opportunities for innovative problem-solving and implementation of creative solutions. Listed here are the most common themes that arose across the focus groups, though many other topics were discussed.

- The people of Petersburg are seen as the City's greatest resource; they are passionate and committed. They love their City, believe in it, and want it to improve.
- Petersburg's rich inventory of historic resources is a unique and important asset. Natural resources, such as the Appomattox River, and recreational spaces, such as Legends Park and Petersburg Sports Complex, are other assets with untapped potential.
- Negative perceptions of the City continue to prevent growth and investment and are often incorrect.
- One of the biggest needs for the community over the next twenty years is investment in City-owned facilities, many of which have fallen into disrepair and are unsafe and/or unattractive for regular community use. Water, sewer, and transportation infrastructure also need improvement to both provide appropriate levels of service and facilitate new investment.
- Blight, the struggling public school system, and a lack of recreational opportunities and programming for youth create an environment that is conducive to crime.
- To achieve equitable and sustainable outcomes, local organizations and community members must be regularly engaged.
- Accountability, commitment, collaboration, and communication are key themes that should be explored in the Plan.

FOCUS GROUPS: WHO PARTICIPATED?

54 *individuals from*
45 *organizations*
including but not limited to:

Cameron Foundation

City of Petersburg Department Heads

Crater Health District

Crater Planning District Commission

Developers

Friends of the Lower Appomattox River

Institutions of Higher Education

National Park Service

Petersburg Area Transit

Petersburg City Public Schools

Petersburg Healthy Options Partnerships

DRAFTING AND REFINING

Plan Formulation

The Planning Commission is ultimately responsible for reviewing and recommending the proposed changes to the Comprehensive Plan, as directed in the Code of Virginia Section 15.2-2223. Code of Virginia Section 15.2-2230 additionally calls for the Comprehensive Plan to be reviewed by the local Planning Commission at least once every five years to determine whether it is advisable to amend the Plan.

Plan drafting was conducted through a collaborative approach between City staff and the Berkley Group planning consultants. The Planning Commission reviewed drafts and provided input and guidance during bimonthly worksessions from March through November 2023.

Public Review

Comprehensive Plans are a product of the community's input as interpreted through the lens of appointed and elected decision-makers. As such, the Plan follows a public review and refinement period that ensures the document accurately represents the community's concerns and has developed a path to address them accordingly. On January 12, 2024, the City of Petersburg hosted a public open house to showcase progress and gather feedback. The City also held two small-group sessions with Petersburg City Public School (PCPS) high school students on the same day to discuss the draft Plan.

Refinement and Adoption

With the inclusion of changes suggested during the public refinement period, the revised draft Plan was made available for public review and considered by the Planning Commission and City Council through a formal public hearing process in accordance with Code of Virginia requirements. City Council voted to adopt the Plan on May 21, 2024.

Interactive mapping activity at a PetersburgNEXT workshop

Croaker's Spot, Old Towne

02 IDENTITY

Chapter 2 of PetersburgNEXT provides a data-driven foundation for the key issues and opportunities facing the City. This chapter looks back at who we were, provides foundational information relevant to who we are today, and establishes the vision to help us reach who we aspire to be.

“PETERSBURG PRIDE IS **ON THE RISE**!”

- Community Survey Respondent

02

WHO WE WERE

Originally known as Peter's Point, Petersburg was settled at the fall of the Appomattox River, a strategic location that lends the City a rich cultural, economic, and social history. When European settlers first arrived in the early 1600s, Indigenous peoples in the area mounted fierce resistance before signing treaties that led to flourishing trade. The growth of the tobacco market in the early 1700s brought about the founding of Petersburg. Petersburg received its charter in 1748 and officially became a City in 1850.

Petersburg's free Black population grew quickly after the Revolutionary War, with Pocahontas Island becoming one of the oldest free Black settlements in the United States. In the 1830s, Petersburg built its first railroads. The ability to connect both locally and regionally by rail led to the flourishing of agricultural and industrial uses, in turn leading to Petersburg's rise as Virginia's logistical and shipping center.

Petersburg was a significant location during the Civil War, with Petersburg National Battlefield remaining a nationally recognized and preserved site. In the spring of 1864, Union army General Ulysses S. Grant surrounded Petersburg for nearly ten months, which was the longest siege of an American city. After General Robert E. Lee and his Confederate forces abandoned Petersburg in April 1865, Lee surrendered, ending the Civil War.

By the early 20th century, the logistical and shipping center of Virginia had shifted north to Richmond. Petersburg then became the retail hub of Southside Virginia. Several new industries were established in Petersburg, including the Seward Luggage Company, which became one of the largest manufacturers of trunks and luggage in the country. Titmus Optical Company and Arnold Pen Company were also founded during the same era and contributed greatly to Petersburg's thriving economy at the turn of the 20th century. During this era, department stores, grocers, specialty stores, and theatres lined Sycamore Street and adjoining streets in Old Towne and sprung up around the Halifax Street triangle, which was the center of a thriving Black community.

Petersburg Courthouse

WHO WE ARE

Petersburg's history, geography, vibrant local businesses, and natural beauty are embraced today with renewed excitement. Petersburg continues as a transportation hub with immediate access to Interstates 85, 95, and 295, and U.S. Routes 1, 301, and 460, as well as an Amtrak station in nearby Ettrick and a CSX freight yard on its border with Dinwiddie County. This ease of access is one factor that has attracted the pharmaceutical industry as a promising addition to Petersburg's economic base. The emerging logistics and distribution industries in adjacent localities, along with Fort Gregg-Adams, a U.S. Army training installation, have also provided residents with stable, well-paying job opportunities.

Petersburg's well-preserved historic buildings and districts evoke the feeling of stepping back in time. This rich backdrop has not only been a draw for tourists from across the United States, but has garnered the attention of the entertainment industry, with internationally acclaimed television shows and films such as *Turn* and *Lincoln* filmed in the heart of Old Towne.

Eco-tourism and sports tourism are other emerging opportunities for Petersburg. The City has a considerable amount of recreational and green space, along with Petersburg Sports Complex, an outdoor recreational venue with various sports fields, ponds, and pavilions. The Appomattox River Trail, Fall Line Trail, and East Coast Greenway will also provide new opportunities to connect Petersburg with the greater Richmond region and beyond.

To plan for the Petersburg of tomorrow, it is important to be knowledgeable about the Petersburg of today. Understanding Petersburg's demographics, how they have changed over time, and how they may continue to evolve in the future provides the City with the foundation required to establish effective and equitable policies and strategies to reach its long-term goals.

Musicians perform at the Halifax Jazz Festival

MAP 2.1 | REGIONAL CONTEXT

Geography and Location

Petersburg is 22.72 square miles – about 14,541 acres – in area and located in south central Virginia. The City is approximately 23 miles south of Richmond, 76 miles west of Virginia Beach, 130 miles south of Washington, D.C., and 148 miles north of Raleigh, North Carolina. Petersburg is located approximately halfway between the states of New York and Florida, giving it unparalleled access to a majority of the nation's population base through two major interstate highways and three U.S. routes.

Metropolitan Statistical Area

Petersburg is one of 17 jurisdictions that comprise the Richmond-Petersburg Metropolitan Statistical Area (MSA). As of 2020, the MSA population was 1,314,434. This reflects a 10% increase from the MSA's 2010 population of 1,188,246, which can reasonably be attributed to the region's relatively low cost of living, high number of job opportunities, and easily accessible location in the central part of the state.

TOTAL POPULATION

CITY OF PETERSBURG

33,458

RICHMOND - PETERSBURG MSA

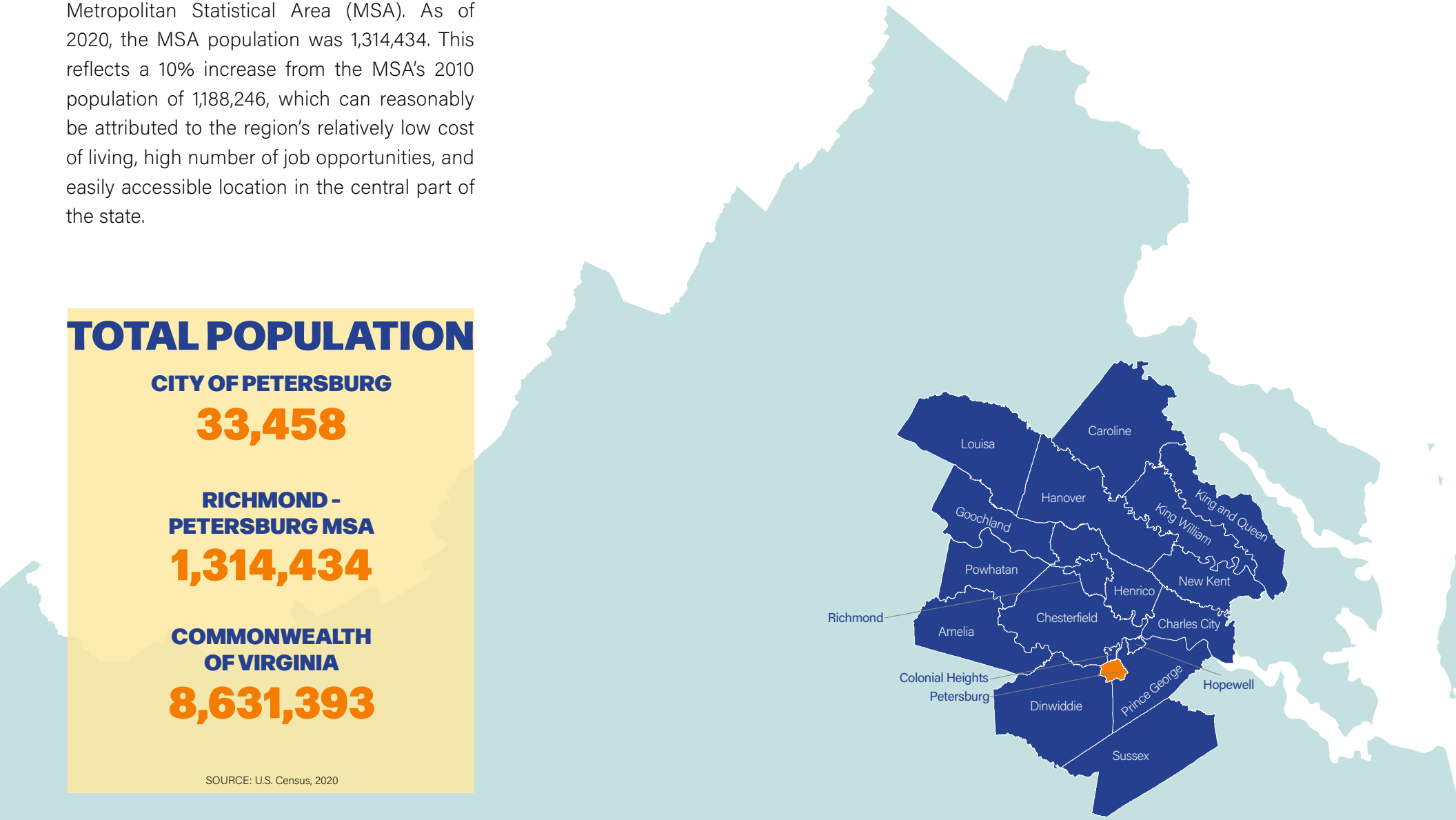
1,314,434

COMMONWEALTH OF VIRGINIA

8,631,393

SOURCE: U.S. Census, 2020

MAP 2.2 | RICHMOND-PETERSBURG METROPOLITAN STATISTICAL AREA (MSA)



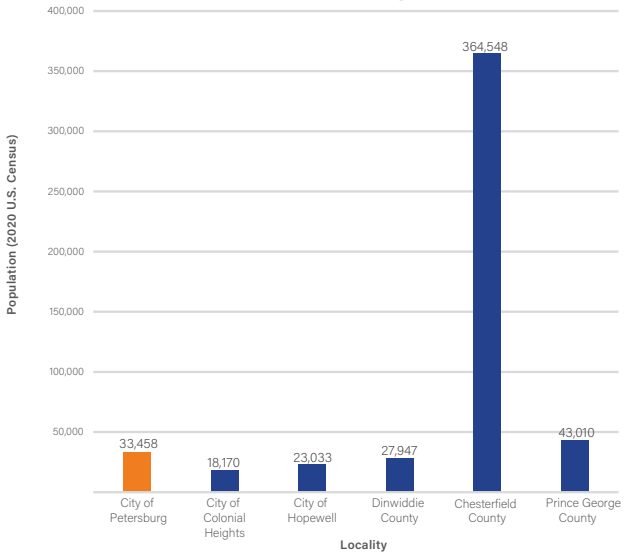
People and Population

Petersburg's population has remained relatively stagnant since 2000, and was 33,458 as of the 2020 U.S. Census. Population is projected to increase slightly between 2020 and 2030, and then remain relatively stable through 2050. To encourage future growth and generate associated increases in revenue streams, the City can be proactive with its land use policies to encourage new development, simultaneously ensuring that the level of service of water, sewer, and transportation infrastructure can support increased use.

Petersburg is the largest of the three cities in the Tri-Cities region, and retains a larger population than all neighboring localities except Chesterfield County.

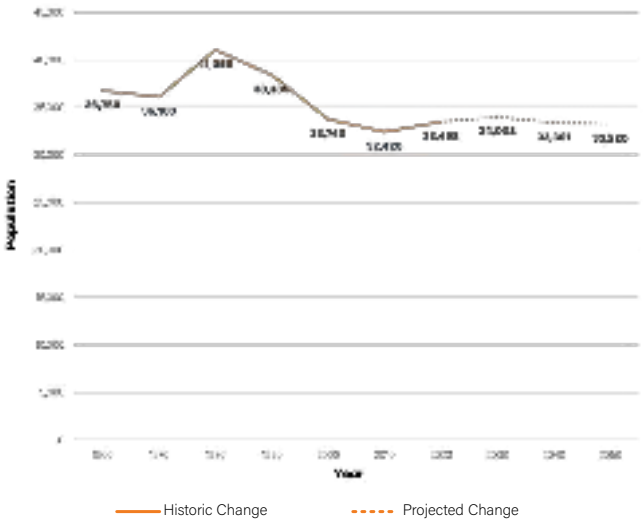
Between 2015 and 2019, Petersburg's net migration was -1,523, indicating that out-migration has played a strong role in stagnated growth. Both in- and out-migration primarily occurred between Petersburg and municipalities in the greater Richmond area. Minimal migration occurred between the City of Petersburg and Virginia municipalities outside of this region, while even lower levels of migration occurred between Petersburg and places outside Virginia.

Total Population, Regional



SOURCE: U.S. Census, 2020

Historic and Projected Population Growth in Petersburg



SOURCE: U.S. Census, 2020; Weldon Cooper Center for Public Service

In-Migration and Out-Migration: Top Destinations

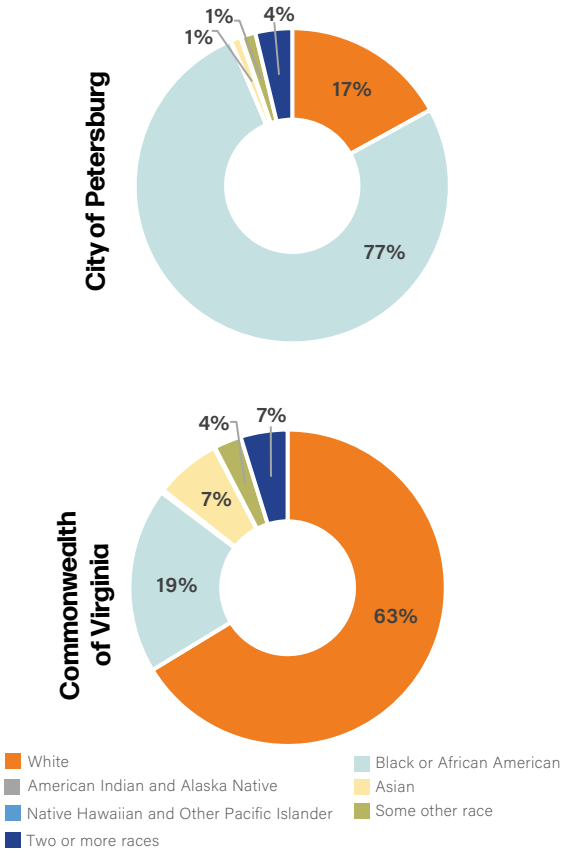
Top Origins (In-Migration)
1. City of Richmond
2. Prince George County
3. City of Colonial Heights
4. Chesterfield County
5. City of Portsmouth
6. City of Hopewell
7. Henrico County
8. Dinwiddie County
9. Clay County, FL
10. Prince William County

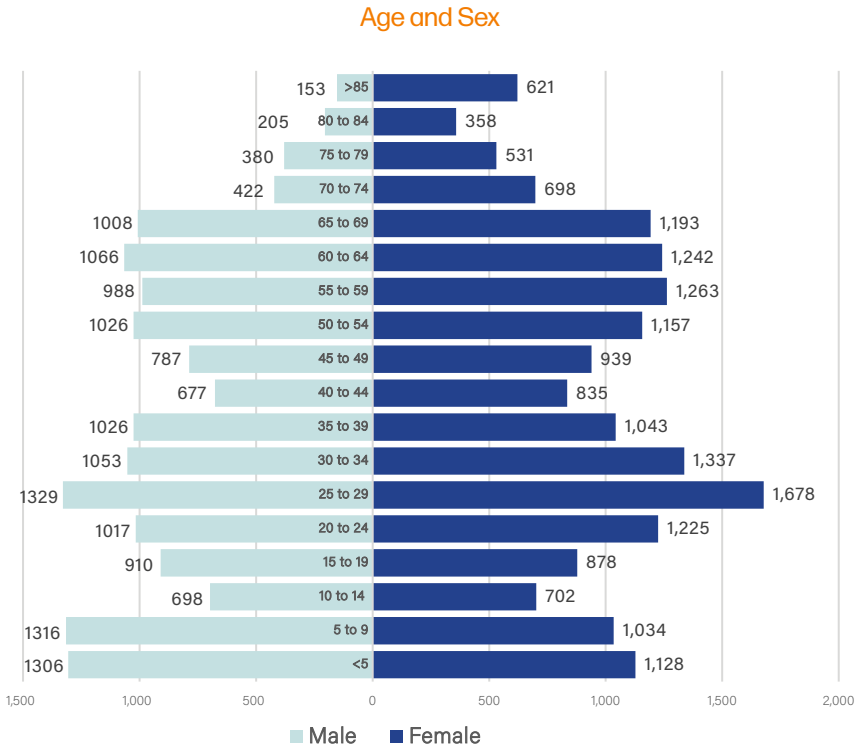
Top Destinations (Out-Migration)
1. City of Colonial Heights
2. Prince George County
3. City of Portsmouth
4. Chesterfield County
5. City of Richmond
6. Henrico County
7. Surry County
8. Augusta County
9. Escambia County, FL
10. City of Hopewell

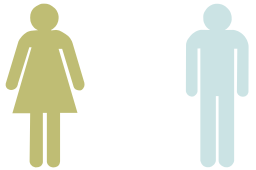
SOURCE: Internal Revenue Service

To plan equitably, the City must be mindful of who is in the community, and how this may change over the next twenty years. Petersburg is a racially diverse City. A majority (77%) of the City's residents identify as Black or African-American; 17% identify as white. Racial diversity has not significantly changed over time, and Petersburg has remained generally more diverse than its neighboring localities and Virginia overall.

Petersburg is generally a slightly younger locality than most of its neighbors and has a younger population than Virginia overall. The median age in Petersburg is 36.6; this has not changed significantly since 2000. The City's population as of 2020 reflects large concentrations of residents between the ages of 0 to 9, 25 to 39, and 60 to 69. Therefore, the ways in which Petersburg will seek to move forward in the future should be intergenerational in nature, meaning that they should have positive benefits for a variety of ages and not solely a specific sub-group.







54% **46%**
City of Petersburg

51% **49%**
Commonwealth of Virginia

36.6
City of Petersburg
Median Age

38.7
Commonwealth of Virginia
Median Age

SOURCE: 2018-2022 American Community Survey, 5-Year Estimates

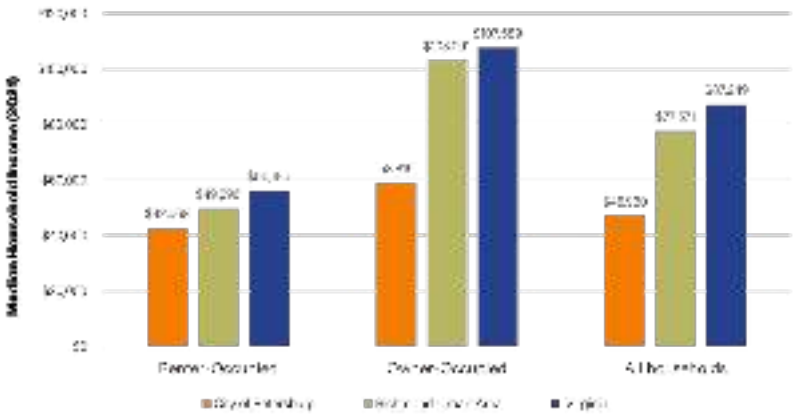
Economy

Baseline economic metrics such as educational attainment, unemployment rate, and median household income are important in understanding the socioeconomic characteristics of the community. Educational attainment in Petersburg falls behind the statewide average, particularly when considering the percentage of adults with an associate's or bachelor's degree.

Petersburg has seen a higher unemployment rate than the rest of the country since 2008. Additionally, it appears that Petersburg's unemployment rate is more susceptible to rise during recessions than the nationwide unemployment rate. Overall, however, the unemployment rate has been trending steadily downward since 2008.

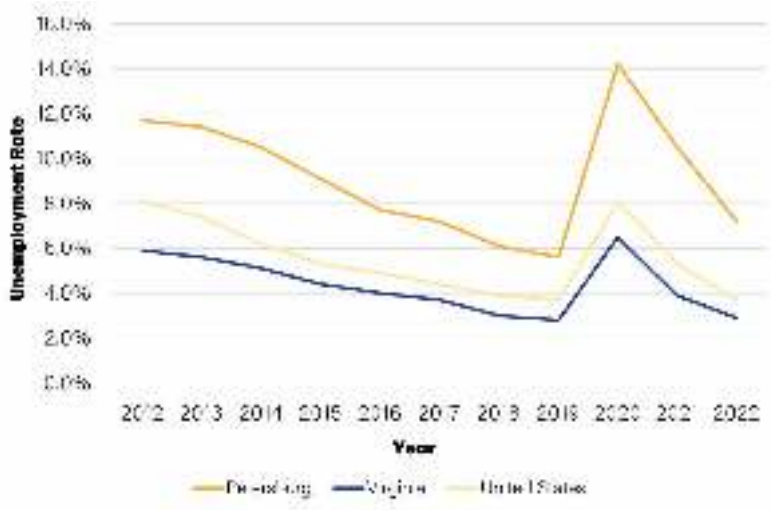
At $46,930, Petersburg's median household income is significantly lower than the statewide median of $87,249. The discrepancy increases when the data is isolated for owner-occupied households: $58,815 for Petersburg, compared to $107,580 for Virginia. The difference in the median household income of renter households is meaningful, but less pronounced than the difference in the median household income for owner-occupied households.

Median Household Income Comparison



SOURCE: 2018-2022 American Community Survey, 5-Year Estimates

Unemployment Rate, 2008-2022



SOURCE: Virginia Employment Commission, Economic Information & Analytics, Local Area Unemployment Statistics

Educational Attainment

Educational Attainment	City of Petersburg	Commonwealth of Virginia
Less than 9th grade	5.3%	3.6%
9th to 12th grade, no diploma	8.3%	5.3%
High school graduate	35.9%	23.9%
Some college, no degree	20.9%	18.5%
Associate's degree	7.9%	7.8%
Bachelor's degree	13.5%	23.1%

SOURCE: 2018-2022 American Community Survey, 5-Year Estimates

56.5%
Labor Force Participation Rate (2020)

Top Employers

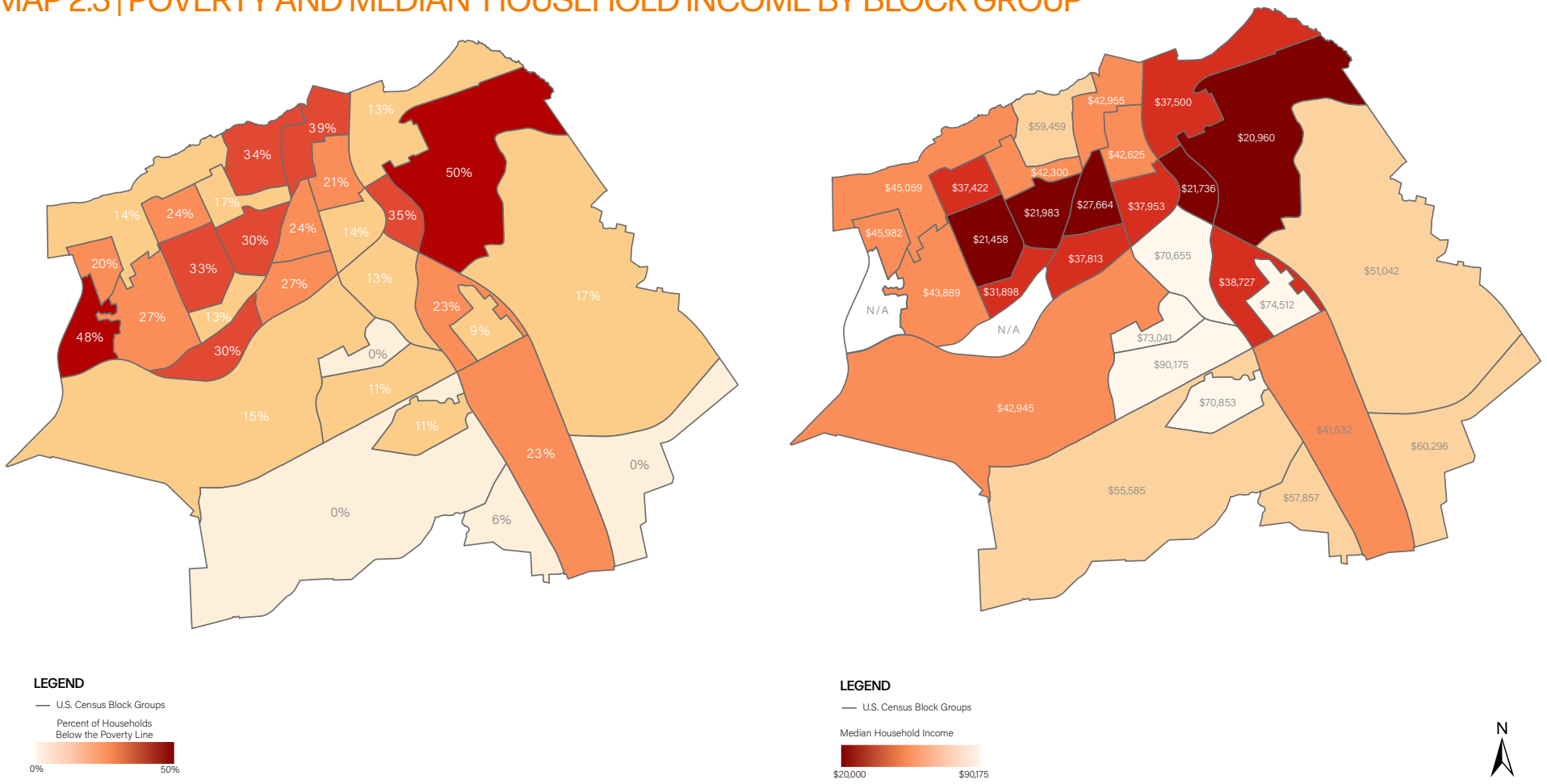
1. Bon Secours Health System
2. City of Petersburg
3. Petersburg City Public Schools

$977
Average weekly wage, all industries

SOURCE: Virginia Employment Commission, Economic Information & Analytics, Quarterly Census of Employment and Wages (QCEW), 3rd Quarter (July, August, September) 2023

High poverty levels have caused challenges for Petersburg in recent years due to demand for the provision of health and human services. This provides an opportunity for the City to reevaluate the efficiency of its operations, determine potential options for public-private partnerships, and expand City facilities. Poverty and household income tend to be inversely correlated (Map 2.3), providing the City with the opportunity to locate facilities in areas of greatest need.

MAP 2.3 | POVERTY AND MEDIAN HOUSEHOLD INCOME BY BLOCK GROUP



SOURCE: 2016-2021 American Community Survey, 5-Year Estimates

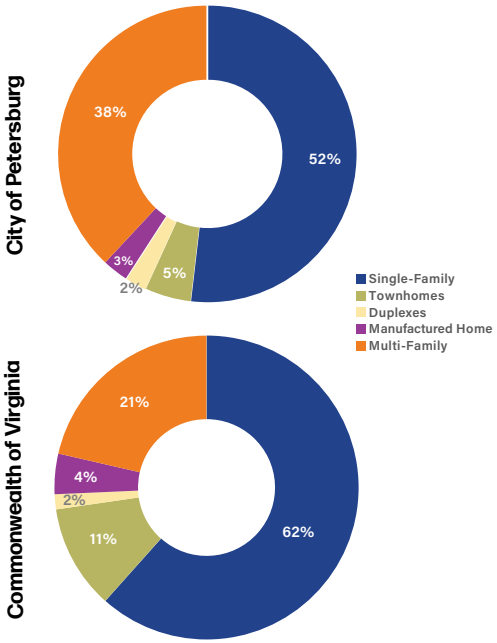
Housing and Neighborhoods

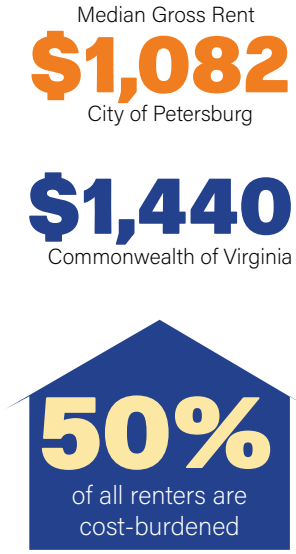
Housing is a major component of land use and development in Petersburg. Community feedback reflected a desire to improve the existing housing stock through blight abatement and adaptive reuse, as well as to ensure that housing costs remain affordable within the context of Petersburg's median household income and poverty rate.

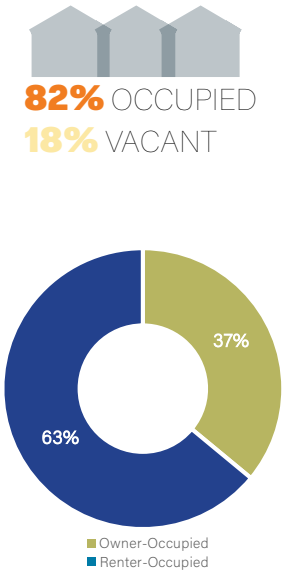
Petersburg's housing stock is primarily composed of single-family dwellings, although the housing stock is more diverse than that of Virginia overall due to a higher percentage of multi-family dwellings. The majority of Petersburg's occupied residences are renter-occupied.

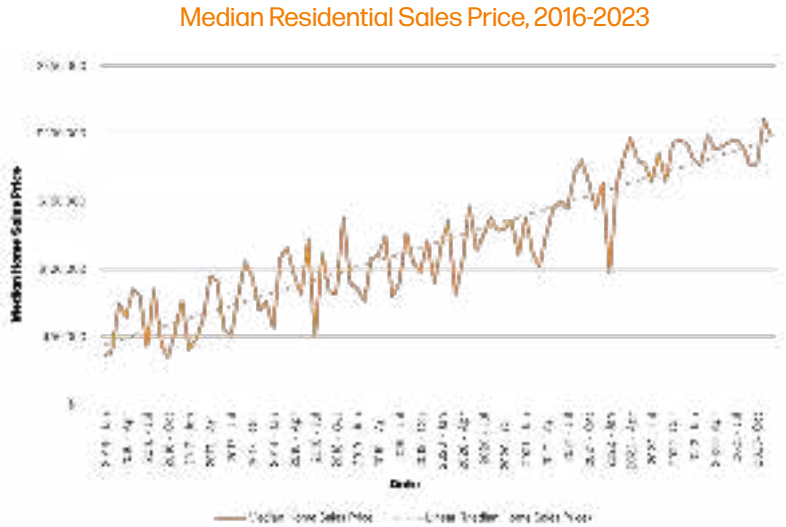
The median home sales price in Petersburg as of December 2023 was $198,000, while the median home sales price across Virginia was $286,250. While lower median home sales prices in Petersburg may imply affordability, there are several other factors to consider, such as blight and a higher percentage of multi-family housing, which is typically lower cost than single-family housing. In addition, approximately 50% of Petersburg's renter households and 30% of Petersburg's homeowner households are considered cost-burdened, meaning that 30% or more of their income goes toward housing costs, including a monthly rent or mortgage payment and utilities.

Broadband access remains a challenge for City residents. 20% of residents can only access the Internet through a cellular subscription, and only 56% of residents have broadband through cable, fiber optic, or DSL. Closing the digital divide is a worthwhile goal for the City, as it opens new doors for online and remote employment and educational opportunities. The Community Facilities and Infrastructure chapter of this Plan (Chapter 6) explores broadband investment in greater detail.









SOURCE (all infographics): 2018-2022 American Community Survey, 5-Year Estimates; Virginia Realtors; Virginia Housing Forward

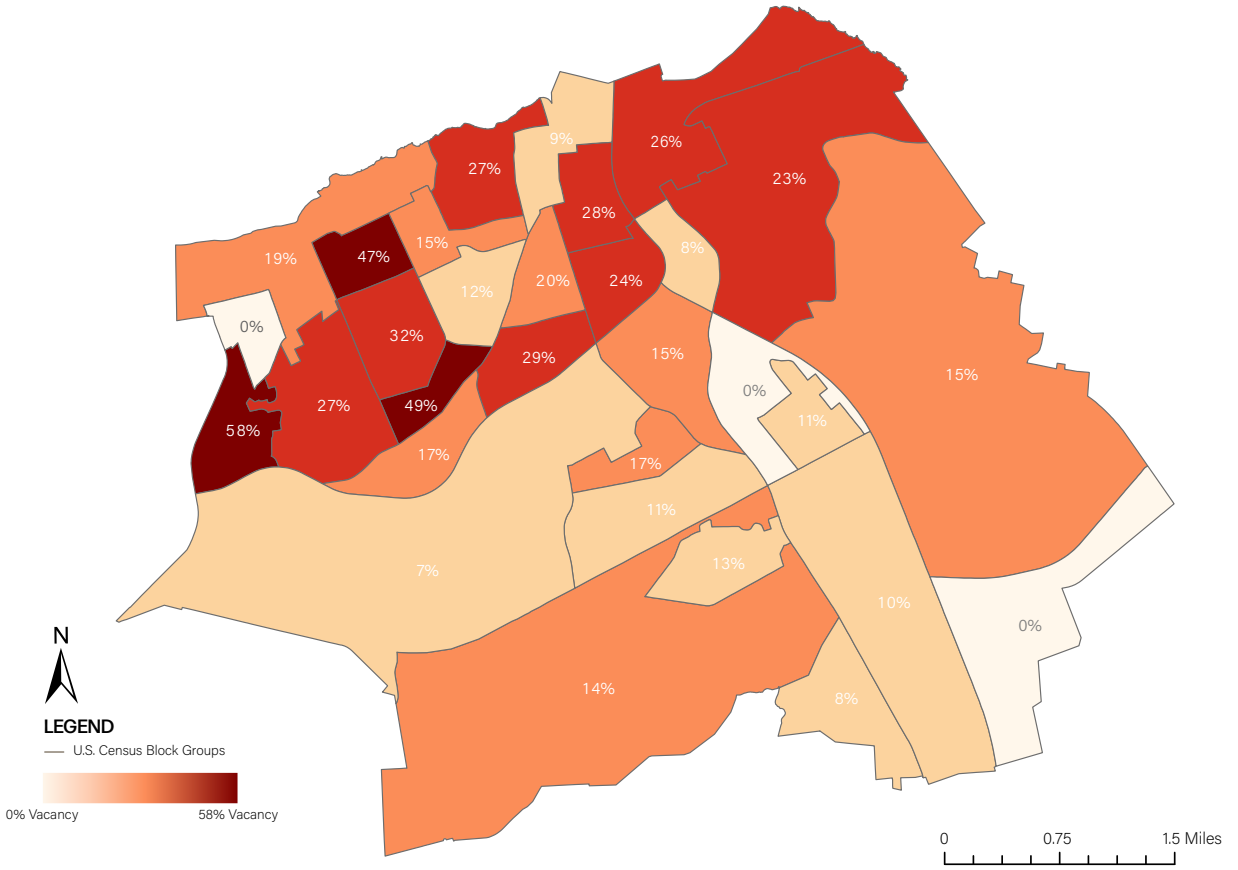
Petersburg's residential vacancy rate is more than double the statewide average. The highest contributors to the City's vacancy rate are the high percentage of blighted and abandoned homes (included in the Other Vacant category), and homes that are available for rent but not yet leased to a tenant. Monitoring the vacancy rate is important as it signals when the City's housing market may be imbalanced. Chapter 4 of this Plan discusses vacancy and strategies for blight abatement and rental properties in greater detail.

Vacancy Status

	Number of Units	Percentage
Other vacant	1,936	59.8%
For rent	837	25.8%
For sale only	257	7.9%
Rented, not occupied	74	2.3%
For seasonal, recreational, or occasional use	129	4.1%
Sold, not occupied	5	0.1%
For migrant workers	0	0%
Total Vacant:	**3,238**	**100%**

SOURCE: 2018-2022 American Community Survey, 5-Year Estimates

MAP 2.4 | RESIDENTIAL VACANCY RATE BY BLOCK GROUP



SOURCE: 2016-2021 American Community Survey, 5-Year Estimates

Transportation

Most of Petersburg's employees commute to work alone. However, 12.3% carpool to work and 3.7% rely on public transportation – both notably higher than the statewide percentages. This can be explained by the fact that 16.5% of households do not have access to a personal vehicle. Investment in alternative transportation methods therefore becomes an important policy tool to provide equitable access to stable, well-paying employment opportunities.

Most of Petersburg's commuters travel to Henrico and Chesterfield Counties, as well as the City of Richmond, for employment. The mean travel time to work is slightly lower than the statewide mean travel time and can be explained by the fact that the top employment destinations for City residents are relatively close by.

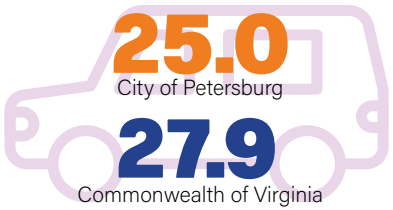
The Mobility and Transportation chapter (Chapter 9) provides considerations for transportation and provides projects that should be prioritized over the timeframe of this Plan.

Commuter Mode of Transportation

Commuting to Work	City of Petersburg	Commonwealth of Virginia
Drove alone	72.4%	70.9%
Carpooled	12.3%	8.3%
Public transportation (excluding taxicab)	3.7%	3.0%
Walked	1.2%	2.1%
Other means	3.3%	1.7%
Worked from home	7.2%	14%

SOURCE: 2018-2022 American Community Survey, 5-Year Estimates

Mean Travel Time to Work (Minutes)



SOURCE: U.S. Census On The Map, 2019

Community Health and Wellness

Land use policies can positively influence the overall quality of life and health outcomes for a community. Investing in alternative transportation options, encouraging housing opportunities that are safe and free of health hazards, providing and maintaining parks and recreational opportunities, and adopting Zoning Ordinance regulations that limit adverse development impacts on the natural environment are all examples of policies that will benefit public health outcomes for residents. Information and strategies related to public health can be found throughout this Plan.

Root causes of poor health outcomes consist of a number of different social and environmental factors, apart from clinical care, including but not limited to transportation, housing, and healthy food access. These root causes, collectively, are why differences in health outcomes between groups known as health disparities persist. For example, Black community members are 40% more likely to have high blood pressure and 20% more likely to die from heart disease than white community members. The difference in outcomes of these groups demonstrates health disparities. The major underlying root causes contributing to these health disparities are poverty and racism. Poverty limits a family or individual's ability to achieve their healthiest life by limiting the availability of healthy options. For example, most people experiencing poverty live in neighborhoods without grocery stores, or other retail outlets that sell healthy and fresh food. Additionally, most impoverished neighborhoods have unsafe streets and sidewalks, either by design or because of perceived crime risk, therefore inhibiting transportation and recreation.

Regional Health Data

Health Metric	City of Petersburg	Dinwiddie County	City of Hopewell	City of Colonial Heights	Prince George County
Median Household Income	$46,930	$77,225	$50,661	$72,216	$80,318
Percentage of Residents Below Federal Poverty Line	22.2%	11%	21.3%	10.2%	8.3%
Overall Life Expectancy (years)	66.2	76.7	70.2	73.7	80.8
Adult Obesity Rate	47%	41%	41%	39%	36%
Food Insecurity Rate	18%	9%	17%	10%	7%
Physical Inactivity Rate	32%	24%	33%	23%	23%

SOURCES: 2018-2022 American Community Survey, 5-Year Estimates; 2023 County Health Rankings

COUNTY HEALTH RANKINGS: PETERSBURG HIGHLIGHTS

STRENGTHS:

- **Rate of Access to Exercise Opportunities:** 94% in Petersburg vs. 83% in Virginia
- **Social Associations Index:** 16.1 in Petersburg vs. 11.0 in Virginia

OPPORTUNITIES FOR GROWTH:

- **Sexually Transmitted Infections:** 1,563.2 per 100,000 people in Petersburg vs. 479.9 per 100,000 people in Virginia
- **Physical Inactivity Rate:** 32% in Petersburg vs. 20% in Virginia
- **Rate of Severe Housing Problems:** 27% in Petersburg vs. 14% in Virginia

Click here to explore the full County Health Rankings for Petersburg.

County Health Rankings, a nationally recognized organization that models the influence of health determinants on a community, ranks Petersburg as the lowest jurisdiction in Virginia for both health outcomes and health factors. Health outcomes indicate how healthy City residents are both in terms of lifespan and quality of life. Health factors represent aspects that the City can help influence to improve long-term health outcomes. Petersburg has much to be optimistic about for several health factors, namely access to exercise opportunities, which can be attributed to the City's large inventory of green spaces. Social associations are another strength due to the City's many passionate and active community groups. Petersburg can draw on those in the community to be active advocates and partners for other healthy changes and initiatives. Ultimately, Petersburg should view public health not as a liability but rather as an opportunity to leverage creative solutions for promoting resident wellbeing and enhance overall quality of life.

The potential for partnerships with local and regional organizations to provide care in areas of greatest need should not be overlooked. Public health is one of the major themes of PetersburgNEXT and can be found interwoven throughout each of the Plan chapters.

Enjoying quality time at a City event

A kayaker navigates the Appomattox River

PLANNING FACTORS

Planning factors are trends, recent changes, or circumstances that influence Petersburg's land use and development policies. They can be local, statewide, or even national in their scope. Petersburg will remain aware of the following planning factors as it seeks to set goals, objectives, and strategies for the next twenty years:

Fort Gregg-Adams

The close proximity of Fort Gregg-Adams to Petersburg presents many challenges and opportunities. Petersburg can evaluate zoning and development patterns on its east side to provide more housing opportunities for military families, as well as evaluate investment in its public school facilities to provide a more attractive incentive for families deciding where to relocate.

Waterfront Investment

Plans to extend the East Coast Greenway multi-modal trail, the Fall Line Trail, and the Appomattox River Trail through Petersburg will be transformative for the City's waterfront areas. Undeveloped parcels along the Appomattox River present opportunities for development that has benefits for both residents and visitors alike, such as recreational spaces that can also hold special events or festivals or additional sidewalk and bicycle infrastructure to connect Old Towne with the waterfront. This, combined with trails investment and possibilities of dredging the river, has the potential to position Petersburg as Central Virginia's new destination for outdoor recreation and tourism.

Virginia State University

The presence of Virginia State University (VSU) across the Appomattox River in Ettrick presents opportunities for investment in multi-family housing, as well as amenities such as retail, restaurants, and entertainment that are desirable to college students.

Water and Sewer Infrastructure

Petersburg can accommodate future growth and investment by repairing and upgrading its water and sewer infrastructure. The City's utilities infrastructure is hundreds of years old, leading to inconsistent provision of quality service to the community. Recent investments have been made to improve service in the Poor Creek Sewer Service Area. The short-term costs will be returned by the long-term benefits of increased capacity that will fuel economic growth.

Historic Preservation

Petersburg's rich history and well-preserved downtown and residential historic districts, along with Petersburg National Battlefield, have long been valued by residents and visitors alike. The City can continue to protect, preserve, and promote the assets as a tourism draw and opportunity to reinforce community pride.

Housing Rehabilitation and Blight Abatement

Across the nation, more and more private corporations and non-local landlords are beginning to control localities' affordable housing supply, as affordable housing is often perceived to be an easy investment opportunity. This is true of Petersburg, where many landlords are non-local, in turn making it more difficult for local residents to achieve homeownership. Additionally, the lack of continuous property monitoring makes it easier for properties to fall into states of disrepair or blight, and more difficult for the City to enforce code violations and tax evasion. Petersburg can explore ways to communicate with and enforce requirements for non-local landlords, and partner with organizations that promote pathways to homeownership.

Rise of Remote Work

The rise of remote work has shifted traditional housing and transportation patterns. Across both Virginia and the nation, remote workers are moving to cities with lower costs of living due to their newfound mobility and flexibility. Remote workers are also drawn to cities with recreation and entertainment opportunities as they contribute to a healthy work-life balance. Many localities have adopted initiatives to attract remote workers as a means of increasing tax bases and opening doors for investment in new amenities that can have broad community benefits, such as co-working spaces, small businesses, and recreational opportunities. Petersburg will consider the degree to which it wants to promote itself as a remote work destination.

New Industries

Petersburg was recently announced as the new home of a pharmaceutical campus. This new industry will have many ripple effects on Petersburg, including a rise in the number of commuters, new families looking to relocate to the City, and new opportunities for specialized education through local community colleges and workforce development programs. Additionally, the emerging warehousing industry and arrival of associated distribution centers in Petersburg and in neighboring localities connects local residents with new job opportunities and warrants the need for a regional approach to investment in transportation infrastructure.

Rendering of Civica, Inc.'s facility in the pharmaceutical campus
Photo Credit: Civica Inc.

Climate Resiliency and Green Energy

As climate change and an associated rise in severe weather events such as flooding and extreme temperatures become an increasing threat, Petersburg must be prepared to respond to emergencies as they happen, and remain resilient in disaster recovery.

Green energy is a large part of climate resiliency. In planning for the future, Petersburg will evaluate how green energy infrastructure - including but not limited to electric vehicle (EV) charging stations - can be established and used to the benefit of the community.

Broadband Infrastructure

Reliable internet is a fundamental apsect of 21st century living, and has many benefits to Petersburg. When residents can access reliable internet at their homes, new doors open for educational and employment opportunities. Additionally, strong broadband infrastructure can spark new economic development through the arrival of new businesses and remote workers. Petersburg will continue its efforts to provide reliable broadband in all areas of the City.

Arts and Culture

Petersburg's rich history has led to a distinctive community culture and a thriving arts community. The film industry, live music, acting and performing arts, and visual arts all enjoy a predominant presence in Petersburg and enrich the City's already vibrant culture. In recent years, there has been a greater effort to further explore other contemporary and cultural assets within Petersburg that might be leveraged as tourist attractions and draw a broader, more diverse audience.

Public art installation in Old Towne

WHO WE ASPIRE TO BE

Understanding who we are today helps us envision tomorrow. Petersburg's collective vision – and the means required to achieve this vision – is a long-term goal. It will require active participation and engagement from a variety of people and organizations. This vision can be achieved by setting goals with specific objectives, strategies, and implementation tools, along with continuously monitoring progress after the Plan is adopted.

The distinct benefit of a Comprehensive Plan is that it provides the direction to transform a clear vision into a recognizable reality. PetersburgNEXT considers how the entire community's values, people, places, and prosperity are interrelated and interdependent. It identifies defining issues and opportunities for the next twenty years, and how Petersbug can leverage its strengths while mitigating its weaknesses. PetersburgNEXT is our community's Plan for a bright future and lays the fundamental groundwork to keep moving forward over the next twenty years and beyond.

Petersburg is a thriving, culturally diverse community where all residents enjoy safe and attractive neighborhoods, economic opportunity, quality education, and celebration of rich history.

PETERSBURG**NEXT** VISION STATEMENT

KEY THEMES

To achieve the vision for 2044 and beyond, Petersburg is committed to making decisions that are equitable, intended to advance public health and safety, informed by collaboration with key partners, and wisely steward natural resources. These key themes are recognized and further discussed in each of the Plan chapters.

Equity

Interwoven through all of the planning efforts and decisions Petersburg must make is the need to plan and provide equitably for all City residents. Housing, community facilities, and transportation infrastructure are three areas of immediate need for improving choice and access, but equitable access to economic opportunities, a healthy environment, and safe neighborhoods are fundamental to Petersburg's bright future.

Public Safety

Safe communities are healthy communities. Petersburg recognizes the impacts of land use decisions, infrastructure provision, and attractive and clean neighborhoods on public safety and is committed to making crime reduction an interwoven element of strategic decision-making.

Public Health

The quality of the built environment has profound impacts on community health. Petersburg will strive to build upon elements that support a healthy community, including active transportation infrastructure, recreational opportunities, and access to fresh and healthy food options.

Responsible Regionalism

Successful implementation of the strategies identified in this Plan will require collaboration with community-based organizations, neighboring localities, and state agencies. Petersburg will be a responsible partner and work actively with the community and region to acheive its visions for 2044.

Environmental Stewardship

The protection and preservation of Petersburg's land, water, and air, along with mitigating the impacts of climate change, are important considerations for the next twenty years. Petersburg will consider resilience, sustainability, and resource protection in its land use and development policies so the City's natural beauty and environment can be enjoyed for generations to come.

Community members enjoying a meal at a Petersburg Night Out

Our Plan for a bright future.

PLAN VISION

Petersburg is a thriving, culturally diverse community where all residents enjoy safe and attractive neighborhoods, economic opportunity, quality education, and celebration of rich history.

KEY THEMES

- EQUITY
- PUBLIC SAFETY
- PUBLIC HEALTH
- RESPONSIBLE REGIONALISM
- ENVIRONMENTAL STEWARDSHIP

PLAN CHAPTERS

- ECONOMIC DEVELOPMENT
- HOUSING AND NEIGHBORHOODS
- PARKS, RECREATION, ARTS, AND HISTORIC PRESERVATION
- COMMUNITY FACILITIES AND INFRASTRUCTURE
- PUBLIC SAFETY
- MOBILITY AND TRANSPORTATION
- ENVIRONMENTAL STEWARDSHIP
- LAND USE

03 ECONOMIC DEVELOPMENT

Petersburg will build a thriving and resilient economy that promotes quality jobs in diverse industries, workforce development, tourism, and business opportunities.

"I WANT TO SEE PETERSBURG BECOME A GATEWAY BETWEEN THE NORTH AND SOUTH; I WANT THIS CITY TO BECOME **A BEACON OF THE EAST COAST**."

- Community Survey Respondent

03

INTRODUCTION

Petersburg enjoys a strategic location within the heart of Virginia, with excellent access to major markets such as Richmond, Hampton Roads, Washington, D.C., and Raleigh, North Carolina. It is served by two primary interstates, rail, and several other major highways. Extensive frontage along the Appomattox River also presents untapped opportunities for economic investment and tourism.

While Petersburg experienced a financial crisis in 2016, the City boasts a A+ bond rating as of 2023. Recent multimillion dollar investments in advanced manufacturing at the pharmaceutical campus will continue Petersburg's legacy as an industrial powerhouse.

The largest sector of the local economy is the Health Care and Social Assistance sector, which supports approximately 4,000 jobs. Other significant sectors include Government, Retail Trade, and Manufacturing. Long-term development and growth of these sectors, particularly professional and scientific jobs related to the pharmaceutical campus and advanced manufacturing, will lead to a rise in residents' household income. Housing and workforce development strategies will help capture this growth and keep high wages circulating within the local economy, producing beneficial ripple effects throughout the community, including growing the tax base.

This chapter highlights the key economic drivers in Petersburg, workforce and industry characteristics, and strategies to continue supporting the existing economy while making intentional investments in prospective growth sectors.

COMMUNITY FEEDBACK: ECONOMIC DEVELOPMENT

- Improving public education and workforce development opportunities was identified as a top priority for the future.
- Currently, community members do not feel that Petersburg is business friendly or has the appropriate mix of jobs that pay a living wage.
- The most encouraged land uses include redevelopment and infill of existing underperforming commercial areas, new commercial and business development, mixed use development, and manufacturing centers.
- Small businesses, general retail such as grocery stories and pharmacies, and entertainment are the most desirable types of non-residential land uses.

Old Mansion Foods facility

WHERE ARE WE NOW?

In 2016, Petersburg faced a financial crisis as a declining tax base combined with collection issues led to the City nearly going bankrupt. However, thanks to sound leadership, Petersburg executed a turnaround for the ages. Tax collection receipts rose from 60% to 85% in a three-year period. A new team of economic development and tourism professionals was brought onboard. These changes placed Petersburg in the unique position of being able to take advantage of opportunities created by the COVID-19 pandemic, specifically the need for domestic pharmaceutical manufacturing. By leveraging state and federal funding, the City was able to attract three major pharmaceutical manufacturers with hundreds of stable and high-paying jobs, placing Petersburg at the forefront of vaccine and related drug manufacturing in Virginia. The rise of e-commerce led to rapid growth in regional warehousing and distribution, with Petersburg looking to site distribution centers within City limits in the coming years as another valuable source of stable jobs and tax revenue.

Some headwinds exist due to the City's unemployment rate remaining higher than the statewide average. Many employers still experience difficulties finding workers in the wake of the COVID-19 pandemic. However, overall trends are improving and the labor force participation rate is experiencing a resurgence. Bringing additional jobs to Petersburg, as well as continuing efforts to raise labor force participation rates, will sustain this improvement. Additionally, local residents will need continued access to workforce development and education in order to ensure they can take advantage of these newly created opportunities, such as the "gig economy," which includes short-term contracts or freelance work.

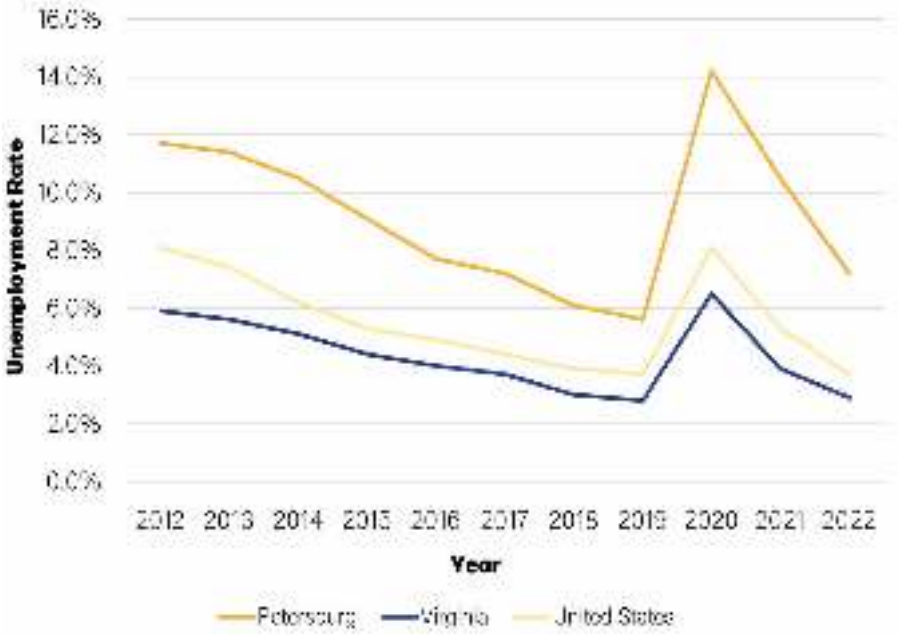
While challenges remain, particularly in ensuring that these newfound opportunities benefit local residents, Petersburg has ultimately positioned itself for a bright economic future through building diversity in advanced manufacturing, warehousing and distribution, and supporting growth in the gig economy.

The pharmaceutical campus is located in Petersburg's southeastern area and currently consists of three pharmaceutical manufacturers: AMPAC Fine Chemicals, Phlow Corp., and Civica Rx.

Unemployment Rate and Labor Force Participation

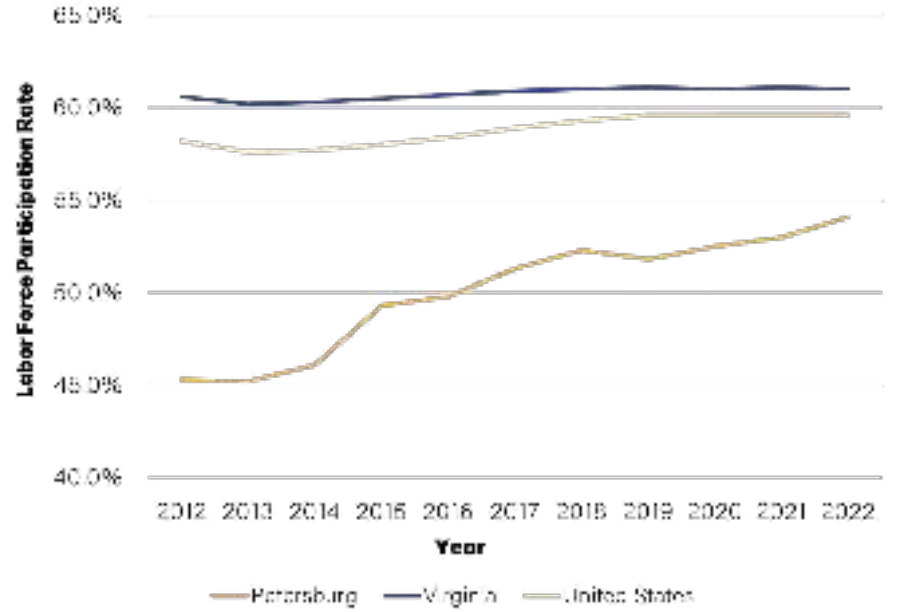
The unemployment rate represents the number of unemployed people as a percentage of the labor force. The Labor Force Participation (LFP) rate is the percentage of the population that is either working or actively looking for work. Strong labor force participation and low unemployment reflect a robust job market. While Petersburg's LFP rate has historically trailed state and national averages, since 2012 it has increased from 45.3% to 54.1%. Similarly, the unemployment rate has been higher than state and national averages but has decreased since 2020. These trends indicate a positive shift in Petersburg's economic landscape, with more jobs available and more people getting back to work after pandemic disruptions in 2020. Investing in workforce development programs in partnership with regional institutions of higher education and business development organizations will be a powerful catalyst for continued labor force growth.

Figure 3.1 | Unemployment Rate, 2012-2022



SOURCE: Virginia Employment Commission, Economic Information & Analytics, Local Area Unemployment Statistics

Figure 3.2 | Labor Force Participation Rate, 2012-2022



SOURCE: American Community Survey 5-Year Estimates, 2018-2022

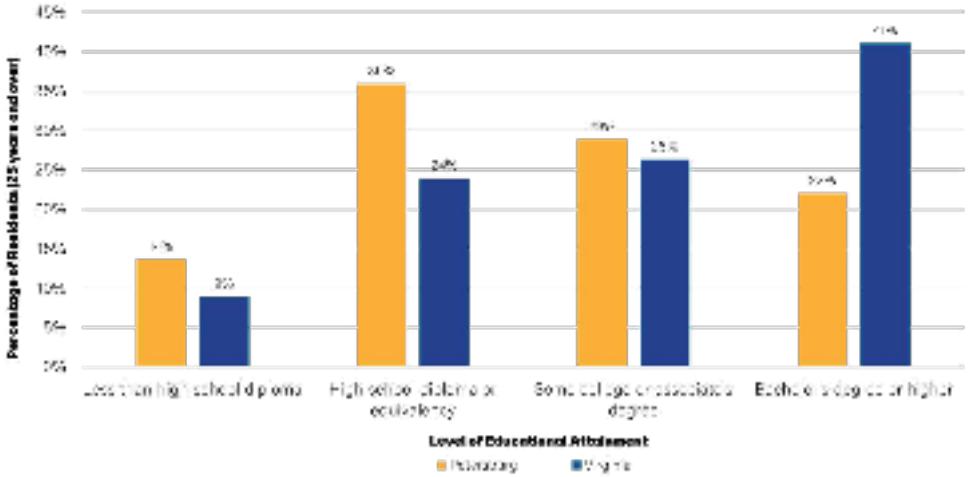
Educational Attainment

Petersburg benefits from its proximity to several colleges and universities, including Virginia State University (VSU), Brightpoint Community College (BCC), and Richard Bland College (RBC), all of which provide opportunities for higher learning to residents. While the number of residents with a bachelor's degree is roughly half of the state average, the number of residents who have graduated high school currently exceeds the state average, and the percentage of Petersburg residents with an associate's degree is very close to the statewide average. The presence of higher education institutions in the community is an opportunity to enhance partnerships and increase participation in education and jobs training.

Household Income and Weekly Wages

Median household income and weekly wages are valuable metrics for evaluating a community's economic health. Petersburg's median household income ranks fifth out of six surrounding localities, and is about 60% lower than the statewide median of $87,249 (Table 3.1). Average weekly wages by industry are shown in Table 3.2. Petersburg's overall average weekly wage of $977 is below the Crater regional average weekly wage of $1,117.

Figure 3.3 | Educational Attainment



SOURCE: American Community Survey 5-Year Estimates, 2018-2022

Table 3.1 | Regional Median Household Income

Locality	Median Household Income
Chesterfield County	$95,757
Prince George County	$80,318
Dinwiddie County	$77,225
City of Colonial Heights	$72,216
City of Petersburg	**$46,930**
City of Hopewell	$50,661

SOURCE: American Community Survey 5-Year Estimates, 2018-2022

Table 3.2 | Average Weekly Wage by Industry

Industry	Wage
Utilities	$2,226
Construction	$1,276
Manufacturing	$1,366
Wholesale Trade	$1,450
Retail Trade	$616
Transportation and Warehousing	$1,016
Finance and Insurance	$1,205
Information	$2,302
Real Estate and Rental and Leasing	$997
Professional, Scientific, and Technical Services	$1,259
Administrative and Support and Waste Management	$713
Educational Services	$859
Health Care and Social Assistance	$1,127
Accommodation and Food Services	$405
Other Services	$776
Government, All	$1,187
Total, All Industries	**$977**

SOURCE: Virginia Employment Commission, Economic Information & Analytics, Quarterly Census of Employment and Wages (QCEW), 3rd Quarter (July, August, September) 2023

Employment by Industry

Table 3.3 shows the number of employees in each industry, as well as the percentage of Petersburg's jobs that each industry represents. The largest industry by employment is the Health Care and Social Assistance sector, representing over 30% of the total number of jobs in Petersburg. Given its outsized importance to the local economy, the health and growth of this sector is a top priority. The coming pharmaceutical campus will add to this presence, though it will be primarily represented in the Manufacturing industry, which currently represents over 8% of the total jobs. Employment in the Retail Trade and Government industries also comprises over 10% each of the total number of jobs.

Table 3.3 | Employment by Industry

Industry	Employment	Percentage of Total Jobs
Utilities	12	0.1%
Construction	462	3.9%
Manufacturing	1,003	8.4%
Wholesale Trade	325	2.7%
Retail Trade	1,256	10.5%
Transportation and Warehousing	178	1.5%
Finance and Insurance	168	1.4%
Information	11	0.1%
Real Estate and Rental and Leasing	150	1.3%
Professional, Scientific, and Technical Services	116	0.9%
Administrative and Support and Waste Management	1,025	8.6%
Educational Services	84	0.7%
Health Care and Social Assistance	3,703	30.9%
Accommodation and Food Services	822	6.9%
Other Services	613	5.1%
Government, All	1,944	16.2%
Total, All Industries	**11,983**	**100%**

SOURCE: Virginia Employment Commission, Economic Information & Analytics,
Quarterly Census of Employment and Wages (QCEW), 3rd Quarter (July, August, September) 2023

PETERSBURG'S TOP TEN EMPLOYERS

1 Bon Secours

2 Petersburg City Public Schools

3 City of Petersburg

4 ConnectRN

5 The Mentor Network

6 Amsted Rail Company

7 Horizon Mental Health Management

8 Walmart

9 Communicare Health Service

10 District 19 Community Services Board

HOW DO LIVABILITY AND PUBLIC HEALTH CONNECT TO ECONOMIC VITALITY?

- The prevalence of preventable chronic diseases – such as Type 2 diabetes and heart disease – raises costs and job vacancies for businesses due to decreased worker productivity and increased healthcare expenses.
- Prospective industries often consider public health factors, such as convenient access to recreation/ open space and public safety when deciding where to locate.
- Workforce development and job training programs help enhance overall quality of life for the community.
- Food deserts, defined by a lack of full-service grocery stores in low-income neighborhoods, prevent residents from accessing healthy food.

SOURCES: Harvard University T.H. Chan School of Public Health; Amherst H. Wilder Foundation; Centers for Disease Control and Prevention

Commuting Patterns and Quality of Life

Since 1990, commuting patterns among Petersburg's labor force have shifted from a majority (54%) both living and working within the City to a culture of in- and out-commuting. As of 2020, only 15% of Petersburg residents also work in the City, while 85% commute elsewhere for their jobs, with an average commute time of 25 minutes (see Chapter 2). Meanwhile, 82% of those who work in Petersburg are commuting in from other locations, primarily Chesterfield, Dinwiddie, and Prince George Counties. Around 7% of residents work remotely; this percentage is highly likely to continue growing due to the expansion of broadband.

A variety of factors may contribute to commuting patterns, including transportation access, perceptions of crime, and the perceived quality of local schools. Petersburg's proximity to Interstates 85, 95, and 295 provide easy access for commuters entering and leaving the City each day. The downward trend in residents both living and working in Petersburg may reflect that the available jobs within the City are not aligned with the qualifications of the current labor force. Diversifying industry while enhancing workforce development opportunities can help more residents fill local jobs.

Perceptions of a community's overall quality of life can also influence commuting patterns. Intentional strategies designed to increase livability, safety, walkability, and public health all contribute to making a place more desirable to live. Likewise, poor public health can negatively affect economic output. Petersburg is uniquely positioned to prioritize health and livability given its community assets in Health Care and pharmaceutical manufacturing, combined with a location that offers many potential opportunities for outdoor recreation, particularly along the Appomattox River, in Petersburg National Battlefield, and in its many neighborhood parks.

ECONOMIC GROWTH AND DEVELOPMENT

There are many opportunities for Petersburg to assist in the growth of the local economy through intentional decision-making and strategic investments. Economic development efforts should concentrate on expanding the existing clusters in Health Care and Social Assistance and Manufacturing, considering the use of tax rebate incentives in the latter case. The ongoing development of the pharmaceutical campus is critical to attracting high-paying professional and scientific jobs.

Simultaneously, housing for these knowledge workers should be developed within City limits in order to keep their income within the local economy (see Chapter 4). Working with local education partners to create talent pipelines can provide a source of skilled labor for these new companies, making Petersburg more competitive in the labor market and focusing investment on the next generation. Lastly, the development of additional housing, particularly in sustainable mixed-use neighborhoods, can help to reverse population loss trends, and provide a built-in market for businesses and services.

Similarly, there are major opportunities for placemaking and community development that build on Petersburg's natural and historic assets and have added benefits for a diverse and healthy economic climate. Unique assets such as Old Towne Petersburg, Battersea, Petersburg National Battlefield, historic sites from the American Civil Rights Movement, and South Side Depot - which is slated for renovation and restoration - offer largely untapped opportunities for heritage tourism.

Online automating of all permitting and licensing processes can help remove barriers for small businesses who may not have the time and financial resources to navigate complex requirements. There can also be improved outreach efforts to help explain these processes and answer frequently asked questions guiding applicants to the correct departments. Establishing a centralized online location for business licensure and permitting to create a "one-stop shop" experience for existing and prospective business owners will further facilitate their success and improve Petersburg's business-friendly climate.

Croaker's Spot

Industry Trends

Petersburg is poised to benefit from accelerated growth in advanced manufacturing, new investment in warehousing and distribution centers, a rapid increase in remote work, growth in gig economy jobs, and ongoing post-pandemic trends in travel and tourism.

Given the importance of the Health Care and Manufacturing sectors in both the local and state economies, the development of the pharmaceutical campus in the southeast area of the City will have major positive effects. Petersburg has a long history as a manufacturing leader due to its role in Virginia's tobacco industry. Thanks to recent state and federal investment in vaccine development and advanced manufacturing, Petersburg will play a leading role in the production of new pharmaceutical products, deepening its historic industrial legacy and adding hundreds of high-quality jobs to the economy. Industry growth has occurred in recent years in and around the Petersburg Interstate Industrial Park, with many opportunities for new development still remaining. Infrastructure improvements along S. Crater Road and County Drive - including a new larger forcemain, new water transmission main, and new storage tank - also will provide greater capacity for industry (Appendix C).

Tourism in Petersburg

In 2021, Petersburg saw a resurgence in travel and tourism, with revenue in 2021 and 2022 exceeding its pre-pandemic levels from 2019. This trend will continue, given the City's rich heritage and significant Black history. Petersburg is ideally positioned to capitalize on tourism revenue, with potential opportunities to increase income through the development of the Appomattox River waterfront and trail as a leisure and recreational attraction and its role as a central hub for the new Fall Line Trail. South Side Depot, which is being redeveloped as a Visitor Center and Contact Station for the City and potentially the Petersburg National Battlefield, is estimated to attract an additional 30,000 visitors to downtown Petersburg.

To extend the stay of tourists beyond day trips and to attract business travelers, there is a need for more hotels in Petersburg. Addressing this demand is Hotel Petersburg, an upscale lodging and dining establishment opening in Old Towne Petersburg in late summer 2024. Hotel Petersburg will cater to a variety of guests, including interstate travelers, tourists, and industry executives visiting Petersburg, providing them with high-quality local lodging options. The tourism industry currently sustains around 400 jobs in the city, a figure that is set to rise with the presence of Hotel Petersburg.

Table 3.4 | Tourism Revenue, 2017-2022

	2017	2018	2019	2020	2021	2022
Traveler Spending	$36,226,626	$35,541,435	$37,838,030	$30,611,580	$39,279,720	$41,204,931
Travel Payroll	$9,254,185	$9,441,852	$10,361,828	$9,172,270	$10,102,054	$11,015,112
Local Travel Taxes	$1,740,451	$1,691,398	$1,826,061	$1,553,349	$1,975,556	$2,165,129
State Travel Taxes	$996,255	$992,650	$1,064,160	$836,847	$1,069,470	$1,167,434

SOURCE: Virginia Tourism Corporation

WORKFORCE DEVELOPMENT

Workforce development is critical to creating a talent pipeline for local industries, giving residents the education and training necessary to access higher-paying jobs, and to fostering entrepreneurship and sustaining local and small businesses. By working with local education partners, Petersburg can bridge the gap between its residents' needs for higher wages and the needs of area businesses for skilled workers. Partnerships, particularly through Brightpoint Community College (BCC) and Petersburg City Public Schools (PCPS) should be strengthened to increase awareness of programs and attract interest from the next generation of workers. These partnerships should include members of the business community, education, and local government economic development professionals.

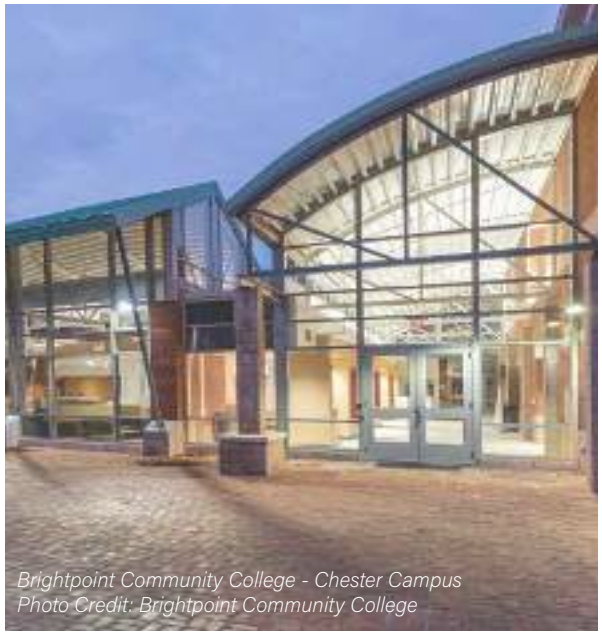
Workforce development and training activities should focus on catering to and enabling the expansion of the existing economic base. Investing in skilled labor will make Petersburg more attractive to prospective employers. Collaboration with education and business partners will help to identify the gaps in labor, but consideration should be given to sectors and businesses the City wishes to attract. Increased and enhanced training programs should even be marketed as an incentive for businesses to locate in the City.

Brightpoint Community College

Established in 1967, BCC serves 12,700 students in academic programs and assists 5,700 existing and prospective workers seeking workforce development opportunities. BCC offers associate's degrees in more than 75 majors with guaranteed admission to over 35 four-year colleges and universities. Additional programs and services include career studies certificates, trades apprenticeships, and workforce training. BCC also partners with PCPS to provide a dual enrollment program for high school students; the City should expand its efforts to promote this program. A major addition to BCC's offerings is the Pharmaceutical Manufacturing program, which will create a talent pipeline designed to meet the growing needs of the pharmaceutical campus. The program is designed to be completed in two semesters, providing an efficient pathway to obtain training for well-paying jobs. While there are two campuses located in nearby Chester and Midlothian, advocating for a local branch of BCC within City limits will help provide more direct access to education and training opportunities for Petersburg residents.

Richard Bland College of William & Mary

Richard Bland College (RBC) is a public junior college associated with the College of William & Mary and located just outside of Petersburg in eastern Dinwiddie County. RBC has 2,500 students across five academic departments. RBC provides rigorous academic opportunities to PCPS students through its Middle College program, which allows eligible high school juniors and seniors to begin fulfilling college credit early. Other programs of note are DroneUp, which is a testing, training, and research and development center, and RBC FAME, which combines college coursework with paid, on-the-job advanced manufacturing training and experience.



Brightpoint Community College - Chester Campus
Photo Credit: Brightpoint Community College

Virginia State University

Virginia State University (VSU) was established in 1882 and is one of the nation's most highly regarded Historically Black Colleges and Universities (HBCUs). VSU's enrollment has continuously increased, with nearly 4,700 students enrolled in fall 2022. The Career Services department provides students and alumni access to career development programs including internships, career coaching, job recruitment connections, and resume assistance. VSU also started an innovative graduate program to address teacher shortages in Petersburg, providing housing incentives for new graduates who work in the City public school system.

Community College Workforce Alliance

As the workforce development division of Brightpoint Community College, the Community College Workforce Alliance (CCWA) serves as the go-to resource and partner for regional businesses seeking talent and for individuals looking for training, advancement, and high-demand career opportunities. The CCWA offers pathways to success for organizations, employees, and job seekers.

Metropolitan Business League

The Metropolitan Business League (MBL) is a non-profit, membership-based business association that creates business connections in Central Virginia. The MBL promotes economic prosperity through education, advocacy, access to resources, and building relationships for small, women-owned, and minority-owned businesses.

Crater Regional Workforce Development Board

The Crater Regional Workforce Development Board (CRWDB) coordinates workforce training and career services through federal funding from the Workforce Innovation and Opportunity Act (WIOA). The CRWDB oversees and implements workforce development initiatives and activities throughout the Crater region. The CRWDB collaborates with program operators and workforce development partners to provide resources and training services for employers, employees, and job seekers.

VSU's Center for Entrepreneurship offers high-quality, innovative training and services to Petersburg's small businesses and entrepreneurs. Learn more about the Center by clicking here!

Virginia State University Campus
Photo Credit: Virginia State University

LEVERAGING INCENTIVE ZONES

Petersburg is well-positioned to build on existing medical, industrial, retail, and accommodation clusters. The large number of major firms in Health Care and pharmaceutical manufacturing will help with recruiting additional ones, as well as generating associated development from suppliers and distributors. Strong and consistent leadership will be vital in continuing to leverage funding opportunities and enhance Petersburg's leadership in advanced manufacturing. The continued growth of this sector should remain a top priority for Petersburg, even as it seeks to broaden the economic base. Other significant clusters, such as professional, scientific, and technical services; heavy industry; and energy production also present growth opportunities, particularly if they can be associated with pharmaceutical manufacturing. Continued support of the gig economy and attraction of warehousing and distribution centers will also be vital.

Careful consideration should be given to choosing target firms, so that they will build and enhance the existing business ecosystem. Through strategic planning, Petersburg can identify gaps and opportunities in its priority clusters and develop targeted incentives to attract the types of businesses needed for growth.

Despite the success of Medical Care and pharmaceutical manufacturing, Petersburg must ensure it is continuing to move towards a fully balanced economy, where it is not overly reliant on any one specific sector. In the past, structural changes in the economy, such as the decline of Virginia's tobacco industry, have been challenging for the City to weather. Diversification and expansion of other sectors of the economy is critical to long term stability and health by ensuring it is resilient in the face of external economic shocks.

There are several useful incentives which the City has to support economic development (Map 3.1). Most are place-based and strategic, and will require additional study and analysis to take full advantage of.

Enterprise Zone

The Virginia Enterprise Zone (VEZ) program is a partnership between state and local governments that encourages job creation and private investment. VEZ accomplishes this by designating Enterprise Zones throughout the state and providing two grant-based incentives, the Job Creation Grant (JCG) and the Real Property Investment Grant (RPIG). These grants are geared toward qualified investors and job creators within those zones, while the locality provides local incentives.

Tourism Zone

Much like a traditional Enterprise Zone, a Tourism Zone allows for businesses to take advantage of local tax incentives and deductions not available to businesses elsewhere. Tourism Zones are passed through amending the local ordinance and may contain both requirements and benefits for existing and new or expanded tourism businesses, including lodging, dining, retail, meeting and sports facilities, outdoor recreation areas, theme parks, and event venues. Petersburg's existing Tourism Zone is well placed to assist with entertainment and tourism in the downtown area. Petersburg may wish to consider designating additional zones with their own needs assessments for areas around the Appomattox River waterfront and interstate interchanges.

Diversification and expansion of Petersburg's economy is critical to long term stability and health by ensuring it is resilient in the event of external economic shocks.

Opportunity Zone

Opportunity Zones are a federal economic and community development tax benefit established as part of the 2017 Tax Cuts and Jobs Act. In these zones, the tax benefits are available to investors with capital gains designed to encourage long-term private investment in low-income urban, suburban, and rural Census tracts. The designation is current through December 31, 2028.

Technology Zone

A Capital Investment Grant is available to eligible businesses located in Petersburg's I-95 Technology Zone. The grant is administered based on the qualified technology that a business has, such as new equipment or qualifying existing equipment during the grant period. The grant is equal to 100% of the machinery and tools taxes.

Triad Metals International facility

WHAT IS THE ECONOMIC DEVELOPMENT AUTHORITY?

Economic Development Authorities (EDAs) can be **powerful change agents in the local economy and in the built environment**. Petersburg's EDA was created under the Code of Virginia's Industrial Development Revenue Bond Act. The Act gives EDAs broad powers to purchase and sell property, make loans, and issue bonds. These powers make the Petersburg EDA **critical to economic growth and investment** in the City. **The EDA plays several important roles, including**:

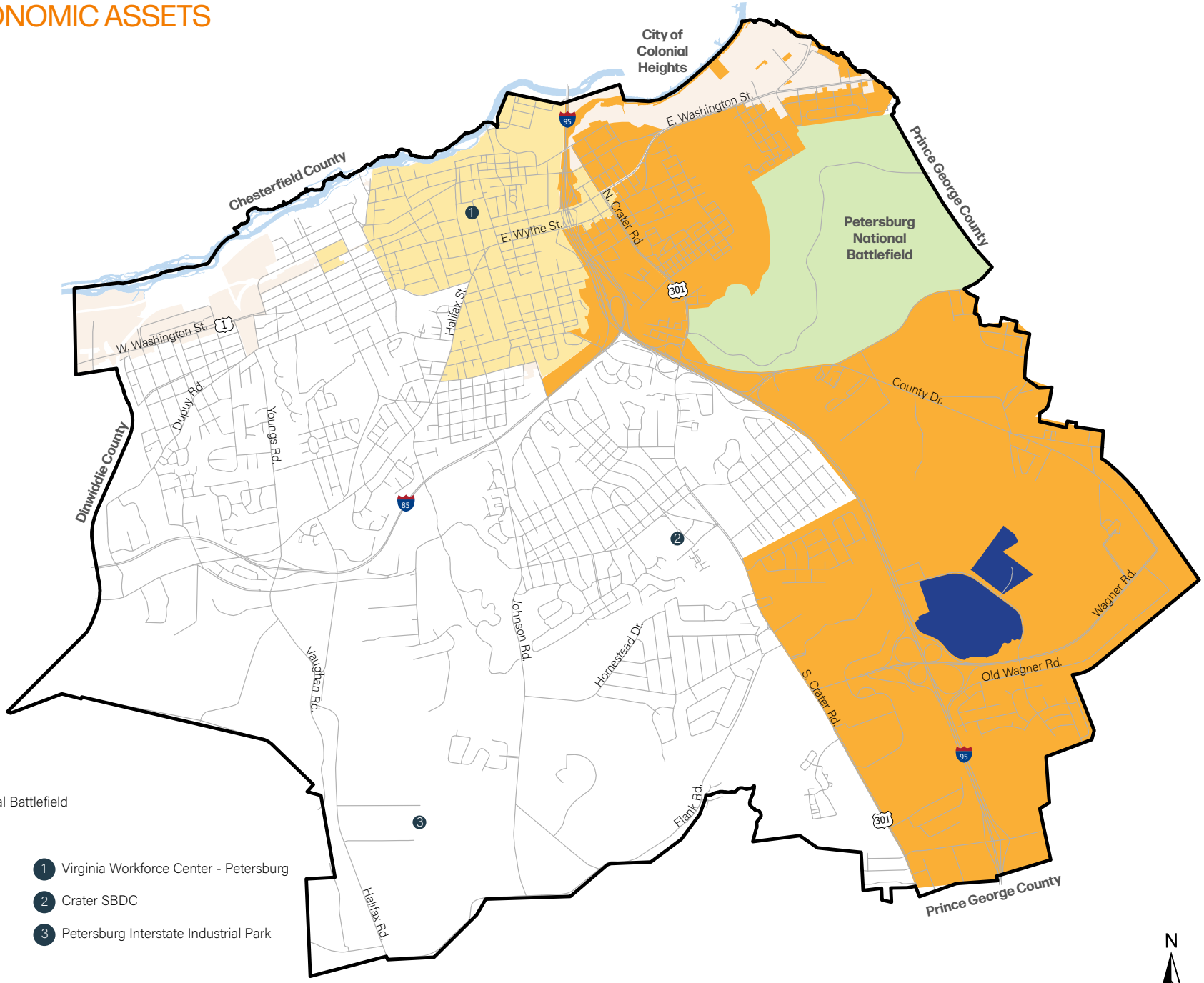
- **Landowner:** EDAs can purchase property and related development rights. It can also acquire smaller pieces of land, blighted properties, or vacant land to assemble for sale. The EDA can work with publicly owned land to see it developed in the appropriate manner. It can also acquire and bank land for future development, ensure appropriate utilities are available to sites, and that sites are appropriately certified and marketed.

- **Matchmaker:** The EDA can acquire property and then resell it, with appropriate caveats, to a developer who then builds a desired project. There are a variety of ways to finance these transactions, such as issuing bonds or Tax Increment Financing (TIF), or even generating revenue through lease agreements.

- **Financer:** The EDA can fill gaps in traditional financing, helping projects get across the finish line that might not otherwise. Petersburg's EDA should develop and maintain a viable Revolving Loan Rund (RLF) to assist in microlending to entrepreneurs.

- **Strategic Planner:** EDA activities should be guided by an Economic Development Strategic Plan. This process helps to concentrate EDA activities to their maximum potential. It will identify gaps and opportunities in the local economy through analysis, and identifying target areas.

MAP 3.1 | ECONOMIC ASSETS



BUSINESS SUPPORT SERVICES AND PARTNERS

Developing strategic partnerships is critical to the success of any economic development strategy. Fortunately, Petersburg has many excellent partners to work with including regional economic development organizations, institutions of higher learning, and community non-governmental organizations. A partial list of these partners is described here:

Partnership for Petersburg

Partnership for Petersburg is a holistic partnership that brings together more than 40 initiatives under eight separate pillars to make a significant difference in the lives and livelihoods of Petersburg's citizens, as well as the economic health of the city itself. The program includes initiatives in commerce and trade, education, health and human resources, and public safety, among others.

Continuing these efforts beyond the current administration should be a priority for Petersburg to ensure lasting and genuine change. This will involve securing funding in many cases through available grants, but also continuing the partnerships that have been forged in the effort. Particular attention should be paid to relationships with the area's major employers.

Virginia's Gateway Region

Virginia's Gateway Region (VGR) is a private, nonprofit economic development organization that markets the Tri-Cities of Colonial Heights, Hopewell, and Petersburg and the surrounding Counties of Dinwiddie, Prince George, Surry, and Sussex. VGR fosters regional prosperity through business growth, powerful partnerships, and delivering innovative resources to its communities, and focuses its efforts on new and existing business investment and job creation.

The Cameron Foundation

The Cameron Foundation strives to transform the Tri-Cities and surrounding Counties into a healthy, vibrant and economically vital region by strategically leveraging resources for community impact. The Foundation supports a holistic approach to community and economic development, including revitalization of distressed neighborhoods, workforce development and increasing workforce quality, and expanding the capacity of economic development agencies to successfully pursue local and regional economic development opportunities.

LISC Virginia

LISC Virginia is one of 35 local offices of Local Initiatives Support Corporation (LISC), a national non-profit organization supporting community development in cities and rural areas throughout the country. LISC has developed an inclusive economic development framework that expands the ability of people, places, and businesses to contribute to equitable prosperity, so that all are able to thrive. Programs include Hispanic Small Biz Loan Program, Tri-Cities Small Biz Loan Program, and BIPOC Small Business Capital Access Program.

Another program of note is Wells Fargo's Wealth Opportunity Restored Through Homeownership (WORTH) program. This program will be led by LISC Virginia and aims to expand opportunities for homeownership for minority residents.

Crater Small Business Development Center of Longwood University

The Longwood Small Business Development Center's (SBDC) core mission is to provide education, consulting, and economic research to support potential and existing small business owners throughout Southern Virginia. The Crater SBDC program through Longwood University is positioned as an economic development outreach program under the umbrella of the University's Office of Community and Economic Development. Results are measured in terms of client capital investment and jobs created. Services include education, consulting, and economic research for potential and existing businesses throughout Southside Virginia - at no cost.

Crater Planning District Commission (PDC) Revolving Loan Fund

The Crater PDC Revolving Loan Fund supports for-profit commercial, service, manufacturing, and distribution businesses. The Revolving Loan Fund Program is for fixed asset and/or working capital projects that range from $50,000 to $500,000 and above.

Virginia Economic Development Partnership (VEDP)

Virginia Economic Development Partnership (VEDP) is the Commonwealth of Virginia's economic development authority. Created in 1995, VEDP collaborates with local, regional, and state partners to encourage the expansion and diversification of Virginia's economy. VEDP works to accomplish these objectives through a variety of activities, including marketing and lead generation; business retention, expansion, and attraction; trade development; business intelligence; competitive benchmarking; site development; performance-based incentives; and talent solutions.

Penniston's Alley

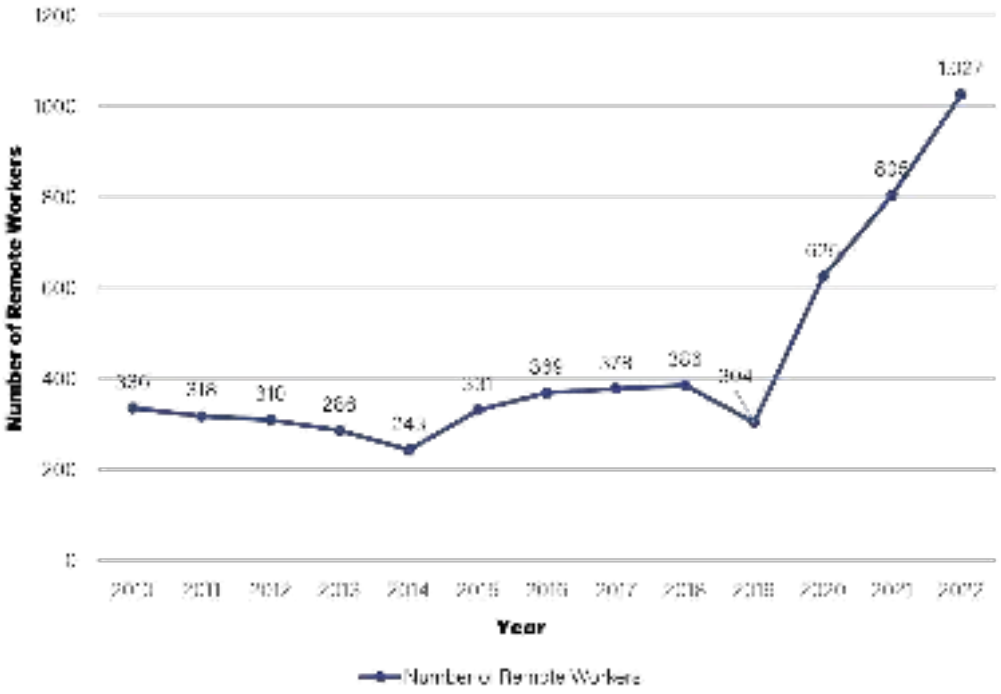
ADDITIONAL ECONOMIC DRIVERS

Remote Work

The number of people working remotely in Petersburg rose over 200% from 2010 to 2022. According to Virginia Realtors, places that attract a solid base of remote workers offer reliable high-speed internet, provide recreation and cultural amenities, and have quality local schools. While Petersburg can continue to strengthen this infrastructure, there are many existing assets Petersburg should be marketing to attract a new wave of teleworking residents, including its proximity to Richmond, low cost of living, and rich culture. Remote workers can provide an economic boost to the area through a bolstered tax base and increased financial support to local and small businesses. Additionally, remote job opportunities open new doors for existing residents who can work from home and not be limited by lack of transportation or physical impediments.

Petersburg will be prepared for a continued rise in remote workers and provide infrastructure to adequately support them. This includes ensuring the provision of reliable broadband, building a high-quality public school system, and supporting new land uses such as co-working spaces and passive and active recreation. Tracking remote work trends over time will be critical in effectively and equitably meeting community needs.

Figure 3.4 | Remote Work in Petersburg, 2010-2022



SOURCE: 2018-2022 American Community Survey, 5-Year Estimates

Fort Gregg-Adams

Fort Gregg-Adams, previously known as Fort Lee until April 27, 2023, supports more than 28,500 people on post and nearly 63,000 off post, including military personnel and civilian contractors, along with their families. As many as 70,000 troops also go through classroom training at this site each year. The presence of Fort Gregg-Adams can be a major economic driver in Petersburg and can also spur land use improvements along E. Washington Street and County Drive.

Petersburg should consider what types of uses are desirable to base personnel stationed at Fort Gregg-Adams and their families. Additionally, the hospitality industry and recreational uses can be attractive for visitors, who are drawn to spend time and money in Petersburg. The City should continue growing its partnership with the Fort to expand its advertising of local historic and tourist attractions.

Television and Film Production

Petersburg has established itself as a film and television production destination, boasting a filmography of over 60 major titles including award-winning features and shows such as *Lincoln, Loving*, and *Turn: Washington's Spies*. The Virginia Film Office facilitates grant and tax credit incentives for prospective projects, as well as markets particular sites in Petersburg that are suitable for various genres from historic to modern.

Maintaining a revitalized, scenic downtown core along with improving scenic environmental and park resources will ensure that Petersburg remains a competitive player in the entertainment sector. Opportunities for additional hotel and lodging accommodations for production staff can help positively impact Petersburg's appeal.

A visitor browses a storefront in Old Town

Building a Healthy and Robust Economic Climate

Goal Statement: Petersburg will build a thriving and resilient economy that promotes quality jobs in diverse industries, workforce development, tourism, and business opportunities.	
Objectives	**Strategies**
3.1 Expand Petersburg's existing clusters in Health Care and Manufacturing.	3.1.1: Identify and target associated businesses, such as suppliers, to support the pharmaceutical campus.
	3.1.2: Work with state economic development agencies, local economic development organizations, and local business partners to market Petersburg to Health Care businesses and manufacturers that would complement the existing businesses in these clusters.
	3.1.3: Hold a biannual "roundtable" meeting of regional Health Care and Pharmaceutical executives, institutions of higher education, and City Economic Development professionals to serve as a catalyst for ongoing collaboration and strategic investment.
	3.1.4: Develop Collier Yard and continued expansion in the Petersburg Interstate Industrial Park for advanced manufacturing and energy production.
3.2 Diversify Petersburg's economy.	3.2.1: Expand the existing clusters in the Manufacturing, Retail, and Accommodation sectors by identifying potential locations for new development and ensuring the proper entitlements and infrastructure are in place to support easy startup.
	3.2.2: Develop a comprehensive Economic Development Strategic Plan to build on existing initiatives and direct future investment.
	3.2.3: Focus recruitment efforts on gaps identified in the Economic Development Strategic Plan by identifying and targeting prospective businesses to fill them.
	3.2.4: Site new warehousing and distribution centers; promote associated job opportunities to Petersburg residents through social media, the quarterly newsletter, and other local job boards.
	3.2.5: Direct community-oriented, environmentally sustainable, and well-designed development at the historic Petersburg Harbor.

Objectives	Strategies
3.3 Build entrepreneurship and workforce development programs to create new job pathways and build community wealth.	3.3.1: Hold quarterly meetings with educational partners to remain updated on vocational and technical training programs, especially for expanding industries such as hospitality, technology, and manufacturing. Collaborate on opportunities to expand existing programs or create new ones.
	3.3.2: Provide annual funding for the existing training options for residents in the Pharmaceutical and Health Care related sectors.
	3.3.3: In partnership with local economic development organizations, offer two small business forums a year that provide educational opportunities on city processes, support opportunities, and new development in Petersburg.
	3.3.4: Maintain a viable Revolving Loan Fund to assist in microlending to entrepreneurs.
	3.3.5: Hold discussions with Brightpoint Community College about creating a local branch within City limits, and identify at least two potential locations.
	3.3.6: Facilitate the development of a coworking space in Old Towne as a pilot program for entrepreneurs and remote workers.
3.4 Create additional opportunities for redevelopment of vacant commercial land and structures.	3.4.1: Use the land bank program for commercial and industrial property in Petersburg.
	3.4.2: Certify all Economic Development Authority (EDA) owned sites through the Virginia Economic Development Partnership (VEDP).
	3.4.3: Direct franchise development in vacant commercial properties, using incentives as necessary.
	3.4.4: Develop a strategic plan for the Poor Creek area to identify the highest and best use of land as it related to potential economic drivers and future employers.

Objectives	Strategies
3.5 Promote tourism and strengthen economic development marketing and branding efforts.	3.5.1: Direct the development of new lodging and dining options around Old Towne and the Interstate 85 and 95 entrance corridors through incentives and Tourism Zone financing opportunities.
	3.5.2: Require short term rentals to pay lodging taxes to generate additional revenue.
	3.5.3: Update City websites and other real estate websites on a quarterly basis to include accurate information about available properties for economic development.
	3.5.4: Update the City's social media and tourism website weekly to include information about upcoming events, things to do, and options for lodging, dining, and retail.
	3.5.5: Evaluate locations for additional Tourism Zones with different strategic goals to support widespread, tourism-focused uses.
	3.5.6: In partnership with the Virginia Department of Transportation (VDOT), install branded wayfinding signage to Old Towne Petersburg, Petersburg National Battlefield, the Appomattox River Trail and waterfront, and historic sites from the American Civil Rights Movement.
	3.5.7: Create a visitor center in the old South Side Depot to serve as a centralized hub for tourism and information.
3.6 Streamline business licensing and permitting requirements.	3.6.1: Automate all permitting and licensing processes through an online platform, and create a one-stop webpage for permitting and licensing information.

04 HOUSING + NEIGHBORHOODS

Petersburg will be a city where all housing and neighborhoods are attractive, safe, and accessible to all residents.

"THE SMALL WINS ARE NOT DISREGARDED. THERE ARE SOME **GREAT THINGS HAPPENING**."

- Community Survey Respondent

04

INTRODUCTION

A house is more than just a structure: it is a shelter and haven from the demands of everyday life. Without a stable and safe place to call home, individuals endure mental, physical, and social consequences due to the lack of protection from the elements and lack of stability to support other needs such as education and employment. Opportunities to take a step forward and achieve homeownership open new doors to build equity and promote financial stability, paving the way for generational wealth.

Neighborhoods are a fundamental building block of a healthy city. They are an important geography for investment due to the power they hold to bring people together and celebrate shared culture and history. Neighborhoods that are cared for and well-maintained send messages to residents that they, in turn, are cared for and supported in their life's journey, and help to preserve community values and history. Neighborhood vitality is a positive output of investing in quality housing and living conditions for all.

Housing is a fundamental human need, and Petersburg will work diligently over the next twenty years to provide housing for all, support neighborhood vitality, promote pathways to homeownership, and ensure investment without displacement.

COMMUNITY FEEDBACK: HOUSING + NEIGHBORHOODS

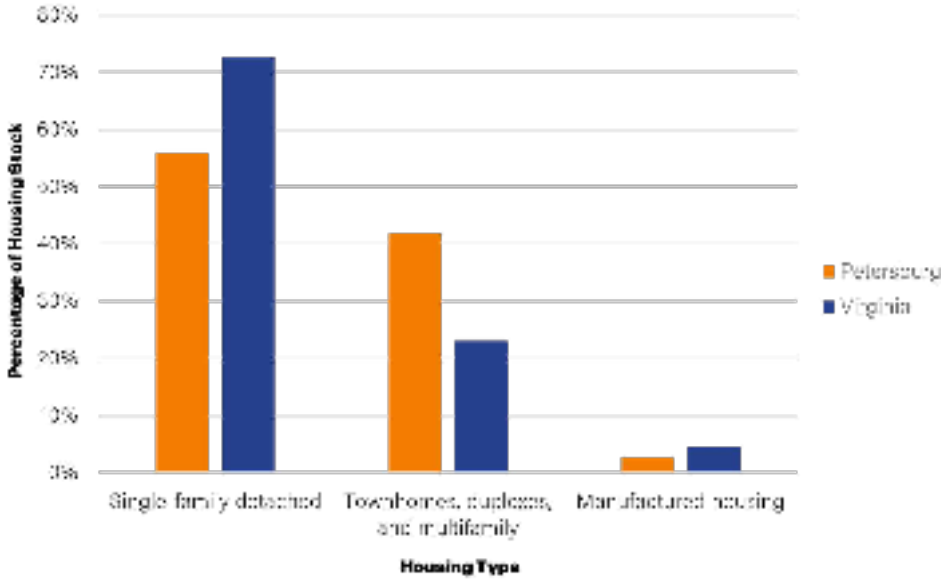
- Residential and commercial blight was the third highest concern the community has regarding Petersburg's future.
- Only 10.2% of survey respondents said that Petersburg's residential neighborhoods are safe and attractive.
- Nearly half of survey respondents spend more than 30% of their annual income – the federal affordability threshold – on housing costs, which include mortgage / rent, taxes, insurance, utilities and standard maintenance.
- While most survey respondents felt that their housing suited their individual needs, they felt that overall, there is not enough housing diversity to meet the needs of *all* Petersburg residents.

WHERE ARE WE NOW?

Housing Type

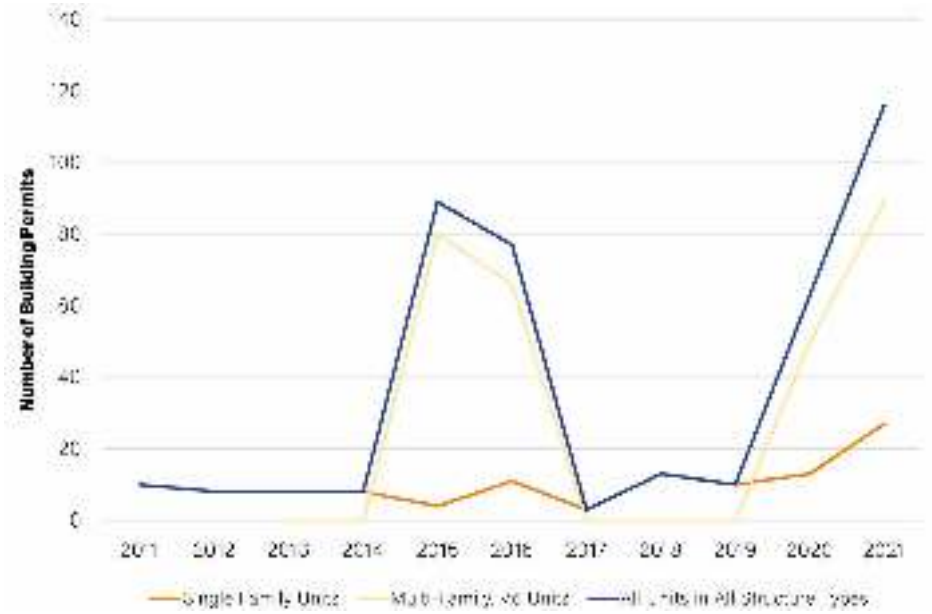
Petersburg has 17,941 housing units, the majority of which are single-family homes. The City's housing stock varies from the statewide housing stock, which has a higher percentage of single-family homes and a lower percentage of multi-family homes. Petersburg did not issue any building permits for duplexes or multi-family structures under 5 units – typically referred to as "missing middle housing" – between 2011 and 2021. Most building permits issued were for multi-family structures over 5 units, and the total number of residential building permits has significantly fluctuated over time.

Figure 4.1 | Housing Type



SOURCE: 2018-2022 American Community Survey, 5-Year Estimates

Figure 4.2 | Residential Building Permits by Type, 2011-2021



SOURCE: Weldon Cooper Center for Public Service, 2011-2021

Housing Vacancy

Petersburg currently has an homeowner vacancy rate of 4.5% and a rental vacancy rate is 8.3%. Comparatively, the homeowner vacancy rate in Virginia overall is 1% and the rental vacancy rate in Virginia overall is 4.9%.

Of the 3,238 reported vacant housing units in Petersburg, 837 are available for rent and 129 are used occasionally for uses such as short-term rentals or seasonal residences, leaving 2,272 units that otherwise have an unknown status. This discrepancy in vacancy rate, along with the high percentage of "other" vacant units, indicates a high percentage of uninhabitable houses. Petersburg's vacancy rate is the highest in the region, indicating that residents who are able to choose where they reside are living elsewhere nearby (Figure 4.3).

Housing Tenure

Of occupied housing units in Petersburg, 37.4% are owner-occupied and 62.6% are renter-occupied, almost exactly the opposite of the statewide averages of 66.9% and 33.1%, respectively (Figure 4.3). Approximately 79% of residents were living in the same house as the previous year, indicating slow housing migration within the City (Figure 4.5). A little over 35% of Petersburg residents (35.4%) moved into their homes between 2015-2018, which may coincide with a rise in newly-built housing units around that period. Of those who moved during that time, roughly 41.2% were owners and 58.8% were renters. The majority of Petersburg re

Figure 4.3 | Regional Vacancy Rates

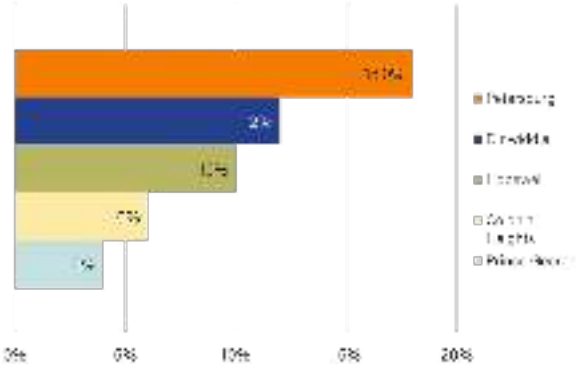


Figure 4.4 | Housing Tenure

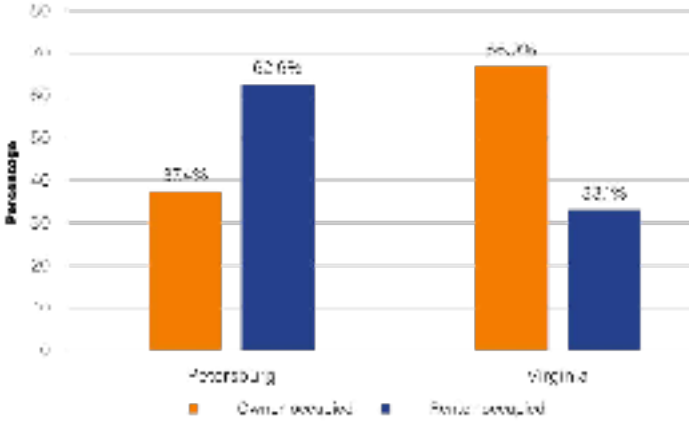
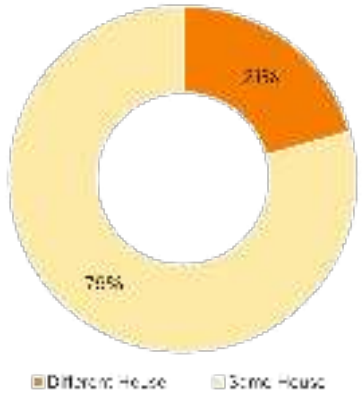


Figure 4.5 | Last Year's Previous Residence



SOURCE, ALL FIGURES: 2018-2022 American Community Survey, 5-Year Estimates

Housing Age

Housing age is an important factor in understanding how to promote neighborhood stability. The housing stock in Petersburg was mostly constructed in the mid- to late-20th century during the post-World War II housing boom, with approximately 72.7% of units built before 1980. Lack of new housing with significant amounts of older housing suggests the need for revitalization of the housing stock to support economic vitality.

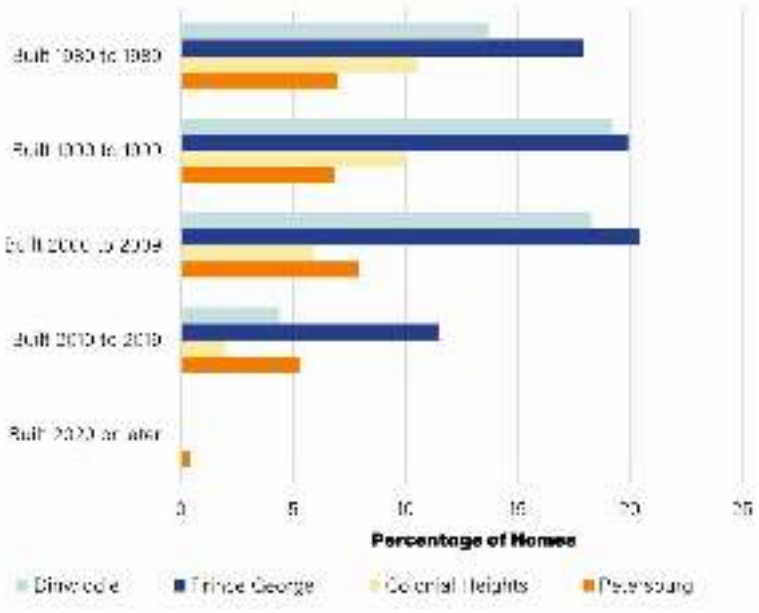
While Petersburg outpaced Virginia in housing construction prior to 1979, it declined significantly after 1980. This decline occurred around the same time as the rise of development outside Petersburg with growth occurring in the City of Colonial Heights and the Counties of Prince George and Dinwiddie (Figure 4.6).

Housing Affordability

As of 2022, Petersburg's median gross rent is $1,082. This has increased by approximately 22% in the past decade. The median owner-occupied home value in Petersburg is $147,200, less than half of the statewide median of $339,800 (Figure 4.7).

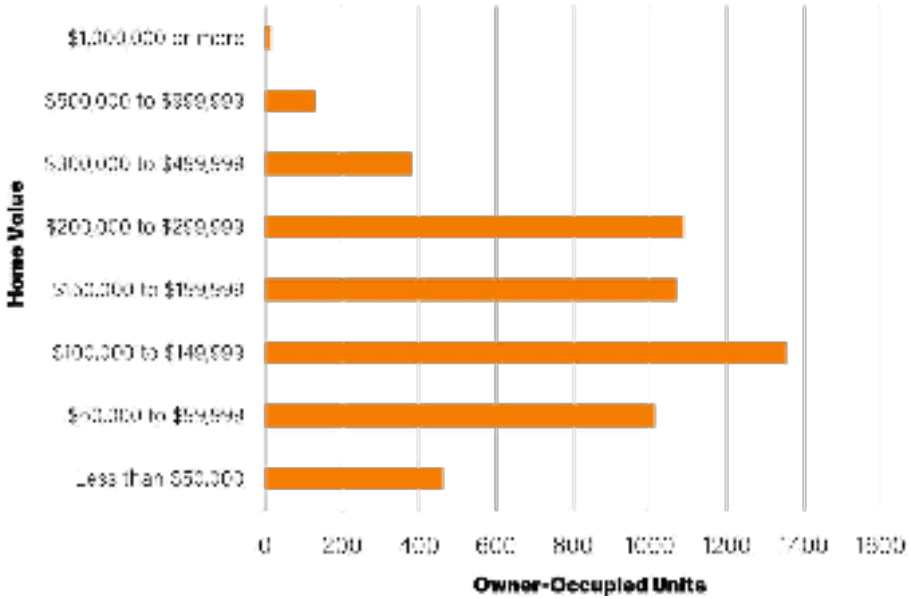
The availability of adequate affordable housing options is critical for sustaining the economic and social health of the community. Approximately 50% of Petersburg's renter households and 30% of Petersburg's homeowner households are considered cost-burdened, meaning that 30% or more of their income goes toward housing costs, including a monthly rent or mortgage payment and utilities.

Figure 4.6 | Construction Year of Regional Housing Stock



SOURCE: American Community Survey
NOTE: This graph only depicts residential construction after 1980.

Figure 4.7 | Value of Owner-Occupied Homes



SOURCE: 2018-2022 American Community Survey, 5-Year Estimates

BLIGHT ABATEMENT AND REHABILITATION

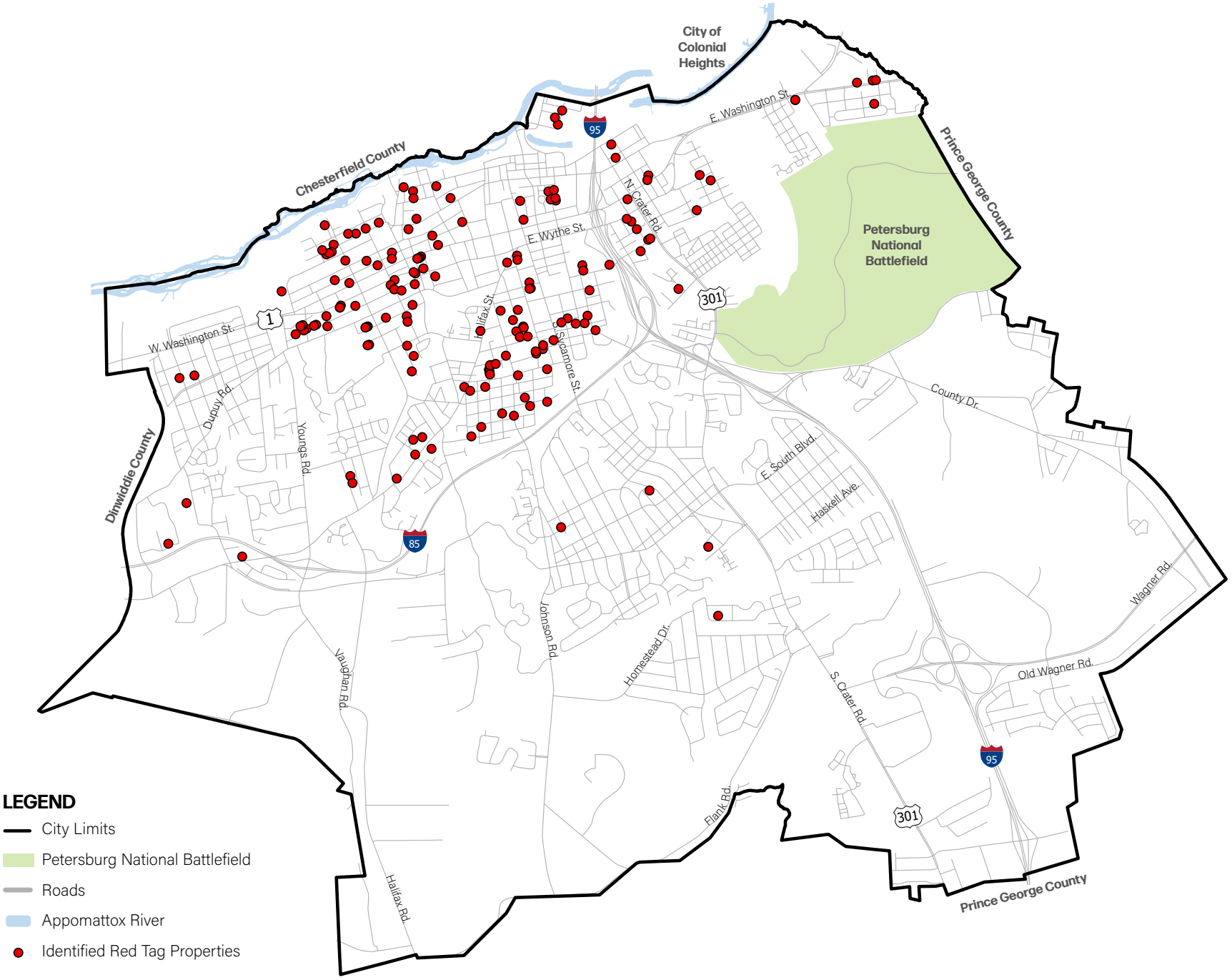
A blighted property is an individual structure that poses a threat to the community's general health, safety, and welfare due to dilapidation, deterioration, or a violation of minimum health and safety standards (Code of Virginia Section 36-3). Blighted properties have several effects on community life in Petersburg, including depressed property values, increased disinvestment from businesses, and heavy financial and time burdens on local government. In some cases, blighted properties become associated with illicit activity, posing significant threats to the health and safety of the greater community. Additionally, blight and disinvestment send messages to potential residents that the quality of life they may be seeking for their family is best met elsewhere, dampening population growth in Petersburg.

The City of Petersburg Department of Code Enforcement is responsible for property maintenance code enforcement. Procedures for identifying and remedying blighted and derelict property are outlined in Chapter 22 of the City's Code of Ordinances and align with what is permitted by the Code of Virginia. The Virginia National Guard assists the City with blight abatement on an annual basis through demolition of properties in violation. Properties identified by the Department of Code Enforcement as "red tag" properties, or properties that have been identified as uninhabitable and evacuated or vacant, are shown in Maps 3.1 through 3.5, and generally have the following characteristics:

- Red tag properties are concentrated in the central area of the City, north of Interstate 85 and west of Interstate 95.
- Red tag properties inversely correlate with median household income: the lower the household income of an area, the greater the likelihood of blight.
- About half of identified red tag properties fall within the boundaries of a designated local, state, or federal historic district.
- Red tag properties tend to inversely correlate with owner-occupancy rate.

There are several challenges to identifying and eliminating blight in Petersburg. One of the biggest challenges to blight abatement in Petersburg is limited staff and financial constraints. Without adequate resources, Petersburg will be unable to proactively identify and remedy blighted properties. Petersburg should prioritize the expansion of its Department of Code Enforcement, aiming to double the number of staff responsible for code enforcement within the next five years.

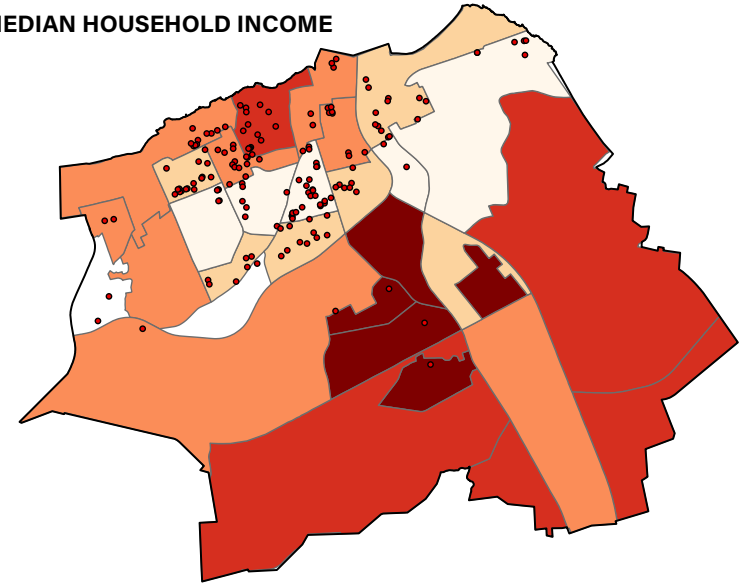
MAP 4.1 | RED TAG PROPERTIES



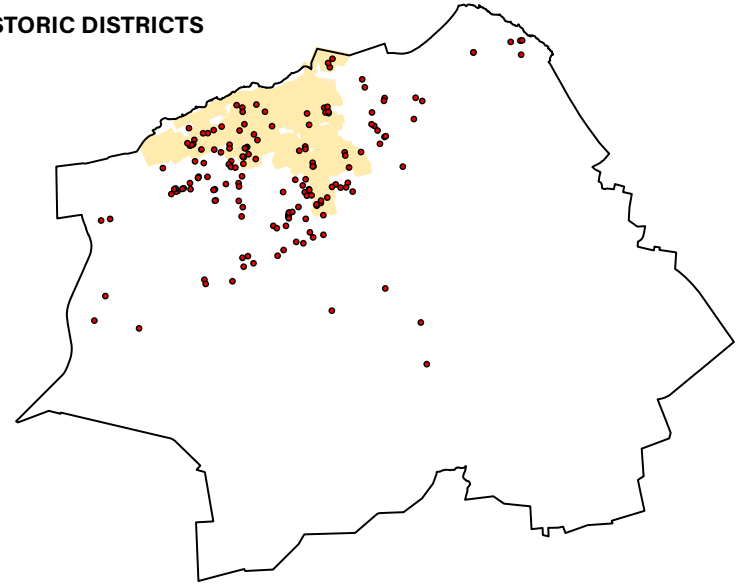
SOURCE: City of Petersburg, Virginia (November 2022)

MAPS 4.2, 4.3, 4.4, 4.5 | RED TAG PROPERTIES AND OTHER RESIDENTIAL CHARACTERISTICS

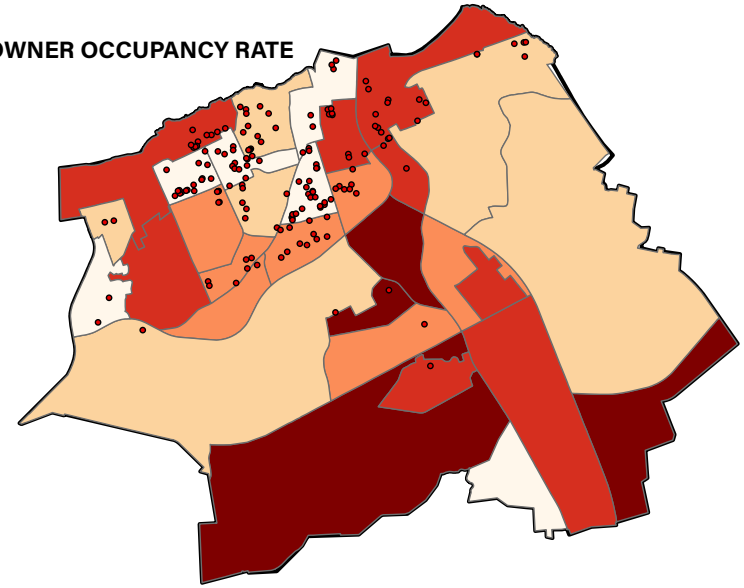
MEDIAN HOUSEHOLD INCOME



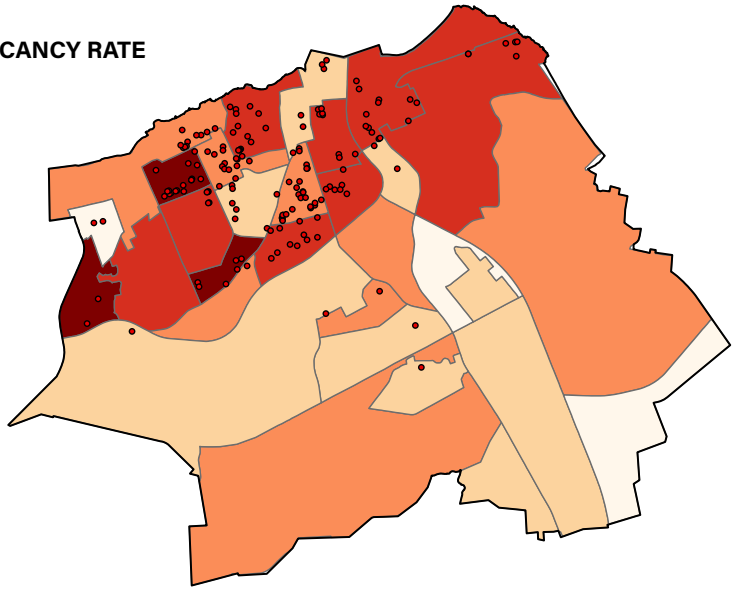
HISTORIC DISTRICTS



OWNER OCCUPANCY RATE



VACANCY RATE



RED TAG PROPERTY

BLOCK GROUP

LOW — HIGH

SOURCES: City of Petersburg, Virginia; American Community Survey 2016-2021

Absentee landowners, or property owners who live outside of Petersburg or Virginia, present challenges to blight abatement due to both physical distance and legal constraints in issuing summonses. Absentee landowners often lead to code violations due to a lack of the owner's continuous monitoring of the property. This can lead to blight, creating a cycle that becomes increasingly difficult to manage and correct over time.

While Petersburg cannot prevent absentee landowners or corporations from purchasing property, there are several ways to ensure they are fully maintaining and investing in their assets:

- Provide adequate staff and financial resources to enforce City Ordinances.
- Review City Ordinances to ensure that penalties for violations are clearly stated and set to the maximum allowable by the Code of Virginia.
- Amend City Ordinances to deny issuing building permits to owners of tax-delinquent property until the delinquency is remedied, as permitted by Code of Virginia Section 15.2-2286.

Finally, the City's older housing stock coupled with low rates of development can contribute to blight by constraining the available supply for potential buyers and renters, creating pressure to keep older homes in service longer. With many of Petersburg's existing homes over 40 years old, the need for upkeep and maintenance can require investments in major building systems, weatherization, energy efficiency, accessibility, and other building repairs, which can often be cost-prohibitive for owners. For properties within a designated local or federal historic district, there are additional standards for aesthetic appearance, adding even more time and cost burden for owners.

Programs and Resources

Several grants and homeowner assistance programs from the Virginia Department of Housing and Community Development (DHCD) are readily available and can provide property owners with the financial and educational support they need to keep their home maintained. These programs offer assistance with rehabilitation, weatherization, and more to ensure homes remain safe, stable, and well-maintained. Examples of these programs and resources are shown in Table 4.1.

Table 4.1 | Housing Rehabilitation Programs and Resources

Click the links to learn more about the available programs!

Available Program	Organization	Link
Emergency Home and Accessibility Repair Program	Virginia Department of Housing and Community Development	**dhcd.virginia.gov/eharp**
Indoor Plumbing and Rehabilitation	Virginia Department of Housing and Community Development	**dhcd.virginia.gov/ipr**
Weatherization Deferral Repair	Virginia Department of Housing and Community Development	**dhcd.virginia.gov/wdr**
Weatherization Assistance Program	Virginia Department of Housing and Community Development	**dhcd.virginia.gov/wx**
Virginia Livable Home Tax Credit	Virginia Department of Housing and Community Development	**dhcd.virginia.gov/lhtc**
Rental Unit Accessibility Modification Program	Virginia Housing	**virginiahousing.com/renters/accessibility-grants**
Lead Hazard Reduction	Virginia Department of Housing and Community Development	**dhcd.virginia.gov/lhr**

Moving Forward

There are several solutions the City can pursue to aid in the fight against blight. Some of these are regulatory in nature, including evaluating an increase in fines for violations and adopting a drug blight ordinance in accordance with the Code of Virginia Section 15.2-907. A drug blight ordinance provides the City with an additional mechanism to eliminate blight associated with confirmed criminal activity.

Blight Abatement in Historic Districts

Demolition in designated local or national historic districts should be avoided. Demolition in areas not designated as historic districts may be pursued after other options have been exhausted or proven infeasible, with contiguous properties assembled and marketed to develop small-scale subdivisions of single-family residences or duplexes. This paves the way for infill that is complementary to the surrounding neighborhood. Reviewing and updating the City's Zoning and Subdivision ordinances to ensure minimum lot sizes facilitate development that is compatible with existing neighborhood character is an important and relevant opportunity.

The City should establish a data-driven, digital real estate database to include property records, maps, and code violations to support code enforcement and policy development efforts. Moving towards data-driven property maintenance code enforcement will improve efforts by allowing City officials to allocate limited resources to achieve the greatest impact. It will also provide additional quantitative data for City Staff, City Council, and the court system, to, at a minimum, track progress over time and to better determine priority areas for intervention. Having a rigorous system to provide readily available data can also better inform Ordinance updates and capital improvements planning.

Ultimately, further study will be necessary to develop a fully comprehensive blight abatement strategy. The City should make the completion of a blight study, and the creation and adoption of a blight abatement strategy, a short-term high priority.

Mayton Transfer Lofts

Housing Diversity

One aspect of ensuring that all residents – regardless of race or socioeconomic background – have access to safe, stable, and affordable housing is ensuring a diverse housing stock. Having affordable, safe, and attractive housing is a critical building block toward a better economy, and ultimately a stronger and more sustainable community.

Housing choice empowers residents to access housing that meets their financial and familial needs. Without sufficient housing choice, residents are often forced to spend more than 30% of their annual household income on housing expenses, which is the state and federal affordability threshold. This, in turn, reduces the amount of financial resources households can spend on fresh and healthy food, healthcare, and transportation costs. It may also lead to increased risk of mental health challenges due to the stress caused by unaffordability.

The housing spectrum provides a useful tool of looking for different housing options in relation to area median income (AMI), which is $44,890 for Petersburg. Different points on the housing spectrum require different housing solutions.

Figure 4.8 | Virginia's Housing Spectrum

SOURCE: Virginia Housing Forward, Virginia Department of Housing and Community Development

Many Petersburg households are estimated to fall above 80% of AMI, although a considerable portion of residents are estimated to fall below 30% of AMI.

Based on the City's existing housing stock, residential building permits issued, and AMI distribution of residents, the priority for future housing investment should focus on affordable homeownership and market-rate rental and homeownership opportunities. Petersburg should promote development of "missing middle housing" in the form of duplexes, townhouses, or garden-style apartments and condominiums. This type of housing is a great option for first-time homebuyers. Zoning Ordinance regulations should be evaluated to identify and eliminate barriers to this type of development, such as restrictive setbacks and minimum lot sizes. Successful blight abatement and rehabilitation will also help increase the supply of single-family homes.

Table 4.2 | Petersburg Households and Housing Spectrum

Housing Spectrum	Household Income Range Equivalent	Estimated Percentage of Households	Estimated Maximum Annual Housing Payment*
Below 30% AMI	$13,467 and below	17%	Below $4,040
30% AMI to 50% AMI	$13,467 - $22,445	13%	$4,040 - $6,734
50% AMI to 80% AMI	$22,445 - $35,912	10%	$6,734 - $10,774
Above 80% AMI	$35,912 and higher	60%	$10,774 and up

SOURCE: American Community Survey, 2016-2021
*Based on the state and federal threshold of 30% annual household income to total housing expense. This table assumes an average of 2.26 residents per household, and includes both renters and homeowners.

Aerial view of the Walnut Hill neighborhood

Aging in Place

Aging in place allows older adults to live in a familiar place where they have well-established social, familial, and medical connections. The desire to age in place may also be an economical decision as moving costs and high mortgage payments are avoided. As Petersburg's population of older adults continues to increase, it will be important to ensure that those who desire to age in place are supported.

There are many strategies the City can pursue to ensure it is fully supportive of its older population – many of whom are lifelong or long-term Petersburg residents. Ensuring that sidewalks are well maintained, wheelchair accessible, and connect residential areas to amenities supports mobility for older adults who cannot drive. Housing rehabilitation programs can provide older adults with the funding and guidance to maintain and modify their homes to be fully accessible. Accessory dwelling units can help offset rising housing costs, create residential space for children or other live-in caregivers, or create adjacent residential space for parents or others for whom care is being given.

Several senior housing and assisted living facilities are present in Petersburg for older adults who require more supportive care as they age. Additional development of age-restricted and senior housing will create new options for those wishing to stay in Petersburg but downsize, transition out of homeownership, or both. These types of housing options are also beneficial in helping provide older adults with more routine medical care.

Veterans' Housing

Veterans' housing is a regional need due to the influence of the U.S. military as a major employer. Veterans' housing can be transitional or permanent in nature and is effective in helping bridge the gap between military veterans and the civilian community. Petersburg strives to partner with its neighboring localities to supply veterans' housing to the community.

Transitional Housing

Transitional housing, or temporary housing options, bridge the gap between homelessness and permanent housing. Currently, there is no permanent shelter or transitional housing opportunities for residents facing homelessness. This is especially challenging for more vulnerable community members: women, children, older adults, and those with physical or mental disabilities.

One model to address traditional housing needs is a system where non-profit and faith-based coalitions share the responsibility of operating a shelter during the winter months. Another opportunity is a transitional housing space that could be managed by local non-profits or community groups; this could be supported through U.S. Department of Housing and Urban Development (HUD) block grant funding.

Over 400 students in the PCPS system were homeless at some point in time during the 2020-2021 school year (College of William and Mary).

There is currently an increasing number of group homes in residential neighborhoods throughout the City. When registered, regulated, and inspected, these residential opportunities provide safe options for residents with barriers to housing. The City should continue its efforts to ensure group homes are regulated and safe, in accordance with all applicable requirements from Code of Virginia.

Subsidized Housing

Subsidized housing meets a critical need for community members who make below 50% of the AMI. The Petersburg Redevelopment and Housing Authority (PRHA) was created in 1967 and owns and manages approximately 310 units of public housing and administers approximately 837 units under the Housing Choice Voucher (HCV) Program. PRHA also manages 38 units of rental housing that are part of the Low-Income Housing Tax Credits (LIHTC) program and 100 units in a HUD Section 202 program. The total number of units managed by PHRA house less than 5% of the City's population, although as much as 30% of the City's population is estimated to make below 50% of the AMI. As of 2021, over 1,230 people were on a waitlist for the HCV program and 300 people were on a waitlist for public housing, indicating that demand for subsidized housing remains high.

To balance the need to meet housing demand and the need to spark more widespread building of generational wealth, the focus for the future should be to maintain existing public housing units and ensure that these units are high-quality and safe rather than developing new units. New subsidized units should be established through the LIHTC program or other tax incentives as opposed to Section 8 housing. This is because the LIHTC program facilitates development of a more diverse array of housing types, can preserve existing multi-family housing stock, and has a demonstrated track record of sparking successful economic investment. LIHTC development can also be paired with historic tax credits as an additional incentive, and should be directed toward areas with the greatest access to economic opportunity to create mixed-income neighborhoods and deconcentrate poverty.

LIHTC encourages the development of affordable rental housing by providing owners a federal income tax credit. It also provides an incentive for private investors to participate in the construction and rehabilitation of housing for low-income families.

Henry Williams Townhomes

WHAT IS "REDLINING"?

"Redlining" is used to describe a discriminatory practice in **which lenders would systematically deny loans, mortgages, and other financial services** to residents of certain areas based on the prevailing race or ethnic group in the area. Lenders would draw red shaded areas on maps to visualize these "hazardous" areas, leading to the term "redlining."

The impacts of redlining are **broad and significant**, but primarily resulted in **generational poverty through neighborhood segregation**, **continuous loan denials**, and **predatory lending.**

To explore a historic redlining map of Petersburg, **click here**.

PATHWAYS TO HOMEOWNERSHIP

Manufactured Housing

Manufactured housing, which includes modular homes, prefabricated homes, and mobile homes, is one option to provide a diverse, attainable housing stock and is one of the most affordable opportunities for homeownership.

Manufactured housing comprises just under 3% of the City's housing stock. The City facilitates manufactured housing placement through allowing it as a by-right use in the agricultural zoning district, and through the Residential Mobile Home (RMH) district in the Zoning Ordinance. Approximately 64 acres of land are currently zoned RMH, with significant buildout potential remaining on these lots. Petersburg should continue to promote the development of manufactured housing in appropriate areas in a safe and attractive manner. In addition to federal standards governing the safety and quality of individual manufactured units, there are several regulations to ensure communities as a whole are safe and well-maintained, including routine inspection, landscaping, and open space requirements.

Fair Housing

One of the biggest barriers to achieving homeownership in Petersburg is a high denial rate for mortgage loans, driven by historic disinvestment and predatory lending. Rental housing choice can be blocked by high-eviction landlords and predatory practices by some lenders.

Petersburg has adopted a Fair Housing ordinance to prohibit discrimination in housing. Additionally, Petersburg was authorized by the Code of Virginia to participate in a pilot Eviction Diversion Program (EDP) through July 2024 where participating tenants must pay at least 25% of the amount due on the return date agreed to by the landlord and tenant. If the tenant makes all payments as required, the lawsuit will be dismissed. However, access to fair housing remains a challenge, especially in areas of the City that were historically subject to redlining. Evictions before, during, and after the COVID-19 pandemic were at unprecedented levels in the United States, with Petersburg having the second highest eviction rate among mid-sized cities in the country at 17.5 evictions per 100 rental homes. The negative effects of eviction and housing instability can have ripple effects across Petersburg and include increased unemployment, homelessness, and costs to provide public services.

Education is one key to ensuring that tenants know their rights and can advocate in situations where their rights may have been violated. A Fair Housing information clearinghouse should be created and provided digitally. Another proactive measure to promote fair housing is to establish defined boundaries for rental inspection districts. Petersburg has adopted a rental inspection district ordinance but has not yet defined boundaries.

A regional approach to fair housing can be highly successful, as time and financial resources are shared. Petersburg should support the creation of a regional fair housing testing program and commission to review fair housing complaints. Additionally, it is recommended that evictions, delinquent payments, and foreclosures be tracked through a regional GIS database for transparent review, research, and monitoring.

Table 4.3 | Regional Filings and Evictions, Q1 - Q2 2022

	Q1 2022		Q2 2022		% Change: Q1 2022 - Q2 2022	
Locality	Filings	Evictions	Filings	Evictions	Filings	Evictions
City of Petersburg	370	125	593	284	60%	127%
Chesterfield County	1,255	498	1,031	518	-18%	4%
Henrico County	725	214	1,484	586	105%	174%
City of Hopewell	178	66	213	85	20%	29%
City of Richmond	1,173	336	1,596	440	36%	31%

SOURCE: Legal Services Corporation (LSC) Civil Court Data Initiative, RVA Eviction Lab Analysis

Economic Investment

One aspect of promoting homeownership is ensuring access to both jobs that pay a living wage and the skills training for those jobs, whether that be through higher education or a continuing education program. Chapter 3 of this Plan addresses economic growth and development in greater detail.

Federal funding can help spark greater economic growth, especially when connected to homeownership and building wealth. Petersburg is a Community Development Block Grant (CDBG) entitlement community, meaning that the City receives annual federal funding that can be allocated in a variety of ways for the betterment of the community. An Advisory Board serves to guide City Council on how to allocate funding. Moving forward, CDBG funding should be prioritized for job training, skills development, and economic development to better position residents for homeownership. The City should also expand community engagement above and beyond mandated public participation to ensure CDBG allocation is addressing high-priority needs for residents, especially needs that may typically be cost-prohibitive given City budget constraints.

WHAT IS A COMMUNITY LAND TRUST?

Community Land Trusts (CLTs) are **successful partnerships** to **support the provision of affordable housing in a community and build generational wealth**. A typical CLT is a non-profit organization operated by community members. The CLT **owns land and leases the land at affordable prices to residents, who can in turn build and purchase a home on the property for up to 50% less than the market rate**. If a resident sells their house, profit is typically limited to ensure that the home in the land trust remains affordable for the next resident.

Other **benefits** of a CLT include preventing blight, promoting neighborhood stability by reducing gentrification, and giving the community greater control over the development happening in their neighborhood. CLTs can be successfully funded through a variety of mechanisms, including public and private grants. **Petersburg is a prime location for a CLT due to its large quantity of vacant land and demonstrated need for affordable housing opportunities. The City should support efforts to create a CLT and promote this opportunity as a successful pathway to homeownership.**

To learn more about CLTs, click to check out the resources **here** and **here**!

Programs and Partnerships

Collaboration with local, regional, and state organizations is important in helping provide and promote pathways to homeownership in Petersburg. Petersburg should maintain regular communication with its regional partners to support their efforts to provide Petersburg residents with safe, attractive, and high-quality places to call home.

Local and regional partners Petersburg can continue relationships with to promote pathways to homeownership include, but are not limited to:

- Crater Planning District Commission (CPDC)
- Habitat for Humanity
- Partnership for Housing Affordability (PHARVA)
- Pathways
- Petersburg Redevelopment and Housing Authority (PRHA)
- project:HOMES
- Southside Community Development and Housing Corporation (SCDHC)
- The Cameron Foundation
- United Way
- Virginia Housing Alliance (VHA)

NEIGHBORHOOD VITALITY

Everybody deserves a great neighborhood. A healthy housing mix is a catalyst to maintaining stable neighborhoods and supporting economic development. Residents need economic opportunity and mixed- income neighborhoods to encourage investment throughout Petersburg. Petersburg's efforts to address housing needs should be coupled with efforts to ensure the overall vitality of its residential neighborhoods. (Map 3.3).

Neighborhood vitality can be achieved in several ways – from regulatory action to "thinking outside of the box" – to address community challenges to community-driven revitalization. The strategies in PetersburgNEXT are intended to spark discussion and new policy directions, all with the goal of creating and sustaining neighborhood vitality throughout the City.

Housing Rehabilitation Zones

Code of Virginia Section 36-55.64 authorizes Virginia localities to create, by ordinance, local housing rehabilitation zones that provide incentives and regulatory flexibility. The establishment of housing rehabilitation zones allows projects that are affordable for a variety of incomes to be eligible for housing revitalization financing. Petersburg should designate up to two housing rehabilitation zones to allow the City and private and non-profit development community to take advantage of funding opportunities to improve housing and neighborhood conditions. The community should be given the opportunity to provide feedback on neighborhoods that are under consideration for rehabilitation zones.

Community-Driven Investment

Tactical urbanism, regular neighborhood clean-ups, and community watch programs are all examples of community-driven investment. This type of investment is important in ensuring neighborhoods are reflective of the history, culture, and priorities of their residents, and is key in helping prevent gentrification (see the "Investment Without Displacement" section later in this Chapter). The City should actively support local neighborhood groups and non-profits in community-driven investment efforts.

W. Washington Street & Market Street Mural In Progress
Photo Credit: Petersburg Healthy Options Partnerships

WHAT ARE SOME OF THE ASPECTS OF COMMUNITY VITALITY?

- Safe and decent affordable housing
- Public safety
- Strong public schools
- Streets that are well-lit, well-landscaped, well-maintained, and provide safe pedestrian infrastructure
- Employment opportunities that are accessible and pay living wages
- Connective public transportation infrastructure
- Pride of "ownership" in the neighborhood
- Convenient access to both active and passive recreation and open space
- Civic and institutional engagement that facilitates strong bonds among community members

Tactical Urbanism

Tactical urbanism is a term often used to refer to low-cost, low-effort, and flexible neighborhood interventions such as street murals and parklets. Tactical urbanism is typically led and maintained by community members and is a widely accepted method of sparking widespread neighborhood revitalization that reflects the spirit of the community.

- A private property mural program can help beautify neighborhoods.
- Little Free Libraries promote literacy and support cohesive communities.
- Pop-up farmers' markets or urban gardens on vacant lots facilitate access to healthy and fresh food and ensure that vacant lots are being maintained and cleaned.
- Other placemaking activities, such as "guerilla landscaping," can create a sense of ownership and community pride.

Petersburg should create pilot programs for tactical urbanism efforts, such as a private property mural program and pop-up farmers markets. These efforts should be led and supported by local community groups and non-profit organizations.

The Dollar Lot Program

One best practice for community-driven investment is a dollar lot program. Successfully piloted in several major U.S. cities, the dollar lot program is characterized by cities selling vacant parcels for $1 to community members who either own land on the same block or otherwise have a demonstrated local interest or investment in the area, such as non-profits or churches. Buyers must retain their property for at least five years and cannot purchase more than two lots through the program. They are also typically required to regularly maintain the lot; some creative solutions for vacant lots include community gardens and temporary art installations. Lots could not be repurposed for uses such as off-street parking, storage of junk, or trash disposal.

A study of a similar program in Chicago found a statistically significant drop in crime after one year in participating neighborhoods. Other potential benefits that Petersburg could experience include increased community stability, a decline in code violations such as trash and tall grass, and less staff time and resources spent on citing those code violations. Petersburg should evaluate the feasibility of creating a dollar lot program for vacant parcels in residential neighborhoods. The City should collaborate with regional partners, such as the Crater Planning District Commission (CPDC) and the Cameron Foundation, for assistance with funding and administering the program. Community Land Trusts (CLTs) can also help manage dollar lot programs.

INVESTMENT WITHOUT DISPLACEMENT

When undergoing revitalization of any kind, Petersburg must be careful that new investment is not a catalyst for gentrification and displacement of long-term community members. There are several different ways Petersburg can ensure that new investment continues to move the City forward while complementing existing neighborhoods and community culture.

Neighborhood Investment, Together

Routinely involve community members in planning processes.

Develop new small area plans for Pocahontas Island, Halifax Triangle, and University Boulevard to further detail a broad-based visioning and neighborhood revitalization planning process in these neighborhoods.

Adaptive reuse or infill projects in designated historic districts or in Old Towne should be complementary to the design and scale of the surrounding neighborhood.

New multi-family housing developments should be mixed-income whenever possible.

Aerial view of Old Towne

Working Together for Vibrant Neighborhoods and Housing for All

Goal Statement: Petersburg will be a city where all housing and neighborhoods are attractive, safe, and accessible to all residents.	
Objectives	**Strategies**
4.1 Systematically identify and eradicate residential blight across Petersburg.	4.1.1: Create a stand-alone, comprehensive residential blight abatement strategy.
	4.1.2: Adopt a drug blight ordinance in accordance with the Code of Virginia as an additional mechanism to eliminate blight associated with confirmed criminal activity.
	4.1.3: Ensure that penalties for blight violations are clearly stated in the City's Ordinances and set to the maximum allowable by state code.
	4.1.4: Avoid demolition of properties in identified historic districts, pursuing rehabilitation, adaptive reuse, or creative reuse instead.
	4.1.5: Allow demolition as needed in non-historic districts to allow infill with compatible residential development.
	4.1.6: Create an online code enforcement database to allocate City resources more efficiently, track progress, and guide Ordinance updates and capital improvements planning.
	4.1.7: Partner with the Virginia National Guard to eradicate blighted structures.
	4.1.8: Prioritize the expansion of its Department of Neighborhood Services, aiming to double the number of staff responsible for code enforcement within the next five years.
	4.1.9: Develop a robust code enforcement strategy to allow the City to be more proactive in preventing properties from reaching Red Tag status.

Objectives	Strategies
4.2 Facilitate the provision of a diverse, safe, attainable, and high-quality housing stock in all neighborhoods.	4.2.1: Amend the Zoning Ordinance to support "missing middle" housing. Create incentives within the Zoning Ordinance for these types of structures to promote their development.
	4.2.2: Amend the Zoning Ordinance to facilitate the provision of safe and attractive manufactured housing development in appropriate areas.
	4.2.3: Provide financial support to the Petersburg Redevelopment and Housing Authority (PRHA) in their work to maintain housing developments, ensuring that they are attractive and safe communities.
	4.2.4: Recommend approval of mixed-income, market-rate, and workforce housing developments, especially when located in areas of opportunity.
	4.2.5: Amend the Zoning Ordinance to allow for adaptive reuse, creative reuse, and opportunities for new housing in non-traditional areas (e.g., former shopping centers, former churches and schools, etc.).
4.3 Expand pathways to homeownership through partnerships, education, and eliminating regulatory barriers.	4.3.1: Prioritize annual Community Development Block Grant (CDBG) funding for job training, skills development, and economic development to better position residents for homeownership.
	4.3.2: Develop a formal Fair Housing Q&A flyer for frontline City staff to ensure a consistent and high-quality process of referring residents to HOME and Legal Aid. Include this in a Fair Housing clearinghouse on a highly visible section of the City's website.
	4.3.3: Establish defined boundaries for two rental inspection districts.
	4.3.4: Evaluate the feasibility of creating a Housing department to streamline the provision of housing services such as education, assistance, and benefits to the community.
	4.3.5: Create and promote a Community Land Trust program in collaboration with local non-profits and lenders.

Objectives	Strategies
4.4 Support neighborhood vitality through community partnerships, regulatory action, and strategic investments.	4.4.1: Update small areas plans for Pocahontas Island, Halifax Triangle, and University Boulevard to further detail broad-based, inclusive visioning and planning for revitalization in these neighborhoods.
	4.4.2: Collaborate with community groups and partner organizations in tactical urbanism efforts to beautify neighborhoods in the short-term. Evaluate the creation of a Private Property Mural Program as a first step.
	4.4.3: Apply for grant funding related to infrastructure improvements as a means of supporting quality neighborhoods and economic development.
	4.4.4: Amend the City Code of Ordinances to designate two housing rehabilitation zones in accordance with the Code of Virginia.
	4.4.5: Establish a Dollar Lot Program through collaboration with regional partner organizations.
4.5 Be mindful of community character when evaluating new residential development to ensure that investment is complementary to existing character and history and does not displace long-term residents.	4.5.1: Direct mixed-income residential development in appropriate areas throughout the City, as guided by the Future Land Use Framework and Map.
	4.5.2: Ensure that adaptive reuse and infill development in designated historic districts and Old Towne is complementary to the scale and architectural character of the surrounding area.

05 PARKS + RECREATION + ARTS + HISTORIC PRESERVATION

Petersburg provides equitable access to parks, recreation, the arts, and historic resources to facilitate healthy lifestyles, tourism, and celebration of heritage and culture.


"THE POSSIBILITIES ARE **ENDLESS** WITH SOME CREATIVE VISION AND A JOINT CITY AND COMMUNITY INSPIRED PARTNERSHIP; A REINVESTMENT OF **TIME**, **IDEAS**, AND **INNOVATION**!"
- Idea Wall Respondent

05

INTRODUCTION

The heart and soul of a community are manifested through its recreational spaces and culture, directly contributing to a high quality of life and an enduring sense of place. Just as water, sewer, and public safety are considered essential public services, access to parks, recreation, and cultural amenities is vital to maintaining the physical and mental well-being of residents and can provide unique opportunities for economic development through tourism.

Petersburg is fortunate to have an abundant inventory of parkland and a rich cultural fabric to support recreation, the arts, and historic preservation. By resourcefully utilizing existing assets and investing in amenity improvements where there is demonstrated need, the City will cultivate a strong foundation of recreational opportunities, community programming, and cultural experiences that collectively define Petersburg as a destination to live, play, and visit. This chapter highlights the existing conditions of Petersburg's recreational and cultural resources and explores opportunities to enhance assets and preserve them for future generations to enjoy.

COMMUNITY FEEDBACK: PARKS, RECREATION, ARTS + HISTORIC PRESERVATION

- Local history and culture are the most valued assets in Petersburg.
- Lack of youth recreational programming and opportunities is a major concern among survey respondents.
- 55.7% of survey respondents did not feel that there is adequate space and programming at community centers to meet the community's needs.
- 53.4% of survey respondents did not feel that cultural events and social opportunities meet the community's needs.
- The top recreational facility improvements desired are trails, indoor community centers, and outdoor event spaces. Updated and accessible playgrounds were also highly desired, along with a public dog park.

Appomattox River

INVENTORY AND ASSETS

Parks and Facilities

Parks and recreational programming is managed by Petersburg's Department of Recreation, Special Events, & Volunteerism, while the Facilities Management and Grounds Maintenance Divisions oversee property maintenance. Overall, the City owns 16 parks within its limits, plus an additional riverfront park in Dinwiddie County, Appomattox Riverside Park, which is also referred to as Ferndale Park. City-owned parks include a large outdoor sports complex, public golf course, community pool, and numerous athletic fields.

Trail systems within Petersburg are available in Legends Park and Petersburg National Battlefield, which have individual systems of internal trails for walking and biking. Additional walking tracks and paths can be found in neighborhood parks throughout the City. Petersburg also boasts newly completed segments of the Appomattox River Trail, which will drive increased opportunities for recreational tourism. Four miles of the Appomattox River Trail have been planned within Petersburg, with key intersections to the Fall Line Trail and East Coast Greenway planned at Patton Park for a coordinated regional trail network that converges in Petersburg.

Community Centers

Community centers provide meaningful services to residents of all ages. There are currently three community center facilities in the City: A.P. Hill Community Center, Harding Street Recreation Center, and the privately-owned Petersburg Family YMCA. Harding Street is vacant and deteriorating rapidly; A.P. Hill is vacant but recently was repaired with a new roof. Community engagement consistently cited the need for more community centers to adequately provide indoor programming and recreation space, particularly for youth. In lieu of constructing new facilities, the City should utilize its existing vacant properties at A.P. Hill and Harding Street, as well as Peabody Middle School, to provide much-needed indoor meeting and recreation space. Desired programming at these spaces includes after-school youth activities and tutoring, adult learning and workforce training, computer labs, 3-D printing, and meeting space to learn hobbies and skills.

The City should also collaborate with Petersburg City Public Schools (PCPS) to facilitate more after-school and community programs within current school buildings and playgrounds after hours. Key benefits to providing more after-school programming for children include safe spaces for youth while their parents work, reduced likelihood of engaging in risky behaviors, and opportunities to learn social and life skills.

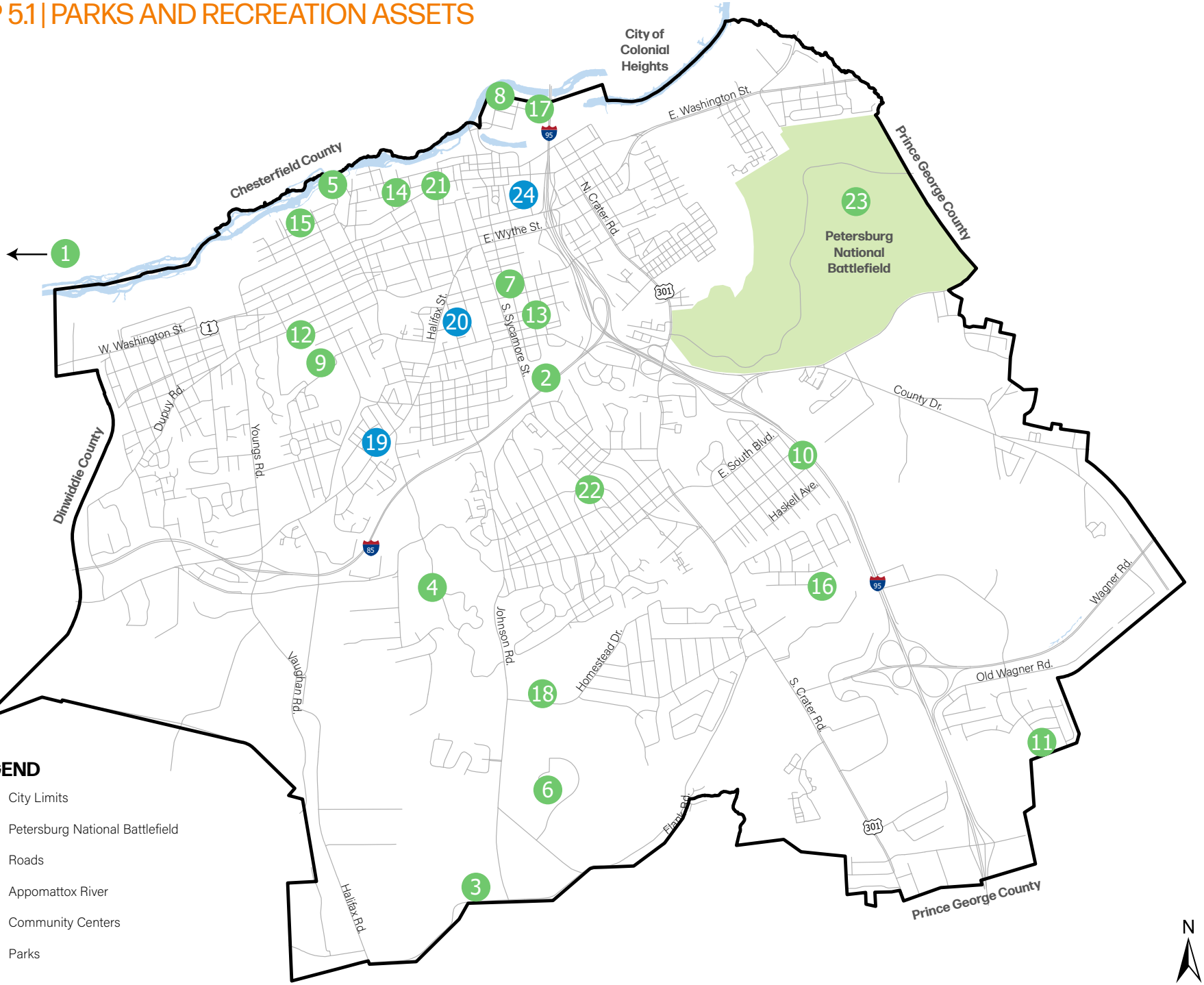
Table 5.1 | Parks and Recreation Assets

Map ID	Facility Name	Address	Park Type	Amenities
City-Owned				
1	Appomattox Riverside Park (Ferndale Park)	24909 Ferndale Road (Dinwiddie County)	Anchor/Regional	Appomattox River Trail, fishing pier, kayak launch, picnic area, playground
2	Cameron Field	909 S. Sycamore Street	Anchor/Regional	Football field, locker room, restrooms, soccer field, stadium, walking track
3	Flank Road Park	1555 Flank Road	Anchor/Regional	Open space
4	Legends Park	1614 Defense Road	Anchor/Regional	Athletic fields and courts (including Cooley Field), bike trails, grill stations, picnic areas, playground, restrooms, trails, wildflower sanctuary, Wilcox Lake
5	Patton Park	527 University Blvd.	Anchor/Regional	Appomattox River Trail, grilling stations, fishing access, picnic areas, natural kayak/canoe launch
6	Petersburg Sports Complex	100 Ball Park Road	Anchor/Regional	Baseball/softball fields, concession stand, locker rooms, meeting rooms, picnic areas, playground, restrooms
7	Poplar Lawn Park	243 S. Sycamore Street	Anchor/Regional	Seating areas, walking paths
8	Rotary Park at Pocahontas Island	149 Rolfe Street	Anchor/Regional	Appomattox River Trail, natural canoe/kayak launch, picnic area, fishing access
9	West End Park	522 S. West Street	Anchor/Regional	Albert Jones football field, basketball court, walking track
10	Anderson Street Park (East Walnut Hill)	2140 Anderson Street	Neighborhood	Open space
11	Berkeley Manor Park (Berkeley Manor)	616 Bradford Lane	Neighborhood	Baseball field, basketball courts, picnic area, playground
12	Farmer Street Pool & Park (Rome Street)	1216 Farmer Street	Neighborhood	Playground, pool, picnic area, recreation field
13	Jefferson Street Park (Bunker Hill)	523 S. Jefferson Street	Neighborhood	Fitness stations, picnic area, playground
14	Low Street Park (High Street/Grove Avenue)	339 Low Street	Neighborhood	Playground, picnic area
15	McKenzie Street Park (Battersea)	951 McKenzie Street	Neighborhood	ADA accessible, basketball court, picnic area, playground, soccer field, walking track

Map ID	Facility Name	Address	Park Type	Amenities
16	Oakhurst Park (Oakhurst)	435 Blackwater Drive	Neighborhood	Baseball field, basketball court, playground, restrooms
17	Pocahontas Park (Pocahontas Island)	800 Magazine Road	Neighborhood	Basketball court, picnic tables
18	Dogwood Trace (Golf Course)	3108 Homestead Drive	Anchor/Regional	18-hole, par 72 golf course
19	A.P. Hill Community Center	1237 Halifax Street	Community Center	Currently vacant/unused
20	Harding Street Recreation Center	453 Harding Street	Community Center	Currently vacant/unused
21	High Street Park	302 N. Market Street	Open Space	Brick pathways, green space, garden
22	Marie Bowen Gardens	1711 Arch Street	Open Space	Pathways, garden
Federally Owned				
23	Petersburg National Battlefield	5001 Siege Road	National	Historic sites, living history demonstrations, nature trails, tours, Visitors Center
Privately Owned*				
24	Petersburg Family YMCA	120 N. Madison Street	Community Center	Before/after school care, camp programs, dance classes, gym and sports amenities, multipurpose space, playground, pool

SOURCE: City of Petersburg
NOTE: Map IDs correspond with numbering on Map 51.
* Privately owned facilities are open to the community through income-based membership.

MAP 5.1 | PARKS AND RECREATION ASSETS

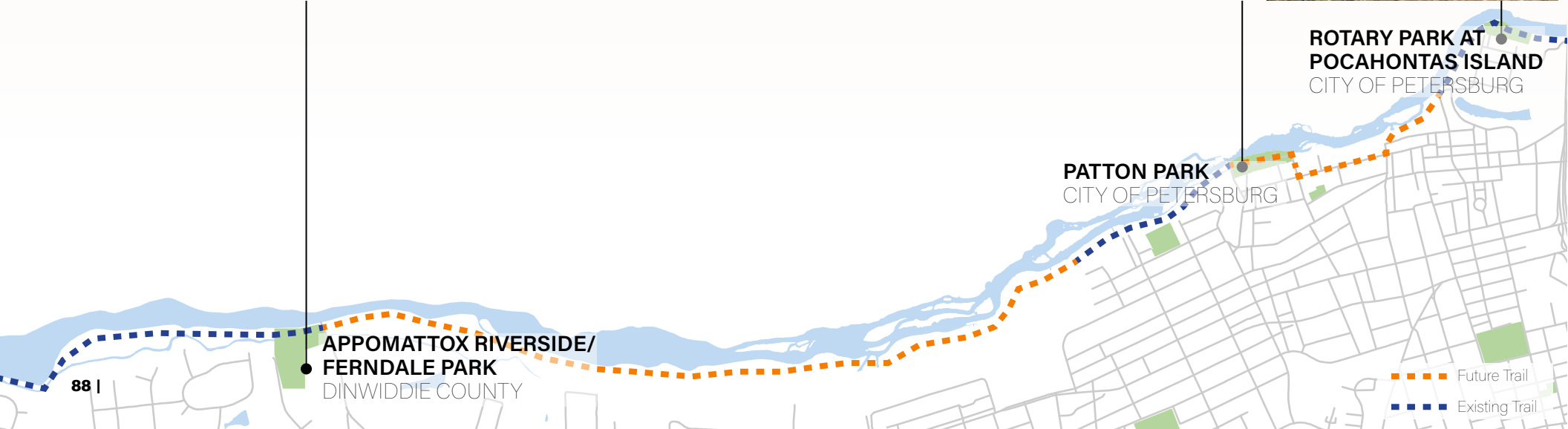


SOURCE: City of Petersburg
NOTE: Map numbering corresponds with Map IDs in Table 5.1.

Appomattox River Trail

A significant effort spearheaded by the Friends of the Lower Appomattox River (FOLAR), in collaboration with local jurisdictions, organizations, and state and regional partners, resulted in the master planning and implementation of the Appomattox River Trail (ART) and park system. The ART is a planned 25-mile greenway and blueway trail connecting three cities and three counties in and around the Gateway Region.

In the City of Petersburg, four miles of trail are planned, which will also intersect with the East Coast Greenway and Fall Line Trail systems. As of 2023, around 50% of Petersburg's segments were fully funded, with 8% completed. An additional 2.2 miles of trails are accessible from the City-owned Appomattox Riverside Park, also referred to as Ferndale Park, just outside the City in Dinwiddie County. The successful development of the Appomattox River Trail and park system brings more opportunities for City residents to participate in outdoor recreation, explore historic Petersburg, and connect with nature.



CAPITALIZING ON PARK ASSETS

Parks and recreational facilities have the unique opportunity to provide services to City residents while also stimulating economic growth. A parks and recreation master plan with a facility space needs assessment and fiscal analysis should be a top priority to fully catalog existing assets and prioritize options for long-term revenue generation.

Petersburg's impressive inventory of City-owned parks and open space exceeds the national average of parkland available to residents, with 21.7 acres available per 1,000 residents compared to 10.8 acres per 1,000 residents. Despite the abundance of public outdoor space, community engagement consistently cited a lack of outdoor recreational amenities as a top concern. This misperception of available resources may be influenced by maintenance issues, aging facilities, and safety concerns at existing parks, which can deter public usage and prevent those with disabilities or special needs from accessing facilities and trails. Public transit options to parks, particularly those that are not walkable from neighborhoods, can also influence real and perceived issues with access to recreation. The City's portfolio of outdoor recreational space is a prime opportunity for renewed investment. As of the FY24 adopted budget, Petersburg spends 73% less on recreation-related operating expenditures per resident than the national average. This stretches thin available funds for programming, maintenance, and equipment upgrades at existing parks; over time, several City parks have deteriorated or had facilities removed altogether, rendering them unusable or inaccessible to the community. The number of dedicated full-time parks and recreation staff also falls 89% below the national average, which can impede program expansions and efficient operations due to lack of staffing.

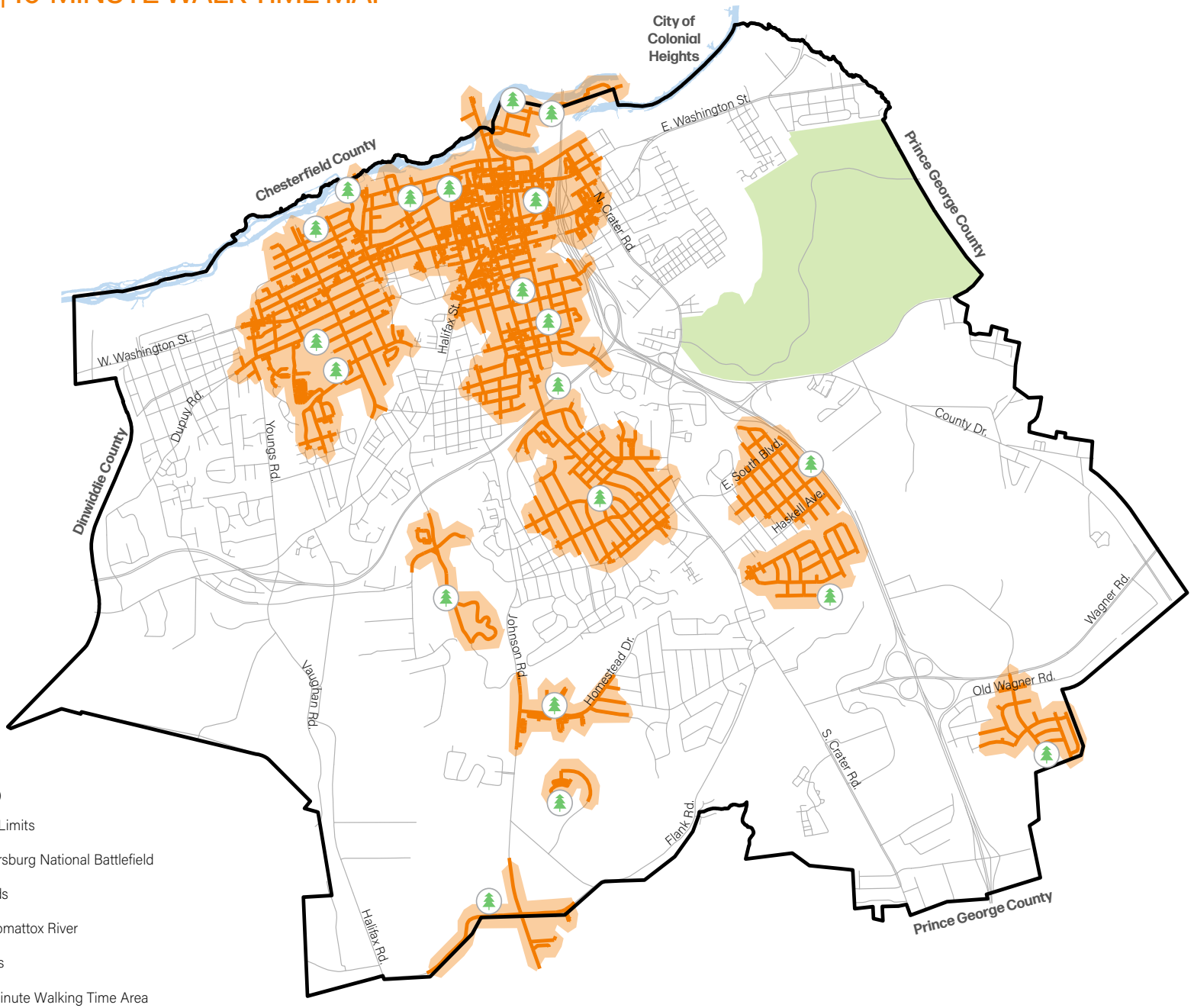
Dogwood Trace Golf Course

Table 5.2 | Parks and Recreation Metrics Comparison

	Petersburg	National Average	City Comparison to National Average
Park to resident ratio	1 park per 2,091 residents	1 park per 2,287 residents	9% higher
Acres of parkland per 1,000 residents	21.7	10.8	101% higher
Full time parks & rec employees per 10,000 residents	1.2	8.9	87% lower
Operating expenditures per resident, FY23 Adopted Budget	$20.24	$94.77	79% lower
Operating expenditures per resident, FY24 Adopted Budget	$25.53		73% lower
Operating expenditures per acre, FY23 Adopted Budget	$931.28	$7,388	87% lower
Operating expenditures per acre, FY24 Adopted Budget	$1,174.68		84% lower
Revenue per resident, FY23 Adopted Budget	$0.84	$21.71	96% lower

SOURCE: Petersburg FY23 and FY24 Adopted Operating Budgets, National Recreation & Park Association (NRPA)

MAP 5.2 | 10-MINUTE WALK TIME MAP



SOURCE: City of Petersburg

The national standard for park access is a **10-minute walk time from a residence to a park facility**. While Petersburg has abundant parkland, **most is concentrated in the north central area of the city**, leaving the majority of Petersburg's residences outside of a 10-minute park walk time. This has **major implications for equity**: as many City residents are low-income and do not have a personal automobile, locating parks within a 10-minute walk becomes even more important to providing all residents the opportunity to recreate and socialize.

As Petersburg continues to build its bright future, there are several ways to expand park access for all residents, including **locating public transit stops at park entrances**, **ensuring that sidewalks provide direct routes between neighborhoods and parks**, and **prioritizing the location of new parks in areas where access is currently limited**. Continuing maintenance of parks is also important so residents not only have access to parks, but feel comfortable using them. A target of 80% of all residents within a 10-minute walk of a park by 2044 is an achievable goal with strategic investment and planning.

Click here to learn more about the 10-minute walk time movement!

Maintenance of major parks that serve as recreational anchors, namely Patton Park, Legends Park, and the Petersburg Sports Complex, should be an ongoing priority, including trail maintenance, equipment upgrades, safety features such as fencing and adequate lighting, and grass cutting. Where equipment and facilities are lacking, particularly in neighborhood parks, grants such as those offered through KABOOM! and the National Recreation and Park Association (NRPA) can provide funding and resources to install new equipment.

Increased investment in park amenities can lead to increased non-tax revenue to supplement the City's recreational budget. Generating revenue will increase cost recovery to offset operational and overhead costs, reducing taxpayer burden while still providing quality recreational services to residents. Enhanced programming helps pay for itself as participation grows through user fees and other revenue streams; this in turn frees up resources to continually expand and improve programs and services.

The City's recreation-related revenue currently accounts for only 4% of overall operating costs and is primarily derived from user fees. Since Petersburg has several unused sites at its disposal, there are opportunities to refurbish existing facilities for additional rental space and new economic development opportunities. Other streams of potential revenue include:

- **Facility-Related Revenue:** Ways to increase facility rental revenue include renting buildings, rooms, sports fields, parking lots, and picnic areas, as well as strategizing scheduling for a steady rotation of use.

- **Recreation Program Revenue:** This type of revenue is typically generated through registration fees for programs and classes.

- **Advertising and Sponsorship Revenue:** As parks and recreation offerings increase, opportunities for increased advertising and sponsorships also increase. Well-placed advertisements and banners in athletic fields and print media will be more lucrative to prospective advertisers.

- **Concession and Leasing Revenue:** Running concessions at parks and recreation facilities can be labor-intensive and cost prohibitive. Allowing third-party food operators, such as food truck vendors and restaurant popups, to operate at park concession facilities can help fill a niche while generating rental fees.

SPORTS TOURISM IN PETERSBURG

Interest in developing a large indoor sports complex to attract regional sports tourism opportunities was **cited as a potential opportunity during community engagement**. The existing Petersburg Sports Complex on Ballpark Road is capable of hosting large baseball and softball tournaments, but the City **lacks additional facility space for indoor sports competitions**. **Sports tourism**, defined by the NRPA as travel for sporting events to either participate in or observe, is **one of the fastest growing tourism sectors**, generating over $90 billion in economic impact across the U.S. in 2021. **Successful sports complexes** that host large events and tournaments will **attract competitors and their families by being supported by safe and easily accessible communities with adequate places to stay, eat, and shop**.

Factors to consider include market saturation in the greater Richmond region and the need to provide related retail and hospitality-oriented uses to support a sports tourism base. Due to the number of other sports complexes in the region, **a market study would be beneficial** to assess the strengths and challenges of further pursuing an indoor sports facility and enhancing sports tourism.

Other non-traditional sports tourism options for Petersburg to explore further include whitewater rafting and recreational kayaking/caneoing on the lower Appomattox River, adventure activites at the University Boulevard Trail and Park Area, and additional multi-use trails at the Petersburg Sports Complex, Legends Park, and the Flank Road ball fields.

To fully capitalize on potential revenue, the City should invest in more full-time recreation staff and consider merging them into a cohesive Parks and Recreation department, including planning, programming, and grounds/ maintenance. A strong roster of full-time staff and administrative coordinators to manage daily logistics, along with a robust team of part-time staff, will help streamline internal communications and more efficiently distribute services and maintenance where they are most needed – particularly as participation and associated facility use grow.

Volunteers can also supplement staff needs. Petersburg currently offers a variety of volunteer opportunities for students, residents, and community partners through the Petersburg Ambassador Program. Current volunteer needs should be assessed annually, along with opportunities for internships. Tapping into Petersburg High School (PHS), Virginia State University (VSU), and Brightpoint Community College (BCC) can lead to creative opportunities for internships that will benefit the City in exchange for class credit. Volunteer efforts should also highlight opportunities to maintain neighborhood parks and organize community clean ups.

PARKS, SAFETY, AND WELLNESS

Parks and Public Safety

According to the NRPA, well-designed and well-used parks and recreation areas are great community assets. But those assets can become a liability when facilities are inconsistently maintained and become unsafe, losing their value and benefit to the community. Keeping parks and recreation areas well-maintained and safe has a direct impact on usage and is a key to community wellness. Research has found that there is a direct relationship between the level of park use and the perception of security: the more visitors involved in positive activities, the more likely that inappropriate behavior is deterred.

Children enjoying a treat at Petersburg Night Out

Working Together for Park Safety

Considerations for designing safe parks include:

- Does it meet the needs of all users, including those with disabilities?
- Does it connect people with place?
- Does it provide people with a positive image and experience?

Recommendations for implementing safe parks include:

- Locate programmed activities near the park perimeter, beside an entrance, or along a pedestrian path.
- Cater programming and the physical design of the park to encourage use during evenings.
- Develop activities and events beyond those for organized sports facilities and playgrounds.

Other key factors to consider include:

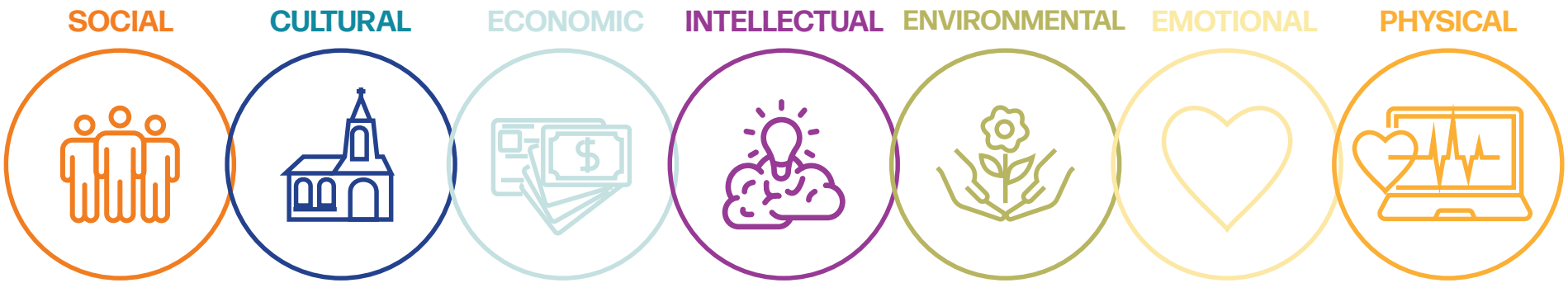
- Perceptions that a park is unsafe are as important as actual safety – both must be addressed to attract more people to parks.
- Involve the community in the design/redesign of park spaces, especially neighborhood pocket parks.
- Clear and understandable signage helps enhance the feeling of safety because it allows people to orient themselves.

Parks and Community Wellness

Access to outdoor recreation helps increase residents' physical activity, supports mental health, and fosters a sense of community. Parks and trails also contribute to environmental wellness by preserving natural and cultural resources from development. The preservation of vegetated natural areas helps reduce pollution, provides relief from heat islands, and naturally captures carbon. Sensitive areas such as floodplains, endangered species habitats, and waterways can be preserved within parkland while still allowing public access to their recreational and educational benefits.

As Petersburg works to improve its local health rankings, investment in parks and recreation should be seen as a direct investment in community health and wellness. The NRPA offers strategies for creating community hubs (further discussed in Chapter 6). Hubs are trusted gathering places that connect every member of the community to essential programs, services, and spaces that advance health equity, improve health outcomes, and enhance quality of life. Community hubs can be integrated with community centers and should be designed to advance wellness across the seven interconnected dimensions of well-being:

Despite historical perceptions of health, health and wellness encompass more than simply being free of disease. Wellness is grounded in equitable access to resources and social supports, and involves the dynamic pursuit of activities, choices, and lifestyles that lead to a state of true health.



- ► Create opportunities for community connection, such as festivals and concerts
- ► Facilitate field trips for older adults to area museums, theaters, etc.
- ► Provide indoor facility space for group meetings, game nights, and other activities

- ► Host community events and celebrations
- ► Create opportunities for visual and performing arts experiences
- ► Celebrate cultural diversity

- ► Coordinate with local organizations to facilitate job fairs and workforce training classes
- ► Partner with local vendors to host farmers markets and pop ups
- ► Market the City's parks as tourism assets

- ► Partner with local schools for outdoor classroom experiences
- ► Encourage social groups to host meetings and events in parks
- ► Incorporate educational signage

- ► Integrate green infrastructure practices into park design
- ► Use native plants and pollinators in park landscaping
- ► Feature programming that gets people outdoors

- ► Provide training to staff and volunteers on mental health first aid
- ► Partner with schools to host positive youth activities
- ► Collaborate with local agencies to connect people to needed mental health services

- ► Offer a variety of playground and sports facilities for users of all abilities
- ► Coordinate youth and adult sports leagues
- ► Ensure all parks are ADA accessible

PLAYSPACE INEQUITY

Playing is the essence of childhood and is a critical developmental need that provides countless physical, social, and mental health benefits. Many children, particularly those in underserved and minority neighborhoods, do not have access to safe and accessible neighborhood playgrounds and parks. This is known as **playspace inequity.**

Organizations such as KABOOM! work with communities to build playspaces to spark joy and foster a sense of belonging for children who are often denied opportunities to thrive. **Providing playspaces for children to play, explore, exercise, and build friendships** can have **lasting positive impacts that are foundational to healthy growth and development**. In Petersburg, a new playground funded through a grant from KABOOM! opened at the Petersburg Family YMCA on North Madison Street in May 2023. The City can **explore additional funding opportunities to develop similar playgrounds in parks currently lacking facilities, as well as upgrades to existing playgrounds to be more inclusive**, such as ADA accessibility, sensory activities, and shade structures. These amenities often get overlooked in underserved communities, but can **provide wellness benefits that will reap generational rewards**.

Parks in need of playground amenities include:
Anderson Street Park – 2140 Anderson St.
Flank Road Park – 1555 Flank Rd.
Pocahontas Park – 800 Magazine Rd.

PROGRAMS AND PARTNERSHIPS

Local organizations and nonprofits work in the community to provide vital resources such as youth outreach, life skills development, parental classes, health education, and more. Below are a few of the local groups and resources available to the community:

- Crater District Area Agency on Aging (CDAAA)
- Petersburg Boys & Girls Club
- Petersburg Healthy Options Partnerships (PHOPS)
- Petersburg Family YMCA
- Petersburg Wellness Consortium
- Progressive Community Outreach


Petersburg Family YMCA

Saxophone player at a Petersburg Area Art League (PAAL) event

ARTS AND CULTURE

Petersburg residents are passionate about local arts and culture, ranking it as the City's most valued asset along with local history. In 2008, the City established the Arts and Culture District in and around Old Towne to increase awareness and support for arts and cultural pursuits, along with an associated incentive program that allows for an exemption of the admissions tax to qualified arts organizations within the District for up to 10 years. The program is targeted to ventures such as theaters, art galleries, museums, and studios. Additional incentives can be considered, such as encouraging new ventures to locate in underutilized and vacant spaces through tax incentives, microgrants, or expedited permit review. The City has also established an 11-member Public Arts Council, which serves to make recommendations about the type and placement of public art around Petersburg.

Community engagement conveyed a strong desire for more robust arts and cultural resources and programming. While partnerships have been formed in the past between the City and area organizations to support the arts, residents would benefit from reinvigorated initiatives to bolster the creative economy. Strategic planning related to recreation and tourism should also include provisions for arts and culture, such as public art procurement and themes, community events planning, and an inventory of available public and private venues and studios. Completion of a public art plan should be considered within the Arts and Culture District to help facilitate new public art installations. Public art and murals can be utilized to beautify dilapidated parks, repurpose vacant walls, add definition to existing significant neighborhoods. By supporting public art planning and programming, Petersburg will reinforce arts and culture as intrinsically valuable community assets.

Arts & Community Wellness

Along with recreation, access to cultural amenities provides interesting and educational activities for community members of all ages, and enhances community pride and promotes inclusion. Creative arts therapies and health programs provide important care options for both mental and physical health. According to the National Endowment for the Arts, the positive impacts of the arts on health begin in early childhood by contributing to healthy emotional and social development. For older adults, participation in the arts is linked to higher cognitive functioning and lower rates of hypertension. Supporting and expanding a strong presence of the arts and culture in Petersburg will contribute to improving local health rates and increasing positive health outcomes.

Arts and Economic Development

Arts and cultural industries should be utilized as economic assets that appeal to visitors and residents alike. The arts and cultural sector stimulates local economies through tourism, consumer purchases, and tax revenue. According to the National Governors' Association for Best Practices, the range of economic benefits include:

- **Helping weak economic areas:** The decentralized nature of creative industries can boost economic stability. At the heart of the creative economy are individual artists who are typically well-connected to their home communities. Linking these artists with entrepreneurial opportunities both inside and beyond their immediate neighborhoods offers many economic development possibilities.

- **Attracting tourism dollars:** Audiences drawn to cultural venues and events also bring economic benefits for other related businesses. A thriving cultural scene helps attract visitors who not only spend money on the events themselves, but also contribute to local economies by dining in restaurants, lodging in hotels, and purchasing gifts and services in the community.

- **Recruiting and developing a skilled workforce:** The arts are an important complement to economic development, providing an enhanced quality of life that plays an influential role in attracting and retaining young professionals. Jobs generated in supporting industries such as hospitality and customer service also benefit the local workforce.

The arts, in combination with parks and recreation amenities, provide a well-balanced quality of life that sustains the heart and soul of Petersburg. Working with local and regional organizations and partners to enhance and promote cultural offerings is an investment with lasting returns.

Halifax Jazz Festival

Below is **just a small sampling of Petersburg's many events and festivals**!

Festival of Grapes and Hops
Hosted in Old Towne Petersburg Harbor, the Festival of Grapes and Hops features over 20 wineries and craft breweries, local food trucks, and musicians.

Friday for the Arts!
Friday for the Arts! is organized by the Petersburg Area Art League and is held the second Friday of every month. The event showcases local arts, with a number of other venues around Old Towne also participating in the event.

Friday Flow at Ironworks
Hosted in the historic Appomattox Ironworks complex, Friday Flow at Ironworks is a weekly summer concert series featuring a variety of Americana, Folk, and Southern Rock musicians.

Halifax Music Festival On the Avenue
This outdoor community music festival occurs every June at Halifax Triangle or "The Avenue". The block party-style event features Jazz and Blues musicians, food, and drinks.

Petersburg American Revolution 250 Commemoration - VA250
Petersburg will be commemorating the 250-year anniversary of American independence through a number of educational, accessible, and enjoyable events from 2024-2026, including an annual reenactment of the Battle of Petersburg at Historic Battersea.

The City's **long-standing attention to historic preservation** is apparent in the quality of Petersburg's historic resources and neighborhoods. To **continue this legacy of quality historic preservation**, the City should:

- Prepare a preservation plan for Petersburg.
- Improve community engagement in historic preservation efforts.
- Continue researching and promoting an inclusive history of Petersburg, including the preservation of historically Black and disinvested neighborhoods.
- Improve code enforcement to reduce blight and neglect of historic structures City-wide.
- Continue to focus on context-sensitive development and preservation of historic structures.
- Utilize key design elements from the City's historic districts to inform new development.
- Improve use of historic resources to promote tourism and expand the local economy.

HISTORIC PRESERVATION

With distinct roles during the Revolutionary War, Civil War, and Civil Rights movement, Petersburg is well known for its rich inventory of historic structures, sites, and resources. Petersburg's historic resources contribute to, and in many respects, define the City's character. Preservation of local historic assets builds community identity, and through that identity, acts as a driver of economic growth and cultural pride in Petersburg. However, many of Petersburg's historic resources have been threatened over the years through population loss, abandonment and demolition of buildings, and renovations that remove historically substantial elements. Balancing forward-thinking growth with the preservation of Petersburg's historic fabric should be an ongoing, foundational element of the City's future planning.

To tell its ever-evolving story, Petersburg manages its historic resources in several ways. The City's Historic Preservation Ordinance regulates renovations to existing buildings and new construction within the City's seven locally designated historic districts; these changes are subject to review by the Preservation Planner and/or the Architectural Review Board (ARB). In addition to administering design review in locally designated historic districts, the City owns and maintains several historic sites, including Centre Hill Museum, Petersburg Courthouse, People's Cemetery, and Blandford Church Museum and Cemetery. The City also maintains Certified Local Government status through the Virginia Department of Historic Resources (DHR) and enforces design guidelines to ensure that new improvements in historic districts are compatible with existing architectural character and contribute to the economic vitality of the City.

Privately owned and operated museums and sites throughout Petersburg, including but not limited to Historic Battersea, the McKenney Building, and McIlwaine House, are significant assets for the community and also are essential in honoring and preserving local history and identity. The McKenney Building is currently being renovated for use as Petersburg's first African-American Cultural Arts Center, and the McIlwaine House provides tours of fine art and Petersburg-made furniture. Battersea is a historic plantation serving to preserve the area's significance during the American Revolutionary and Civil Wars.

Historic Preservation and Community Wellness

Historic development patterns in Petersburg are reflected through a compact, human-scale development pattern. Preservation of human-scale patterns of development, with walkabout street grids and functional forms, contributes to an equitable, multimodal transportation network. Historic street grids tend to be more walkable and bikeable, and also have access to public transit, giving residents multiple options for navigating Petersburg in addition to personal vehicles. This promotes more daily activity and provides reliable options for travel to healthcare appointments and employment opportunities.

In addition to physical benefits, historic preservation also fosters a sense of place, enhancing the intrinsic benefits of community identity, continuity, and pride. Research has shown that an entire group's health can suffer after losing a special place – blight and demolition can erode, and even destroy, the heart and soul of neighborhoods by removing the community spaces that define the area. Continued efforts to maintain physical connections to the past through the preservation of Petersburg's sacred buildings and sites will positively contribute to community wellness and ensure that Petersburg's story will endure for generations to come.

Historic Preservation and Economic Development

Historic preservation has many benefits for Petersburg, including promoting green development, bolstering the tourism economy, preserving existing affordable housing stock, celebrating shared culture and social connection, and ultimately enhancing quality of life.

- **Attracting talent and investment:** Historic neighborhoods contribute to urban livability and an environment for job creation. Businesses located in cities that are perceived as good places to live, with a sense of historic authenticity, have an advantage in attracting talent and investment. Retaining historic patterns of mixed use design can also provide attractive spaces for both employers and professionals looking to settle in Petersburg.

- **Property values:** Historic preservation helps maintain strong property values, with historic district values consistently rising more than in non-historic areas. Additionally, studies show that historic districts better maintain their value during recessions and recover more quickly.

- **Heritage tourism:** Heritage tourists tend to stay longer and spend more per day, therefore generally having a greater economic impact per trip.

- **Business incubation:** Older, smaller buildings are critical to the incubation of small businesses that are the primary job creators in the U.S. economy. Neighborhoods containing a diverse mix of older, smaller buildings support greater levels of positive economic and social activity than areas dominated by newer, larger buildings.

McIlwaine House

Photo Credit: Virginia Department of Historic Resources

PRESERVATION PROGRAMS, TOOLS, AND INCENTIVES

Virginia Landmarks Register and the National Register of Historic Places

Petersburg boasts 12 districts and 34 individual sites that are recognized on the Virginia Landmarks Register and/or National Register of Historic Places (Table 5.3). An additional 44 properties are considered eligible, but are not formally listed. Inclusion on state and national historic registers is honorary and generally does not carry preservation protections, but inclusion does open opportunities for preservation tax credits, grants, and easements. As a cohesive collection of resources, properties listed on historic registers can be a key economic driver for neighborhood revitalization, business development, affordable housing, and heritage tourism.

Tax Credits

Rehabilitation tax credit programs provide tax credits to property owners who undertake the rehabilitation of historic buildings in compliance with the Secretary of Interior's Standards for Rehabilitation. Through the federal and state rehabilitation tax credit programs, property owners are given substantial incentives for private investment in preservation, resulting in enormous advantages to the public. The preservation of these structures encourages a connection to the past, enhances the identity of a community, and stimulates private investment.

Locally Designated Historic Districts

In addition to the 12 state and federally recognized historic districts (Map 5.4), Petersburg has seven locally designated historic districts. Local districts may follow the same boundaries as their state/federal counterparts, but local districts are not strictly honorary and are subject to additional standards and protections through the Zoning Ordinance.

Architectural Review Board

The Architectural Review Board (ARB) is an appointed body responsible for reviewing all proposals for development and exterior modifications to buildings and signs within the City's seven local historic districts. The City should continue to develop educational materials on appropriate maintenance procedures and requirements for owners of historic properties within local historic districts and promote Petersburg's historic district guidelines as an aid to property owners planning renovation, rehabilitation, or new construction to historic properties.

Certified Local Government

Petersburg is recognized as a Certified Local Government (CLG). CLGs are municipalities that have demonstrated a commitment to local preservation through a formal certification process with DHR. Becoming a CLG promotes community-wide preservation, supports local preservation programs, and establishes the credentials to qualify for them. Requirements to become certified include:

- Establishing a qualified historic preservation commission and/or Architectural Review Board.
- Creating a historic district ordinance to enforce appropriate regulations for the protection of historic and heritage resources.
- Maintaining a system to regularly survey and inventory local historic resources.
- Facilitating public participation in local preservation and stewardship programs.

Once certified, CLG communities are eligible for additional benefits such as competitive grant funding and technical assistance.

Easements

Easements allow property owners to voluntarily protect the historical, architectural, and archaeological integrity of their property by placing a permanent preservation easement on the property. The easement restricts future development of the property, prohibits certain activities, and requires prior approval of others. Except for rights specifically relinquished, the landowner continues to own, use, and control the land.

Dodson Tavern

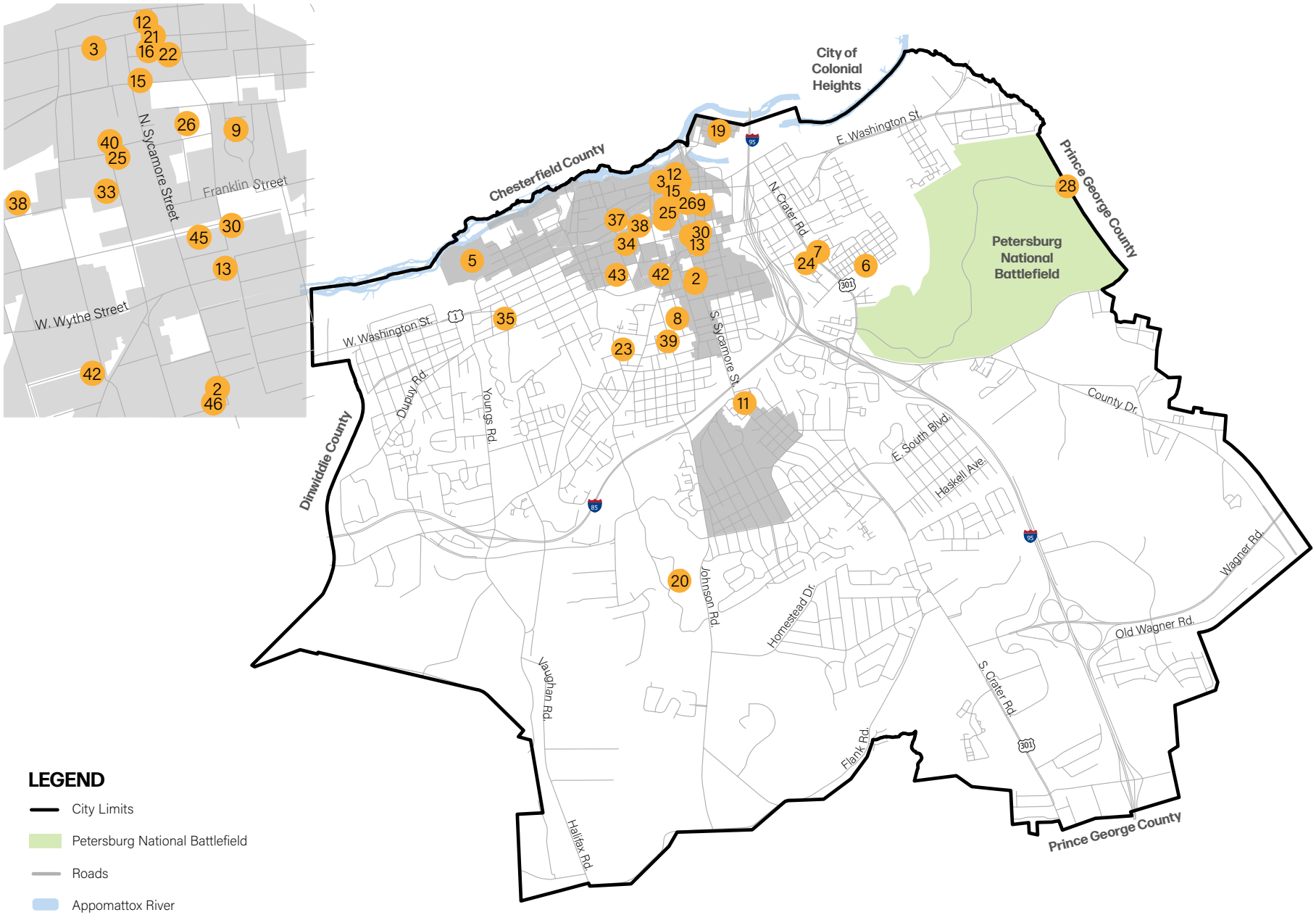
Table 5.3 | State and Nationally Designated Historic Properties and DIstricts

Map ID	Site Name	Year Built/Period of Significance	Dated listed on Virginia Landmarks Register	Dated listed on National Register of Historic Places
1	African-American Cemeteries in Petersburg, Virginia, 1818-1942 MPD (Multiple Property Designation)	1818-1942	12/5/2007	3/28/2008
2	Anna P. Bolling Junior High School	1926	9/14/1998	10/30/1998
3	Appomattox Iron Works	1812-1897	4/20/1976	8/11/1976
4	Atlantic Coast Line Railroad Commercial and Industrial Historic District	1879-1960s	6/18/2009	8/27/2009
5	Battersea	1768	5/13/1969	11/12/1969
6	Blandford Cemetery	1702-1924	4/22/1992	10/15/1992
7	Blandford Church	1734-37, 1901	4/18/1972	5/31/1972
8	Byrne Street USO Club	1942	3/17/2022	5/27/2022
9	Centre Hill	1823	11/21/1972	12/27/1972
10	Centre Hill Historic District	1914-1923	10/15/1985	6/13/1986
11	Chris and Grace Episcopal Church	1925, 1955-57	12/12/2019	2/27/2020
12	City Market	1878-79	11/5/1968	6/11/1969
13	Cohen House	1851	9/5/2007	11/1/2007
14	Commerce Street Industrial Historic District	Early 20th century	6/19/2008	9/12/2008
15	Exchange Building	1841	11/5/1968	6/11/1969
16	Farmers' Bank	1815	1/18/1972	4/13/1972
17	Folly Castle Historic District	Late 18th & 19th century	2/26/1979	7/16/1980
18	Halifax Triangle and Downtown Commercial Area Historic District	1842-1964	3/16/2017	2/12/2019
19	Jarratt House	1820	9/15/2022	9/05/2023
20	Legends Park	1921	6/14/2000	8/14/2000
21	McIlwaine House	1815	6/19/1973	7/16/1973
22	Nathaniel Friend House	1815-16	4/20/1976	8/11/1976

Map ID	Site Name	Year Built/Period of Significance	Dated listed on Virginia Landmarks Register	Dated listed on National Register of Historic Places
23	Peabody Building of the Peabody-Williams School	1920	6/14/2000	8/2/2000
24	People's Memorial Cemetery	1840-1942	12/15/2007	3/28/2008
25	Petersburg City Hall	1856-59	4/18/1978	11/16/1978
26	Petersburg Courthouse	1840	4/17/1973	5/14/1973
27	Petersburg Courthouse Historic District	1815-1940	8/21/1990	12/21/1990
28	Petersburg National Battlefield	1864-1865	10/18/1983	10/15/1966
29	Petersburg Old Town Historic District	1851	11/20/1979	7/4/1980
30	Petersburg Trailways Bus Station	1946	6/18/2015	9/29/2015
31	Pocahontas Island Historic District	1749-1956	9/6/2006	11/3/2006
32	Poplar Lawn Historic District	1767-1945	2/26/1979	5/23/1980
33	Saint Paul's Episcopal Church	1857	4/15/1986	5/30/1986
34	Second Presbyterian Church	1861	12/12/1989	1/14/1991
35	South Chappell Street Car Barn	1899-1903	12/18/2008	2/25/2009
36	South Market Street Historic District	1840-1905	6/19/1991	4/22/1992
37	Stewart-Hinton House	1798	6/18/2003	1/14/2004
38	Strawberry Hill	1792	11/19/1974	12/23/1974
39	Sutherland House	1860	9/22/2011	11/22/2011
40	Tabb Street Presbyterian Church	1843	2/21/1978	5/31/1979
41	The North Battersea/Pride's Field Historic District	1810-1940	3/16/2005	5/26/2005
42	Thomas Wallace House	1855	4/15/1975	5/2/1974
43	Virginia Trunk and Bag Company	1903-1931	9/17/2009	12/23/2009
44	Walnut Hill Historic District	1913-1972	12/8/2022	9/22/2023
45	Washington Street (United) Methodist Church	1842	6/17/1980	11/24/1980
46	William McKenney House	1890	12/12/1989	12/6/1990

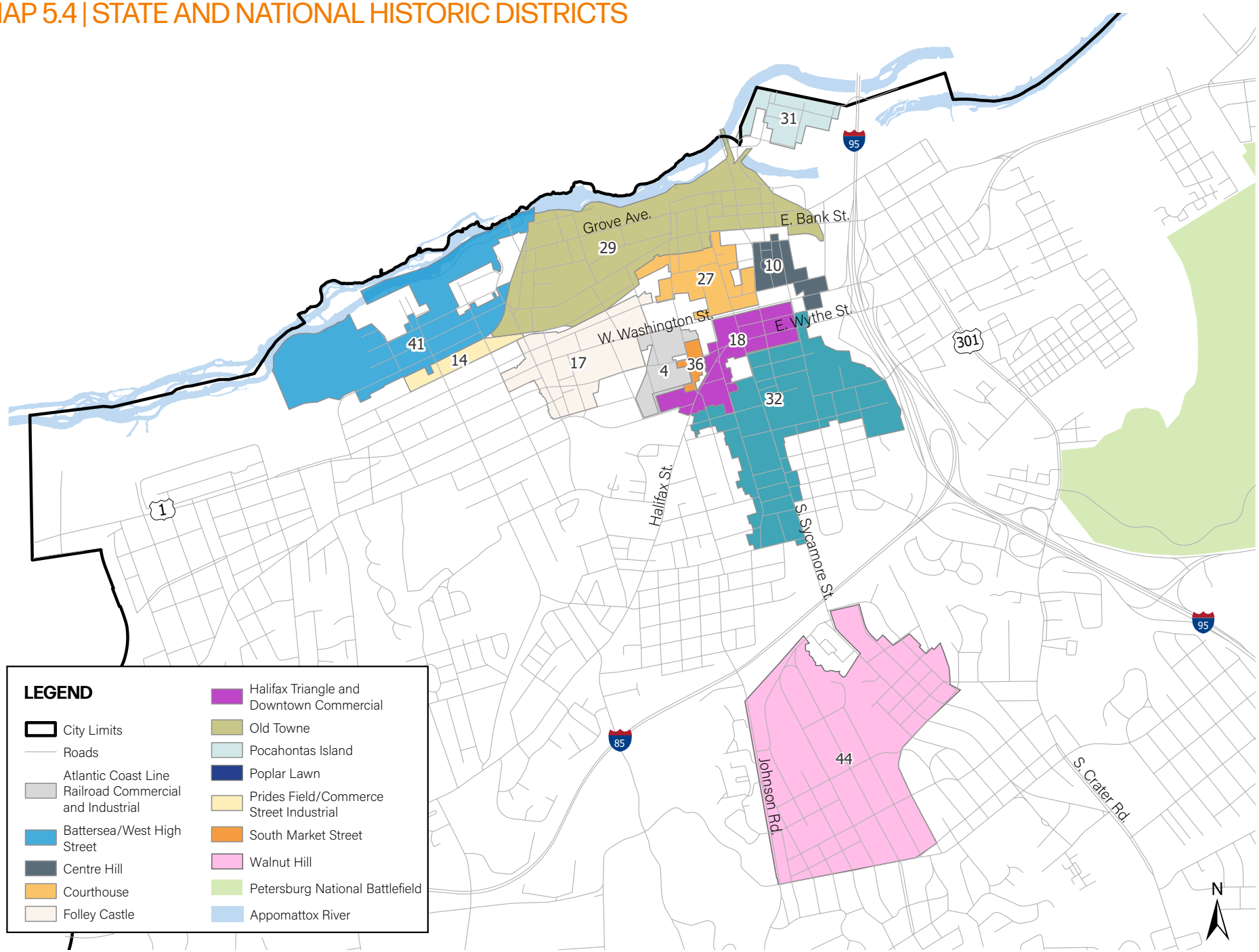
SOURCE: Virginia Landmarks Register; National Register of Historic Places
NOTE: Map IDs correspond with numbering on Map 5.3 and Map 5.4.

MAP 5.3 | PROPERTIES LISTED ON STATE AND NATIONAL HISTORIC REGISTERS



SOURCE: Virginia Landmarks Register; National Register of Historic Places
NOTE: Map numbering corresponds with Map IDs in Table 5.3.

MAP 5.4 | STATE AND NATIONAL HISTORIC DISTRICTS



SOURCE: Virginia Landmarks Register; National Register of Historic Places; City of Petersburg
NOTE: Map numbering corresponds with Map IDs in Table 5.3.

LOCALLY DESIGNATED HISTORIC DISTRICTS

Old Towne

The Petersburg Old Towne Historic District was established in 1973 and contains the highest concentration of 18th century buildings in the City. The City's commercial and formerly industrial core comprises the eastern area of the district. The western area of the historic district is largely residential and is predominantly composed of 18th and 19th century homes of former prominent and working-class residents alike.

Poplar Lawn

Poplar Lawn began as a genteel residential area for many of the area's prominent merchants. The neighborhood is centered around the 19th century Central Park and features a variety of Greek Revival, Italianate, Queen Anne, and Colonial Revival homes.

Folly Castle

The Folly Castle district is centered around Folly Castle, an 18th century residence, and was developed between the mid-18th and early 20th-centuries. The neighborhood largely consists of high-style Georgian, Federal, Greek Revival, Italianate, and Queen Anne homes, along with middle class and factory workers' housing to support the numerous tobacco factories that once surrounded the residential portion of the neighborhood.

Centre Hill

The Centre Hill Historic Area takes its name from Robert Bolling's 18th-century Centre Hill mansion, home to prominent Petersburg residents and distinguished guests from across the country. In 1910, owner Charles Hall Davis sold much of the grounds for speculative housing, giving rise to a neighborhood of bungalows, Colonial Revival, and American Foursquare residential structures dating to this period.

South Market Street

The South Market Street Historic Area is comprised of portions of South Market, Wythe, Brown, and Halifax Streets and largely consists of grand Greek Revival, Gothic Revival, and Italianate residences constructed by prominent residents in the mid- to late 19th century. Many of the historic residences retain their original outbuildings. The Wallace-Seward House, located within the district, is the site of the last meeting between President Abraham Lincoln and Union General Ulysses S. Grant after Petersburg's fall and just days before the Confederacy's surrender.

Courthouse

The Courthouse Historic Area includes the 1838 Petersburg courthouse, the 1843 Tabb Presbyterian Church, the 1856 Customs House, and the 1855 St. Paul's Episcopal Church. Additionally, the district features a unique mix of Federal, Greek Revival, Italianate, Renaissance Revival, Neoclassical, Classical Revival, and Chicago School structures. The district is centered on North Sycamore Street and is located directly south of the Petersburg Old Towne Historic Area.

Battersea/West High Street

The Battersea/West High Street Historic Area consists of the Prides Field and Battersea neighborhoods, located along the Appomattox River to the west of the Petersburg Historic Area. The neighborhood's growth began with the completion of the Upper Appomattox River Canal in the 1820s, and the neighborhood is dominated by late nineteenth century Italianate vernacular frame residences, set close together on shallow lots and occupied by the middle class in their time.

PHOTO CREDIT: Virginia Department of Historic Resources; City of Petersburg

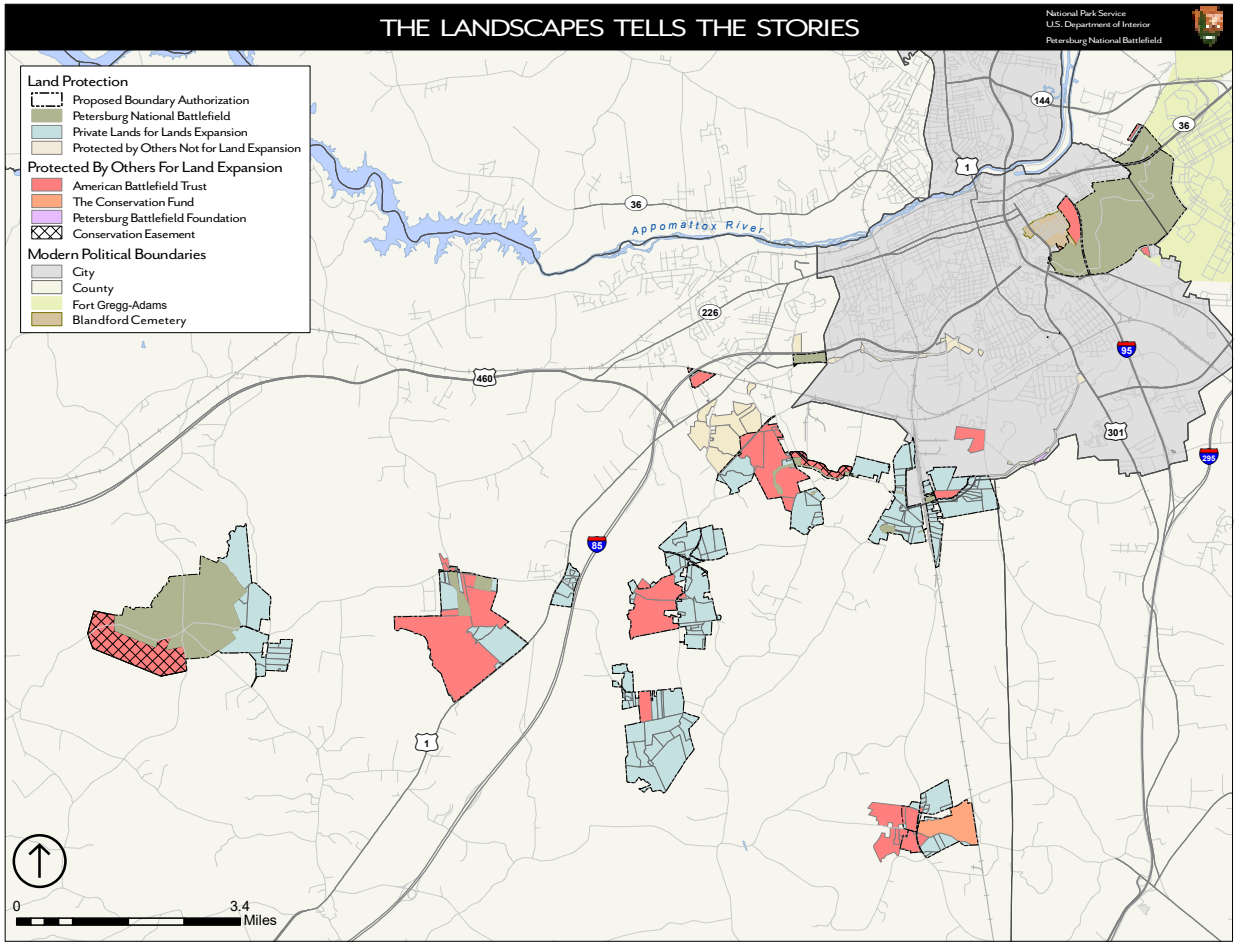
ADDITIONAL HISTORIC HIGHLIGHTS

Petersburg National Battlefield

Petersburg National Battlefield Park is one of the City's most well-known assets, drawing 201,606 visitors in 2021. The Park commemorates the ten-month siege of Petersburg from 1864 to 1865 and includes acreage in Petersburg, Hopewell, Prince George County, and Dinwiddie County. Roughly 2,700 acres of the Park are located in and immediately around Petersburg, along with over 10 miles of trails for hiking and biking. Visitors can experience historic battle reenactments, ranger-led tours, and self-guided tours, as well as curated exhibits at the Eastern Front Visitors' Center located on Siege Road.

Community engagement indicated that residents desire more direct connections to the Park itself, noting that the existing entrance forces visitors to bypass the heart of the City. To the extent possible, the City should engage with the National Park Service (NPS) on any future Park plans to incorporate additional routes, trails, and wayfinding directing visitors to Petersburg. This effort should be combined with City efforts to revitalize and beautify shared gateway corridors.

MAP 5.5 | PETERSBURG NATIONAL BATTLEFIELD LAND PROTECTION PLAN



SOURCE: National Park Service, 2023

Pocahontas Island

Pocahontas Island, located along the Appomattox River on the northern edge of Petersburg, is one of America's oldest free Black settlements and has evidence of prehistoric Native American settlement dating to 6500 B.C. Named for the renowned Powhatan princess, the island was initially situated further north along the river's upper banks until the early 20th century when a new channel pattern formed the current configuration. Slaves were first brought to this area in 1732 to work in tobacco warehouses. The island was formally platted in 1749 and named Wittontown; the original street grid pattern is still reflected today. The name was changed to Pocahontas Island in 1752. By 1800, over 300 of Petersburg's freed slaves had settled here and formed a prosperous residential and commercial community, making it home to the largest free Black population in Virginia.

Today, Pocahontas is a quiet residential neighborhood consisting of mostly frame, one-story dwellings that date from the turn of the 20th century, with two buildings that are known to have survived from before the Civil War. A tornado in 1993 destroyed many of the homes on the island, creating more open space than historically existed in this once dense urban neighborhood.

Local efforts spearheaded by lifelong resident Richard Stewart prioritized the preservation of Pocahontas Island's history and remaining structures. Through his dedication and perseverance, the Pocahontas Island Black History Museum was opened in 2003 to showcase over 300 years of Black history, with hundreds of artifacts and detailed historical records. Its location on Witten Street was part of the Underground Railroad during the Civil War. To commemorate and substantiate Pocahontas Island's rich legacy in Petersburg, the Pocahontas Island Historic District was added to the Virginia Landmarks Register and National Register of Historic Places in 2006.

While numerous studies have been conducted in recent years to determine plans for the future of Pocahontas Island, residents have conveyed concern that little action has been taken after studies are completed, and certain actions have conflicted with resident desires. The existing residential areas are flanked by the former Roper Lumber site to the east and south, with opportunities for redevelopment currently being explored by the City. Environmentally, the Roper Lumber site is located within floodplains and Resource Protection Areas (RPAs). Redevelopment and economic opportunities for this former industrial site must be balanced with environmental and cultural resource protections and should be sensitive to the neighborhood's history and current residential fabric.

Part of the Roper Lumber property encompasses the existing Pocahontas Island neighborhood park. Any future redevelopment of this area should consider opportunities to permanently retain this recreational space. Community engagement favored converting the Roper site into an outdoor park and event space, which would be well-suited to connect to Rotary Park via the neighborhood park to create a cohesive recreational open space network that defines the perimeter of Pocahontas Island.

Pocahontas Island

Special Places

The rich history of Petersburg is evident throughout the City, including areas and places that are not formally part of a designated historic district. These sites are still considered to be special places to the community because of the historic, aesthetic, natural, and/or cultural elements that they contribute. Together, these special places help weave the story of Petersburg's past. Many of these locations are commemorated with historic markers or memorials describing their history and importance – there are approximately 150 throughout Petersburg related to:

- Early African-American history;
- Architectural heritage;
- Civil War battles and forts;
- Historic homes, churches, schools, and parks; and
- Civil Rights history.

Petersburg can enhance and expand its existing preservation efforts by working alongside the community, the Crater Planning District Commission (CPDC), and NPS to map and inventory monuments and markers, providing a more accurate and data-driven approach to preservation and celebration of special places for the next generation.

There are approximately 150 markers and memorials throughout Petersburg. Click here to view a list of these sites, including locations and descriptions!

Marie Bowen Memorial Gardens
Photo Credit: Marcus Squires

Growing and Promoting Our Quality of Life

Goal Statement: Petersburg provides equitable access to parks, recreation, the arts, and historic resources to facilitate healthy lifestyles, tourism, and celebration of heritage and culture.	
Objectives	**Strategies**
5.1 Provide parks and recreational spaces that are safe and accessible to all.	5.1.1: Annually assess the current conditions of park facilities to identify and prioritize safety improvements, ADA accessibility, and repair/replacement of broken or aging equipment.
	5.1.2: Ensure that the City's major anchor parks, such as Patton Park, Legends Park, and the Petersburg Sports Complex, have routine grounds and trail maintenance to provide a safe and inviting recreational atmosphere. Install or repair safety fencing, emergency lighting, street lighting, and security cameras in parking areas and along trails where needed for increased nighttime safety.
	5.1.3: Coordinate with local non-profit organizations and volunteer groups to assist with grounds maintenance and cleanup programs, particularly in neighborhood parks.
	5.1.4: Apply for grants and other creative funding sources to install new playground equipment in parks that currently lack facilities.
	5.1.5: Renovate A.P. Hill Community Center, Harding Street Community Center, and Peabody Middle School for use as community centers.
	5.1.6: Utilize available resources from the National Recreation and Park Association (NRPA) to evaluate and enhance existing park assets, safety considerations, and public wellness opportunities.
	5.1.7: Integrate community hubs with community centers and design them to advance wellness across the seven interconnected dimensions of well-being.
	5.1.8: Develop new parks throughout Petersburg so 70% of all residents are within a 10-minute walk of a park.

Objectives	Strategies
5.2 Capitalize on existing assets to increase revenue streams and invest in staffing resources.	5.2.1: Identify underutilized City-owned properties for reinvestment as multifunctional facility spaces for rentals and events.
	5.2.2: Invest in dedicated staff resources to provide quality recreational programming more efficiently.
	5.2.3: Identify and evaluate opportunities for increased sponsorship opportunities at major events and parks.
	5.2.4: Leverage creative marketing and branding to generate interest in recreational programming, assets, and events and drive participation rates.
5.3 Create a parks and recreation master plan to best utilize existing parks and recreational assets for the community and generate revenue for facility and program improvements.	5.3.1: Incorporate facility space needs assessments and fiscal analyses to balance improvement costs with new revenue streams.
	5.3.2: Coordinate new investment with regional plans for the Appomattox River Trail, Fall Line Trail, Petersburg National Battlefield, and other regional amenities to ensure cohesive visioning and efficient use of resources.
	5.3.3: Establish landscape design standards and maintenance plans for sites within City-maintained right of way to formally create additional opportunities for neighborhood park access.
5.4 Continue to develop and enhance recreational opportunities along the Appomattox River.	5.4.1: In collaboration with regional stakeholders, invest in park upgrades and facilities at Patton Park, Rotary Park at Pocahontas Island, and Appomattox Riverside/Ferndale Park.
	5.4.2: Identify opportunities to create additional riverfront park space with piers and docks for water access.
	5.4.3: As river access increases, install additional wayfinding and safety signage along the riverbank for both land navigation and water access.
	5.4.4: Require that all recreational enhancements along the Appomattox River waterfront incorporate shoreline and water quality protection measures in accordance with the latest state guidelines and regulations.
5.5 Support a strong local arts and culture economy.	5.5.1: Develop a public art master plan and/or incorporate public art considerations into related City strategic and master plans to help revitalize, define, and enhance the character of Petersburg and its neighborhoods.
	5.5.3: Actively market Arts and Culture District incentives to entrepreneurs and arts organizations; evaluate the feasibility of new incentives to direct investment in vacant, underutilized spaces.
	5.5.4: In collaboration with local stakeholders, organize festivals and events to increase tourism and establish Petersburg as a regional event center.
	5.5.5: Identify and pursue creative marketing strategies to promote arts and cultural opportunities in Petersburg.

Objectives	Strategies
5.6 Leverage historic preservation as a means of enhancing quality of life for Petersburg's residents.	5.6.1: In collaboration with local partners and the Virginia Department of Historic Resources (DHR), identify creative ways to further educate the community on Petersburg's diverse history.
	5.6.2: Build inclusive preservation efforts by identifying and preserving sites/districts associated with historically Black and disinvested neighborhoods.
	5.6.3: Direct the rehabilitation and adaptive reuse of historic Old Towne properties as a means of increasing downtown population and economic vibrancy.
	5.6.4: Utilize key design elements from the City's historic districts to inform new development, especially along major commercial corridors and within transition areas between historic districts and non-historic peripheral areas.
	5.6.5: Provide support, including technical assistance and documentation, for owners of newly eligible properties for potential inclusion on the Virginia Landmarks Register and National Register of Historic Places. Collaborate with partners as needed.
	5.6.6: Leverage historic preservation and heritage tourism as key elements for a strong and resilient local economy.
	5.6.7: Maintain Certified Local Government status and enforce local historic preservation ordinances as tools in promoting community-wide preservation.
	5.6.8: Provide support, including funding as needed, to ensure the continued operations of Petersburg's museums, such as Blandford Church, Siege Museum, and Center Hill Museum, as tourism drivers and sources of City history and identity.
	5.6.9: In partnership with Crater Planning District Commission (CPDC) and other regional partners, develop a comprehensive Geographic Information System (GIS) database and map for historic resources and green space in Petersburg, including but not limited to earthworks, markers, parks, and monuments.
	5.6.10: Collaborate with private individuals, businesses, and non-profit groups to identify, preserve, and maintain Petersburg's historic and archaeological resources and to identify historic landmarks for visitors.

06 COMMUNITY FACILITIES + INFRASTRUCTURE

Petersburg provides and maintains exceptional community facilities, services, and infrastructure to enhance livability and promote a high quality of life for all residents.

"PETERSBURG IS A
DIAMOND IN THE ROUGH."

- Community Survey Respondent

06

INTRODUCTION

Community facilities, services, and infrastructure play an important role in shaping the Petersburg community. Educational facilities, like schools and libraries, drive the local economy by educating the next generation of the workforce. The availability of healthcare and community wellness outlets supports resident health, well-being, and safety. Infrastructure availability, including water, sewer, and stormwater management, is a key factor in where and how new commercial and industrial development occurs. Technological advancements in broadband, communications, and transportation open new doors of possibility for connecting residents with the world and bridging the digital divide.

The condition and accessibility of these and other community facilities and services influence the overall quality of life enjoyed by Petersburg's residents. This chapter articulates how Petersburg is meeting the community facilities, services, and infrastructure needs today and making wise investments for meeting the needs of tomorrow.

COMMUNITY FEEDBACK: COMMUNITY FACILITIES + INFRASTRUCTURE

- 16.8% of survey respondents listed utilities and infrastructure as their top concern for Petersburg's future.
- 45.9% of survey respondents did not agree that trash and recycling services adequately serve the community.
- More than half of survey respondents do not feel that space and programming at community centers meets community needs.
- 66.2% of survey respondents do not agree that public school facilities are well-maintained.
- Over 80% of survey respondents say that more schools, libraries, and government buildings should be encouraged.
- 76.1% of survey respondents feel that public library facilities and services are meeting the community's needs.

CITY ADMINISTRATION AND GOVERNANCE

The City of Petersburg is organized under a Council-Manager form of government. Seven elected members sit on City Council, representing each of the City's seven wards. An appointed City Manager oversees the City's daily operations, consisting of approximately 30 departments and 900 part- and full-time staff. Together, City Council and the City Manager are committed to transparency, efficiency, and accountability in governance.

Keeping the community informed and engaged is an important aspect of transparency, particularly as the communications landscape evolves with new digital applications and technologies. The City's Department of Communications, Marketing, Tourism, and Government Relations keeps the community informed of important news through a variety of online, print, and broadcast platforms. Petersburg's website details information about City departments, provides Council meeting dates and agendas, and acts as a repository for City news and information.

Even so, 72% of survey respondents felt that communication and outreach efforts from the City could be improved. To change misperceptions about ongoing communications efforts, the City can take simple steps to reach more residents:

- Maintain a robust social media presence.
- Revamp the City's website to make it more user-friendly and maintain updates on important announcements.
- Expand the online Geographic Information Systems (GIS) catalogue.
- Expand virtual/online service options.
- Engage with student interns from Petersburg High School (PHS), Virginia State University (VSU), and Brightpoint Community College (BCC) to help with marketing and public relations.

KEEPING UP WITH THE CITY OF PETERSBURG

- Check the City's website at **http://www.petersburgva.gov**
- Sign up for e-newsletters through the City's Public Information Officer, and check out the City's quarterly paper newsletter
- Read press releases and news articles at **https://www.petersburgva.gov/1030/News-Media**
- Tune in to the City's government access channel – Channel 15 (Comcast)
- Follow the City of Petersburg on social media

EXISTING FACILITIES

The City of Petersburg owns nearly 100 buildings comprising more than one million square feet, including departmental offices, emergency response facilities, and schools. The Facilities Management Division of the Department of Public Works is the primary caretaker of these buildings and is responsible for the construction, preventative maintenance, repairs, and custodial services of City buildings. Ongoing funding and staffing challenges exist, as well as aging and outdated structures. Keeping the inventory of older civic buildings functional and relevant should be a key priority for the City, particularly for those that have local significance or contribute to historic streetscapes.

Petersburg does not have a standalone, official government complex; rather, City facilities are dispersed around Petersburg. The decentralized nature of essential City services and functions can make it difficult for interdepartmental collaboration and for residents to obtain the assistance they need. Additionally, many of these facilities are aging, creating safety concerns for employees.

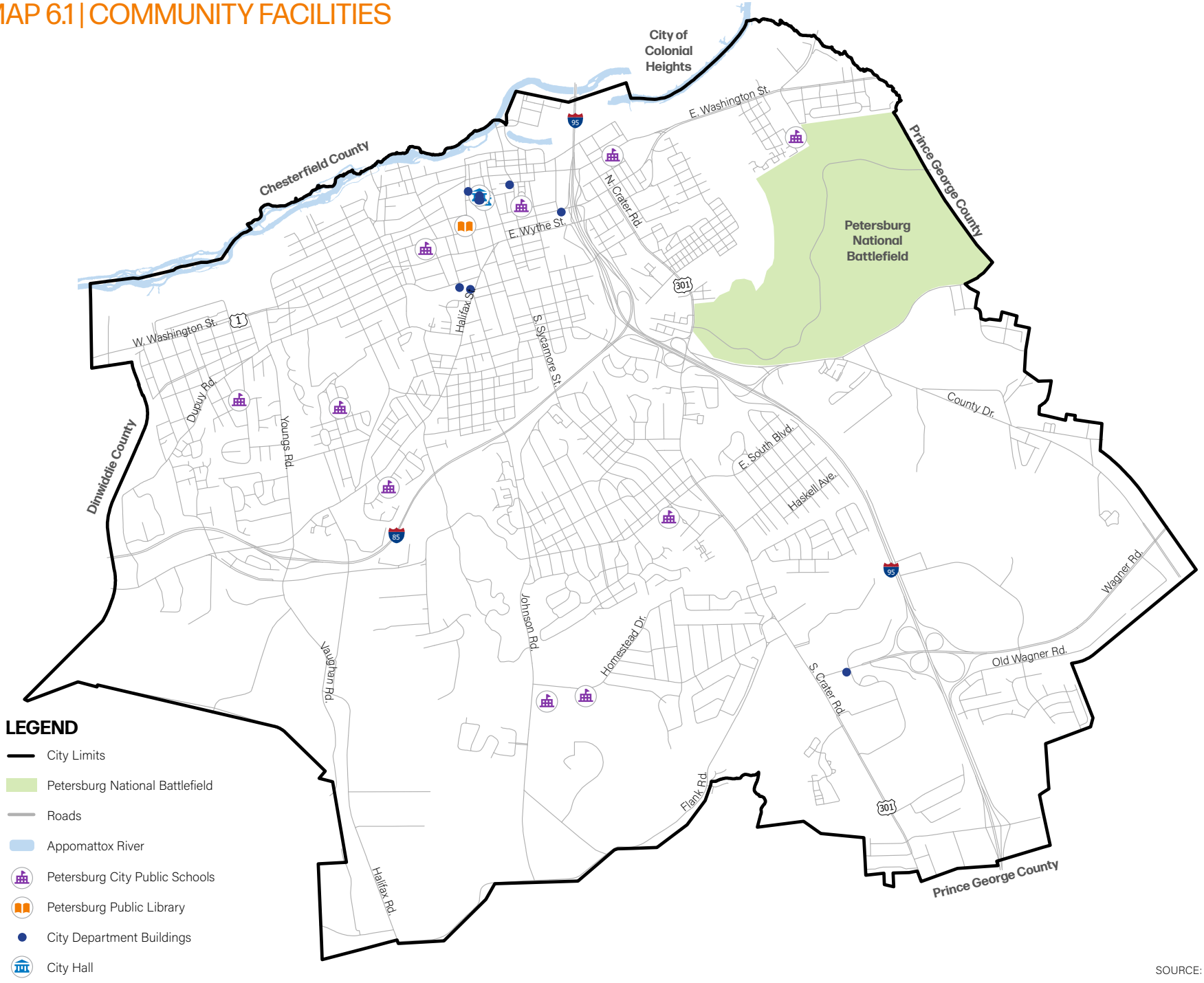
The City also owns a large number of vacant properties. Consideration should be given to the future of these properties, with a study necessary to assess key factors that will influence future investment, such as:

- Structural condition and historic preservation value;
- Opportunities for repurposing buildings for government offices or school needs, with potential cost savings versus new construction;
- Opportunities to preserve significant buildings in partnership with historic land trusts or nonprofit organizations;
- Opportunities to convert unimproved space into parks, community gardens, event spaces, and other community-oriented uses; and
- Economic development potential; consideration of the Highest and best use as City-owned assets for lease versus sale for redevelopment and potential tax revenue

City-owned vacant properties may have untapped tax revenue potential. If properties cannot be repurposed to satisfy existing space needs for the City or its schools, there may be new revenue opportunities through the lease or sale of assets. Creating a regularly updated inventory or land bank would allow Petersburg to evaluate these properties to better determine future ownership and economic potential. However, historic and cultural sensitivities should also be incorporated into consideration if there is a risk of losing historic value to development.

Aerial view of Petersburg Courthouse

MAP 6.1 | COMMUNITY FACILITIES



SOURCE: City of Petersburg

The City should undertake a **Space Needs Assessment** to develop a comprehensive and cohesive building inventory, and to "right-size" the number and type of City-owned buildings. Space Needs Assessments involve c**ollecting data on critical and resident-facing functions of each department to provide a better understanding of how City services interact with residents.** Since the population of Petersburg is expected to remain relatively stable over the next 20 years, the evaluation of this data can then be assessed for adequacy and plans for improvements outlined. Better understanding the spatial needs of City facilities and departments **will ultimately help to effectively program improvement through the CIP, ensuring that valuable staff and personnel resources are being used efficiently for priority improvements.**

A critical aspect of facilities planning is completing an inventory of capital needs and prioritizing improvement through a Capital Improvement Program (CIP). A CIP is a key method of municipal capital budgeting and is a recommended provision of the Code of Virginia Section 15.2-2239. The CIP is intended to be reflective of collaboration between the Planning Commission, the City Manager, department heads, and interested residents and community organizations, and is also required to include cost estimates and road and transportation improvements.

The City has adopted a CIP in the past but has not developed one in recent years; Petersburg should be reviewing and updating a CIP annually to position itself for strategic and wise investments in its facilities and infrastructure.

View of a residential street

COMMUNITY FACILITIES AND QUALITY OF LIFE

Public buildings and facilities offer services that directly contribute to the quality of life for residents. These facilities include community centers and libraries, which contribute to the fabric of life in neighborhoods through providing spaces for residents to gather as a community, access educational opportunities and build life skills, and obtain valuable information on other community resources, services, and events.

Community Hubs

Community engagement feedback conveyed a strong desire for more facility space that is open during evening and weekend hours. As discussed in Chapter 5, community centers or hubs are trusted gathering places that connect every member of the community to essential programs, services, and spaces that advance health equity, improve health outcomes, and enhance quality of life. These spaces can be indoor or outdoor facilities, or have activities that leverage both indoor and outdoor space In addition to recreation space, hubs may offer computer labs, maker's spaces, and gathering spaces. Reimagining unused or underused City property into community hubs has tangible benefits to the fabric of a neighborhood and can help to spark community revitalization. Partnerships with local nonprofits, churches, and civic groups can be explored to assist with long term operation and maintenance of facilities. There are also opportunities to explore public-private partnerships with businesses to serve as entrepreneurial hubs, or coworking spaces that encourage entrepreneurship and learning.

Farmers' Markets and Urban Gardens

Community facilities can provide valuable opportunities for residents to grow their physical, mental, and social health. In addition to community hubs and libraries, farmers' markets and urban gardens can be powerful catalysts for social interaction and community cohesiveness through bringing neighbors together, as well as for individual improvements in physical health.

Currently, Petersburg is served by the River Street Market, a non-profit year-round produce, artisan, and food market located in Old Towne near the historic City Market building. The River Street Market also operates a pop-up market at the Petersburg Public Library, supported by Petersburg Healthy Options Partnerships (PHOPs), and a mobile market operating on Wednesdays, Fridays, and Saturdays. Additional pop-up and mobile markets could be held occasionally closer to neighborhoods and could be a good use for vacant or underutilized lots. Ongoing support for organizations such as PHOPs to expand mobile market services to low-income neighborhoods should continue to be a priority.

In addition to local markets, unused municipal lots in neighborhoods can be converted to community gardens by partnering with residents and local civic groups to oversee ongoing maintenance. The City should evaluate which vacant properties would be ideal for this type of use.

A visitor shops for produce at River Street Market. Photo Credit: River Street Market

Aerial view of Petersburg Public Library
Photo Credit: Petersburg Public Library

Petersburg Public Library

The Petersburg Public Library is centrally located at 201 W. Washington Street in Old Towne and provides a welcoming and safe space for the community to access educational and informational resources, including reading materials, public computers with internet access, meeting rooms, and special events such as job fairs and educational seminars. A pop-up farmers' market is also located in the Library, providing the community with easy access to fresh and healthy groceries.

The Library was consistently stated to be one of Petersburg's most valuable assets during the community engagement phase of PetersburgNEXT. Between 2010-2019, the Library issued 26,964 library cards, added 53,973 items, checked out 1,004,131 items, and had over 600,000 visitors. Library programming also provides quality of life activities and important services for residents, such as yoga classes and visits from the Sentara Mobile Care unit to provide health and wellness care, including medical care, behavioral health, social assistance, and financial support for Medicaid and uninsured community members.

Petersburg continues to recognize its public library as a strong community asset and can continue providing financial support to ensure the Library can continue to effectively serve and empower residents for generations to come.

EXISTING INFRASTRUCTURE

Infrastructure is the circulatory system of a city. It provides the necessary ingredients to build the foundation of community vitality, such as clean water and the removal of waste. Good infrastructure gives a community what it needs to grow. Conversely, inadequate infrastructure can inhibit a city, keeping it from reaching its full potential, particularly if upgraded systems are needed to support industrial and commercial growth.

For Petersburg, quality infrastructure is critical to realizing positive economic development outcomes and supporting the everyday lives of its residents. By alleviating infrastructure bottlenecks and maintaining existing infrastructure to the highest standards, Petersburg will ensure that it has a solid foundation to build the bright future of tomorrow.

Water and Sewer

Water is provided to the City of Petersburg by the Appomattox River Water Authority (ARWA). The Authority was formed in the 1960s to own and operate a regional water supply and to provide drinking water to the Cities of Petersburg and Colonial Heights and the Counties of Chesterfield, Dinwiddie, and Prince George. Water is supplied by the 3,100-acre reservoir at nearby Lake Chesdin and pumped to a nearby treatment facility capable of producing up to 95 million gallons of treated water per day. After treatment, finished water is fed to a transmission system and distributed into locally maintained water systems.

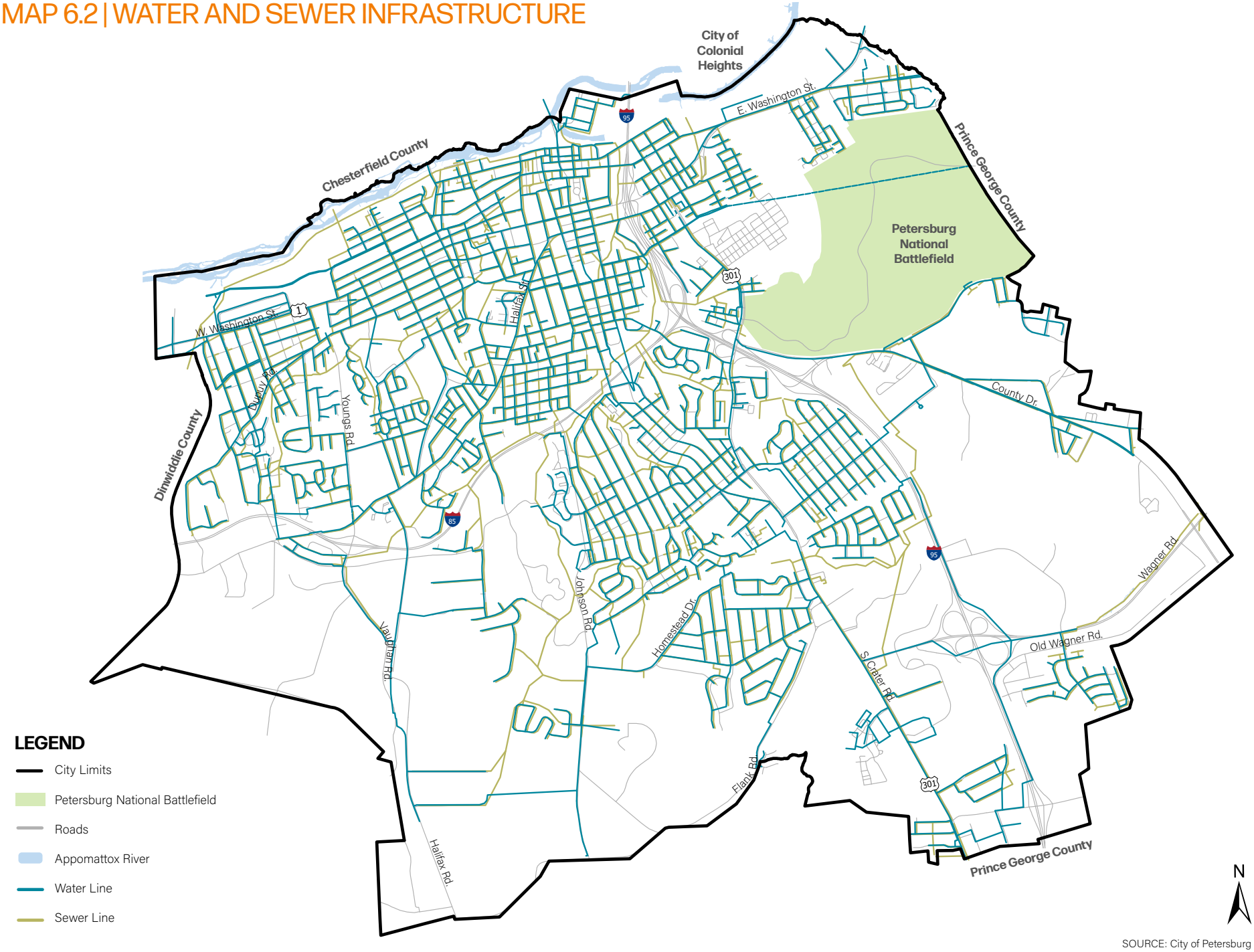
Wastewater is treated through an agreement with the South Central Wastewater Authority (SCWWA), which provides wastewater treatment services to the Cities of Petersburg, and Colonial Heights and the Counties of Chesterfield, Dinwiddie, and Prince George. The SCWWA operates the wastewater treatment plant located east of Pocahontas Island on Magazine Road. The plant was originally constructed in 1955, with upgrades and expansions in the 1970s and 1990s, bringing the current treatment capacity to 20 million gallons per day. This treatment capacity is expected to be adequate for the City's immediate needs, but additional growth in the surrounding localities may require expanded capacity during the timeframe of this Plan. The SCWWA is currently undertaking a nutrient reduction project and additional improvements may be required over time due to increasing regulatory requirements.

The local water and sewer systems within Petersburg are maintained by the Department of Public Works. The systems distribute approximately 5 million gallons of drinking water a day and collect 8 million gallons of wastewater, including wastewater from several neighboring jurisdictions and Fort Gregg-Adams. These systems are comprised of 1,400 miles of pipe and include six water storage tanks, 21 pump stations, and 1,375 fire hydrants.

Utility metering and billing is handled through the Department of Public Utilities. Components of the City's metering system are older and in need of replacement – particularly sewer lines, many of which are at capacity. This can also translate to inconsistencies and inaccuracies in monthly bills, creating a financial and time burden for residents. Additionally, much of the in-ground infrastructure is located on private property without easements, making access and maintenance difficult.

Operating and maintaining water and sewer systems is an expensive task. While not directly responsible for production or treatment, the City is a member of both the producing and treatment authorities. Given Petersburg's past fiscal challenges, special consideration should be given to maintaining an appropriate rate structure. In addition, funding is needed for improvements to the in-ground network. The City should evaluate the current rate structure to determine if it is adequate to cover the cost of providing these services, especially in light of increasing costs caused by recent inflation, materials scarcities, and deferred maintenance.

MAP 6.2 | WATER AND SEWER INFRASTRUCTURE



SOURCE: City of Petersburg

Stormwater

In April 2013, City Council adopted the Stormwater Utility Ordinance. This ordinance instituted an impervious area-based fee on all properties within the City and created a dedicated funding stream to address stormwater needs. Previously, funding stormwater improvements through General Fund revenue had caused a backlog of projects as stormwater competed with other needs. The ordinance created an average monthly fee of $3.75 and was estimated to generate $1,148,000 in annual revenue. This funding was estimated to provide for a Level of Service 3, which allowed for compliance with State regulations and some partial CIP implementation. The fee and level of service should be reevaluated in five-year cycles to align with review of the MS4 and VPDES permit, with potential fee increases going toward ongoing system improvements.

Most existing stormwater infrastructure is in or adjacent to Old Towne. Future study and consideration should be given to installing drainage in other areas of the City, particularly in denser residential neighborhoods. This will work to reduce spot flooding and ponding issues in these areas, result in less required maintenance of roadways, and generally improve conditions in residential neighborhoods.

In order to provide the infrastructure to support the desired type and level of future development, the following priority projects need to be completed. These projects are crucial to providing a firm footing for the development of Petersburg and economic development sites such as the Petersburg Pharmaceutical Campus. Some funding from state and federal sources has already been secured, but more is needed to complete the projects. Possible sources for this funding include the Capital Improvements Program, General Obligation Bonds, and various state and federal sources. Careful consideration should be given to future development in these areas; generally, changes in zoning and economic development activities should follow the infrastructure as it is improved and the ability to support future development is obtained. However, prioritizing the below projects will shorten that timeline, leading to a brighter future for the City.

Poor Creek Water and Wastewater

Improving the water and sewer infrastructure in the Poor Creek service area is critical to future economic development outcomes in Petersburg, as a number of businesses associated with the Petersburg Pharmaceutical Campus are located within the service area and there is significant potential for additional businesses in the future.

The service area is in the southeastern portion of Petersburg and comprises approximately one third of the City's land area. While some work and funding have been secured in the past, additional critical priorities remain, which

The City of Petersburg owns and operates stormwater management facilities and **is required to have a Virginia Pollutant Discharge Elimination System (VPDES) permit to discharge stormwater into local waterways**. The specific permit is referred to as the MS4 General Permit and is issued by the Virginia Department of Environmental Quality (DEQ) in 5-year cycles. The current permit **requires the City to develop a stormwater management program that addressed six minimum control measures**:

1. Public education and outreach on stormwater impacts;
2. Public involvement and participation;
3. Illicit discharge detection and elimination;
4. Construction site stormwater runoff control;
5. Post-construction stormwater management for new development and development on prior developed lands; and
6. Pollution prevention and good housekeeping for municipal operations.

Strategies to implement the permit's six control measures **should work in tandem with recommendations included in PetersburgNEXT**.

were identified in the Poor Creek Pump Station Capacity Study. These improvements will allow for reductions in flooding in several areas by laying new force mains to increase flow and pumping rates to be adequate for a 10-year storm, replacing most of the water distribution mains in the area, abandoning the wastewater line through Petersburg National Battlefield, rehabilitating the Walnut Hill Water Tank, and various other necessary distribution upgrades.

Mount Vernon

The Mount Vernon water pumping station currently does not meet reliability requirements set by the Virginia Department of Health (VDH). The station supplies water to Old Towne Petersburg and various other core areas of the City and provides water to several storage tanks. Necessary improvements include rehabilitating the pump station and equipment as well as improving the transmission mains.

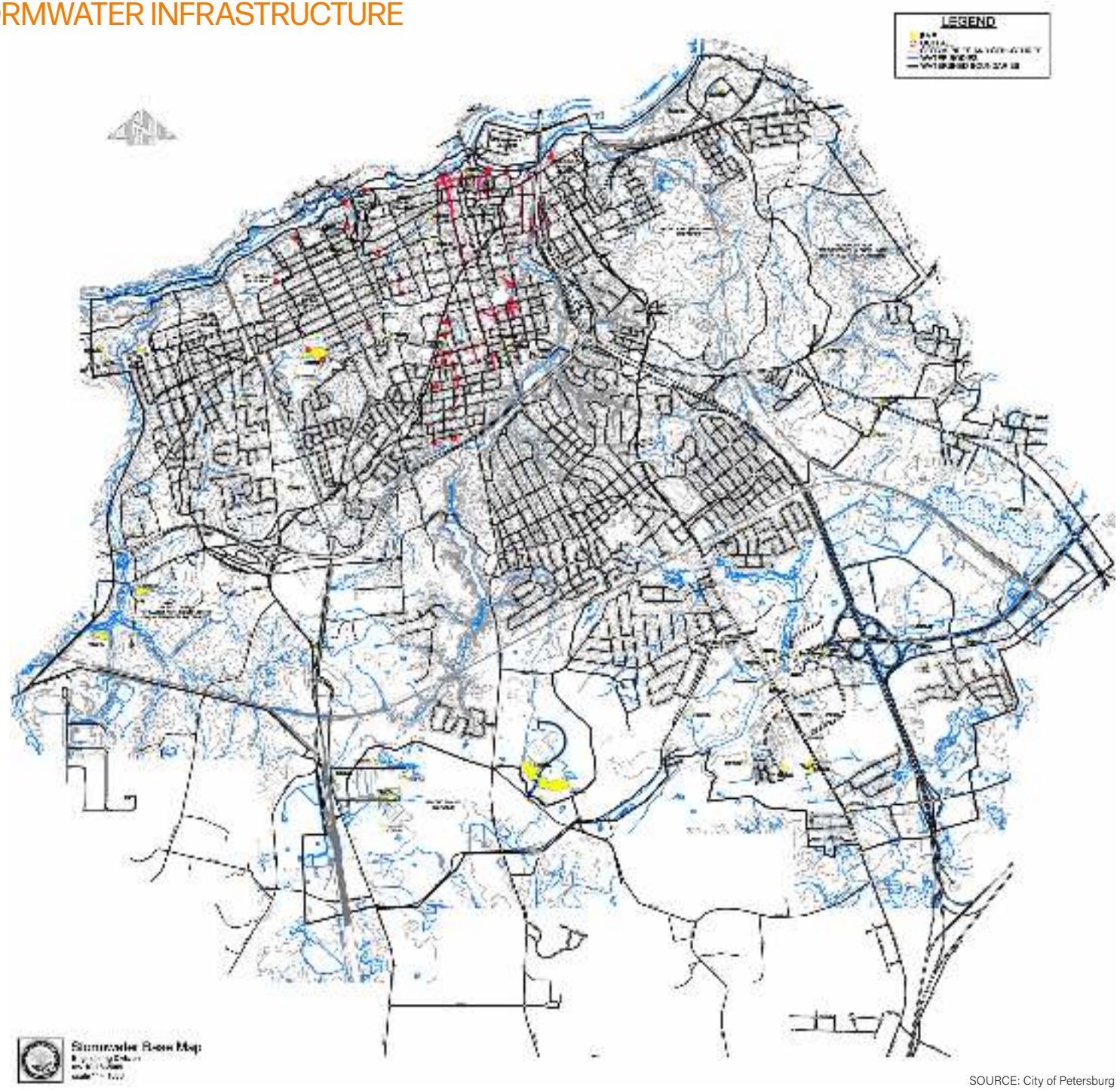
Old Towne Petersburg

Two key improvements that are vital to the future success of Old Towne Petersburg are the replacement of both the Main Street Pump Station and the Bank Street Pump Station. The Main Street Pump Station has reached the end of its useful life and has no backup power generation capability. The Bank Street Pump Station is in an area susceptible to flooding from Poor Creek, posing issues with station operation during flood events and necessitating flood proofing.

Lock's Booster Station

The Lock's Booster Station supplies all drinking water to the City of Petersburg from the Lake Chesdin reservoir in nearby Dinwiddie County. The station pumps are inadequate for future growth, operate beyond their expected lifespan, contain significant amounts of asbestos piping, and have no functional backup power generators. Necessary improvements include the installation of new new pumps, a power generator, and a new electrical system.

MAP 6.3 | STORMWATER INFRASTRUCTURE



SOURCE: City of Petersburg

KEEPING PETERSBURG CLEAN + BEAUTIFUL

Through the Adopt-A-Street and Adopt-A-Spot programs, **caring citizens** take part in **preserving and maintaining streets** throughout Petersburg. A wide range of community organizations, civic groups, businesses, schools, and churches adopt sections of road in or near their communities and r**emove litter from those segments at least four times a year for a minimum of two years**.

The **benefits** of these programs include:

1. Serving as an educational tool against littering;
2. Contributing to the City's commitment to create a more livable and sustainable community;
3. Helping advance tourism, development, and quality of life for the community by improving the appearance of our area; and
4. Saving taxpayer dollars by performing a valuable public service on a volunteer basis.

Solid Waste

Petersburg is a member of the Central Virginia Waste Management Authority (CVWMA), which oversees solid waste management for the region. Curbside collection to approximately 11,000 households and small businesses is provided privately through a contract. Larger commercial waste is collected under private contracts between businesses and private collection firms. Residents are provided with refuse as well as recycling bins. Petersburg produces approximately 14,000 tons of waste annually.

As of 2019, there were nine permitted landfills being operated within the Authority's coverage area. The Tri-Cities Regional Landfill, a privately-owned facility located in Petersburg, and the previous destination for most solid waste from the City, was shut down by the state in 2019 for violations. Since this time, Petersburg's solid waste has been transferred to a facility in Lunenburg County. The CVWMA's 2019 Solid Waste Management Plan determined that, while existing landfills within the CVWMA's coverage area were becoming full, there was sufficient capacity in the nearby landfills to accommodate the region's needs through 2039.

Like water and sewer, the City may wish to evaluate the current rate and fee structure to ensure that solid waste and recycling operations are not a net-revenue loss affecting the City's bottom line. Another way to reduce costs is through strategies that reduce the amount of solid waste that must be disposed of. Such strategies could include "Reduce, Reuse, Recycle" promotional campaigns to raise awareness of how household choices impact the waste stream. The City could also consider a grant program for municipal backyard composters, or taxes and ordinances aimed at reducing plastic bag use.

Community Infrastructure and Economic Development

To realize sustainable growth in economic development – particularly advanced manufacturing and pharmaceutical-oriented uses – and living-wage jobs, the City's economic development sites such as the 200-acre Petersburg Interstate Industrial Park must have the infrastructure to meet the demands of industry. Utilities such as water, sewer, internet, and stormwater management must be in place to attract future industries and to sustain operations. The lack of infrastructure in areas targeted for future economic growth becomes an impediment to development and a headwind to Petersburg realizing its full potential.

INVESTING IN THE FUTURE

Healthcare

Healthcare is a key component of supporting individual health and building a high quality of life for the community overall. The need for expanded primary and urgent care options – especially for veterans, older adults, and the uninsured – was stated to be a high priority for the community during the engagement phase of PetersburgNEXT.

Petersburg is an excellent position to leverage medical care due to recent momentum in public-private partnerships, employment growth in the Health Care sector, and renewed energy towards improving its health rankings. Petersburg should continue to recognize the provision of primary medical care as a vital community service that enhances livability and provides individual stability.

Partnerships have been important in providing medical care to the community in innovative, low-cost ways. The Crimson Clinic operates in public school system thanks to local partnerships with Central Virginia Health Services (CVHS) – which also operates an additional school-based health center and an addiction recovery center – and provides free services to public school students and their families. Another example of a strong public-private partnership is the Sentara Mobile Care clinic at the Petersburg Public Library. The clinic provides health and wellness care to residents in a convenient location. In addition, such mobile clinics can extend services to populations that may have a difficult time obtaining quality health care, such as the uninsured. Mobile clinics can also offer social assistance and financial support, as well as behavioral health care and education.

Thanks to strong public-private partnerships, the Virginia Community Resource Center (VCRC) opened in Old Towne Petersburg in spring 2023. VCRC is open Monday - Friday from 8 a.m. to 5 p.m. at 22 W. Washington Street.

Routine care visit at the Crimson Clinic
Photo Credit: Central Virginia Health Services

WHAT IS HEALTH LITERACY?

According to the U.S. Health Resources and Services Administration (HRSA), health literacy is **the extent to which individuals can find, understand, and use information and services to inform decision-making for their personal health and the health of their families**. Individuals with low health literacy are more likely to have hospital stays, have higher mortality rates, and are less likely to follow treatment plans from a doctor or other medical professional.

Low health literacy is generally linked to lower income levels and lower rates of social connectivity (National Institute of Health). Fostering **a community that supports and values high personal health literacy** is therefore an important and positive step in **building a more equitable Petersburg**. Petersburg can be a cohesive community that **works together to grow health literacy** through coordinated partnerships, consistent and understandable messaging, and intergenerational outreach through public schools or faith-based groups.

Other innovative options to assist residents in obtaining health care could be working with providers to offer telehealth or recurring pop-up services at community centers or hubs. Telehealth can provide remote access to providers in areas where they have no physical presence, as care is provided through video conferencing and can allow patients to see specialists they might not otherwise have access to. Pop-up services can help facilitate the provision of routine care such as physical exams, dental exams, as well as screenings for sexually transmitted infections (STIs) and mental disorders.

The City should continue its efforts to ensure that all residents have access to healthcare by educating residents about their insurance options. Those who are uninsured may have access to Medicare or Medicaid or may be able to access insurance through the exchanges created by the Affordable Care Act. Petersburg could undertake educational outreach through City services such as the Library, sports program for young people, or even including announcements on monthly utility bills to help make residents aware of these programs. Mobile sign-up clinics are another great way to help residents get the access they deserve, particularly when held at community or school events such as Back to School Night.

Social Services

The Petersburg Department of Social Services (DSS) has the mission of providing quality services to community members that will promote self-sufficiency, responsibility, and safety. DSS provides valuable assistance to over 21,000 Petersburg residents through administering self-sufficiency services, family services, children's services, and benefit programs.

DSS' caseload has increased since the COVID-19 pandemic, creating challenges for a staff of just over 100. Greater collaboration through private-public partnerships will be transformative in alleviating caseload for DSS employees and providing more specialized assistance for residents. A comprehensive informational clearinghouse made available both on the City website and as a paper copy would also facilitate the process of information sharing, promote an evenly distributed caseload between DSS and other service providers, and help increase health literacy in Petersburg. This clearinghouse should be reviewed and updated annually to ensure information remains accurate.

Broadband

The value of high-speed internet access was made critically important during the COVID-19 pandemic. Reliable household internet access opens doors to residents for learning, working from home, entertainment, and accessing valuable financial assistance and resources. Without high-speed internet, residents can be left behind on the wrong side of the "digital divide."

Several cable, wireless, and telecommunications companies currently offer broadband internet access in Petersburg. However, many of these services are not high-speed or as consistent as services offered elsewhere. For example, Verizon's FIOS service is only available in a few areas of the City. Petersburg should initiate a dialogue with providers to encourage additional service to more areas of the city. In addition to expanding coverage, work should be done to encourage service affordability. Encouraging competition will also help to keep prices to consumers affordable. Grant funding to support upgrades to existing service and provide for service expansion in underserved or unserved areas should be pursued.

One way of helping provide universal broadband access is through using City-owned streetlights or structures to collocate technology to support Wi-Fi and 5G. Several private organizations provide grant programs and financial assistance to install upgrades; the City should begin by evaluating the feasibility of implementing this type of infrastructure and explore potential assistance accordingly.

The digital divide is the gap that exists between those who do and do not have access to modern information and communication technologies, such as internet access through smart phones, computers, or tablets. The digital divide creates inequality around access to information and resources.

Petersburg City Public Schools (PCPS)

Petersburg City Public Schools (PCPS) is dedicated to excellence in education and has a mission of developing "21st-century citizens able to effectively collaborate, communicate and innovate." The system is comprised of seven schools, one early childhood center, and one alternative program for a total student enrollment of 4,045 as of 2023.

In 2016, PCPS entered a Memorandum of Understanding (MOU) with the Virginia Board of Education. The purpose of this MOU was to assist PCPS in obtaining full accreditation for all schools. As of the 2022-2023 school year, all schools are now accredited. Maintaining accreditation should be the top priority for PCPS; capital improvements which assist in meeting this goal should be pursued accordingly.

Innovate 2022, the PCPS strategic plan, focuses on instruction-based strategies, which are the purview of the School Board and its staff. PCPS also submits an annual capital improvement plan (CIP) as part of the budget process. Currently, most capital projects undertaken by PCPS are maintenance oriented. These include new roofing for several schools, track and field improvements, HVAC related items, and school buses. The 2021 Facility Evaluation and Efficiency Review, conducted between PCPS and the Virginia Department of Education (VDOE),

PETERSBURG CITY PUBLIC SCHOOLS

Cool Spring Elementary School

Lakemont Elementary School

Pleasants Lane Elementary School

Walnut Hill Elementary School

6th Grade Academy at Blandford

Vernon Johns Middle School

Petersburg High School

Westview Early Childhood Education Center

Pittman Academy

SOURCE, ALL: Petersburg City Public Schools

identified recommendations for capital projects to improve efficiency and safety in operations at all City public schools. While the study did not find a need to provide additional classroom spaces or alter grade structures due to an ongoing decline in student enrollment, several capital projects were recommended as high priorities at all PCPS facilities, including ADA accessibility at playgrounds and bathrooms, safety and vehicular circulation, interior lighting upgrades, and HVAC replacement. The PCPS CIP for fiscal years 2023-2027 allocates funding for priority improvements based on these recommendations.

Graduation Ceremony
Photo Credit: Petersburg City Public Schools

Table 6.1 | Petersburg City Public Schools (PCPS) Capital Improvement Plan, FY 2023-2027

Fiscal Year	Improvement	Location	Cost	Description
2023-24	Parent Drop Off Loop	Westview Early Childhood Education Center	$262,000	Safety improvements to establish a safe parent drop off area.
	Roof Replacement	Westview Early Childhood Education Center	$350,000	Roof leak repair.
	Window Replacement	Cool Spring ES	$356,000	Energy efficient window replacement; includes ESSER Grant funding.
	New Ceiling & Lighting	Cool Spring ES	$35,000	Energy efficient lighting & ceiling replacement; includes ESSER Grant funding.
	Roof Replacement	Lakemont ES	$350,000	Roof leak repair; includes ESSER Grant funding.
	New School Construction	Westview/Walnut Hill ES Replacement	$26,600,000	A new building is proposed to consolidate two aging school buildings.
2024-25	Repoint/Repair/ Replace Brickwork	Walnut Hill ES	$150,000	Brick and mortar repair.
	Bathroom Upgrade	Walnut Hill ES	$36,000	ADA upgrades and enhancements; includes ESSER Grant funding.
	New Ceiling & Lighting	Lakemont ES	$35,000	Energy efficient lighting & ceiling replacement; includes ESSER Grant funding.
	Window Replacement	Lakemont ES	$266,400	Energy efficient window replacement; includes ESSER Grant funding.
	Field House	Petersburg HS	$1,200,000	New field house to increase functionality of activities.
2025-26	Roof Replacement	Vernon Johns MS	$350,000	Roof leak repair; includes ESSER Grant funding.
	Roof Replacement	Cool Spring ES	$350,000	Roof leak repair; includes ESSER Grant funding.
2026-27	Replacement School Bus	PCPS Transportation Dept.	$103,000	Replacement of older bus.
	New Ceiling & Lighting	Pleasants Lane ES	$35,000	Energy efficient lighting & ceiling replacement; includes ESSER Grant funding.

SOURCE: Petersburg City Public Schools Capital Improvement Plan, FY 2023-2027

GOVERNOR'S SCHOOLS

The **Appomattox Regional Governor's School for the Arts and Technology (ARGS)** opened in the old Petersburg High School in 1999, and offers six focus areas: theatre arts, musical arts, visual arts, dance, literary arts, and technology. ARGS **provides advanced instruction to gifted and talented students** with a curriculum in their chosen area of study that would not otherwise be available generally.

Students who participate in **Virginia's Summer Residential Governor's Schools** return in the fall with new experiences to share with their teachers and classmates, and teachers who serve as instructors for Summer Residential Governor's Schools **acquire new skills for working with academically advanced students, providing expanded knowledge and content**.

Schools are integral in fostering community identity by serving as centralized gathering places. Currently, PCPS allows third-party groups to use its facilities with advance permission. However, greater public access to school property should be encouraged. Envisioning schools to serve a dual purpose as community centers weaves them more tightly into the fabric of the community and produces safe spaces for students to learn and thrive outside the classroom. While prioritizing maintenance and enhancement for the core function of K-12 education, strategies and capital projects can also be designed to include items intended for extracurricular activities. Examples such as holding community meetings at schools, keeping playgrounds and fields open to the public at nights and on weekends, and allowing some access to computer labs and maker spaces are all ideas that can help advance synergy between neighborhoods and schools, and help schools be seen as places for continued life-long learning.

PROGRAMS AND PARTNERSHIPS

Petersburg fosters and maintains many partnerships and initiatives with other organizations. These organizations all provide valuable community services and maintain an important physical presence in service provision to the community. Continuing to work with these groups, among others, is necessary to provide quality community services to the public:

- Appomattox Regional Water Authority (ARWA)
- Bon Secours
- Central Virginia Health Services (CVHS)
- Communities in Schools (CIS) of Petersburg
- Crater Planning District Commission (CPDC)
- Dominion Energy
- Petersburg Career and Technical Education
- Petersburg Healthy Options Partnerships (PHOPs)
- South Central Wastewater Authority (SCWWA)

Strengthening Infrastructure and Services to Build a Stronger Petersburg

Goal Statement: Petersburg provides and maintains exceptional community facilities, services, and infrastructure to enhance livability and promote a high quality of life for all residents.	
Objectives	**Strategies**
6.1 Demonstrate commitment to transparency, efficiency, and accountability in governance.	6.1.1: Expand and improve external government communications through maintaining a robust social media presence and revamping the City website to maintain regular updates on important announcements.
	6.1.2: Create a phone-based civic alert system or a reverse 911 notification system to provide important updates and emergency alerts to residents without internet access.
	6.1.3: Enhance interdepartmental communication across City government as well as between the various public boards and City Council.
	6.1.4: Explore the feasibility of creating a centralized government complex.
	6.1.5: Seek community input on service needs and priorities to ensure equitable investment in infrastructure and facilities.
6.2 Offer City facilities that are efficient, effective, and meet the needs of residents and businesses.	6.2.1: Develop a Capital Improvements Plan (CIP) as recommended by Code of Virginia Section 15.2-2239; review annually to monitor progress and update with emerging needs.
	6.2.2: Perform a Space Needs Assessment to determine and prioritize the needs of City departments and facilities.
	6.2.3: Inventory and assess unused City-owned land and parcels to determine optimal uses for City services and/or redevelopment opportunities.

Objectives	Strategies
6.3 Maintain functional water, sewer, and stormwater infrastructure to support residential and business development.	6.3.1: Develop comprehensive water, sewer, and stormwater improvement strategic plans to determine the highest priority needs for investment.
	6.3.2: In partnership with Crater Planning District Commission (CPDC), develop a comprehensive Geographic Information System (GIS) database and map for water, sewer, and stormwater systems.
	6.3.3: Upgrade stormwater infrastructure in dense residential neighborhoods with histories of spot flooding and ponding issues.
	6.3.4: Assess utility needs in areas targeted for future commercial and industrial development, such as industrial parks.
	6.3.5: Apply for state and federal grant programs to help address vital water, sewer, and stormwater improvements.
6.4 Expand educational opportunities for residents through support of modern technology, Petersburg City Public School facilities, and community spaces.	6.4.1: Provide financial support to the Petersburg Public Library to maintain and grow the space as a valued center of community and learning.
	6.4.2: Pursue grant funding to support upgrades to existing broadband and cell service and expansion of broadband in unserved areas to ensure universal access.
	6.4.3: Provide financial support to Petersburg City Public Schools (PCPS) as they work to maintain accreditation for all schools, and complete capital improvements which assist in developing high-quality learning environments.
	6.4.4: Permit the use of Petersburg City Public Schools (PCPS) facilities after-hours to provide safe, neighborhood-oriented space for education, recreation, and socialization.
	6.4.5: Monitor Petersburg City Public Schools (PCPS) student enrollment as a means of determining the short-term and long-term needs of school facilities.

Objectives	Strategies
6.5 Recognize the relationship between high-quality community facilities and infrastructure and overall health, wellness, and quality of life.	6.5.1: Improve collaboration between the Department of Social Services (DSS) and regional organizations to alleviate caseload and provide more specialized assistance for residents.
	6.5.2: Create a comprehensive informational clearinghouse available both online and as a paper copy that provides a comprehensive list of available health and human services resources in the Tri-Cities region; review and update annually.
	6.5.3: Advertise, and encourage community involvement in, the Adopt-a-Spot, Adopt-a-Street, and Don't Trash Petersburg programs.
	6.5.4: In partnership with regional stakeholders, initiate educational campaigns and marketing efforts to reduce solid waste flow and encourage household recycling and sustainability.
	6.5.5: Allocate funding for the placement of additional waste receptables around Old Towne.
	6.5.6: Promote urban gardens and small-scale agriculture by allowing unused City-owned property to be used for community gardens.
	6.5.7: In partnership with regional stakeholders, identify potential locations throughout Petersburg that could support new pop-up Farmers' Markets.
	6.5.8: Recommend approval of rezoning and development proposals for primary, urgent, and emergency medical care land uses in and around the Old Towne, South Crater Road, and Blandford areas.
	6.5.9: Strengthen existing partnerships with Virginia Department of Health (VDH), Central Virginia Health Services (CVHS), and other regional organizations to identify community health needs and provide equitable and reliable medical care.
	6.5.10: Evaluate the potential for additional mobile markets during the summer months in partnership with PCPS, local non-profits, and regional organizations.

07 PUBLIC SAFETY

Petersburg prioritizes community safety and wellbeing through consistent, efficient, and equitable public safety service delivery.


"YOU HAVE TO MAKE THIS **AWESOME**
AREA SAFE FOR PEOPLE
TO COME TO..."
- Community Survey Respondent

07

INTRODUCTION

Public safety contributes greatly to the quality of life in a community. When residents feel safe, they can focus on building their physical, mental, and relational health. This is because threats – both real and perceived – no longer prevent them from freely accessing opportunities for education, employment, socialization, and recreation.

Public safety services in Petersburg are provided through several agencies: the Bureau of Police; the Petersburg Sheriff's Office; Fire, Rescue, and Emergency Services; the Emergency Communications Center; and the judicial system. Together, these agencies work to fight crime, respond to emergencies in a timely manner, mitigate the effects of hazards and natural disasters, seek justice, provide safe facilities, and overall ensure that safety is recognized and celebrated as a high priority as Petersburg moves forward into its bright future.

COMMUNITY FEEDBACK: PUBLIC SAFETY

- A majority (63%) of survey respondents identified crime as the top concern for the City's future.
- Half (50%) of survey respondents said that enhancing police, fire and rescue, and emergency services should be the highest priority for Petersburg in future planning efforts.
- Additional design elements such as crosswalks, lighting, and safety signals are needed to improve public safety on City streets, especially after dark.
- 49% of survey respondents said they felt safe in their respective neighborhoods, but only 24% of respondents said they felt safe in Petersburg overall.
- Cleaning up vacant lots, abandoned buildings, and litter will help create an environment less conducive to crime.

MAP 7.1 | PUBLIC SAFETY FACILITIES

SOURCE: City of Petersburg

WHERE ARE WE NOW?

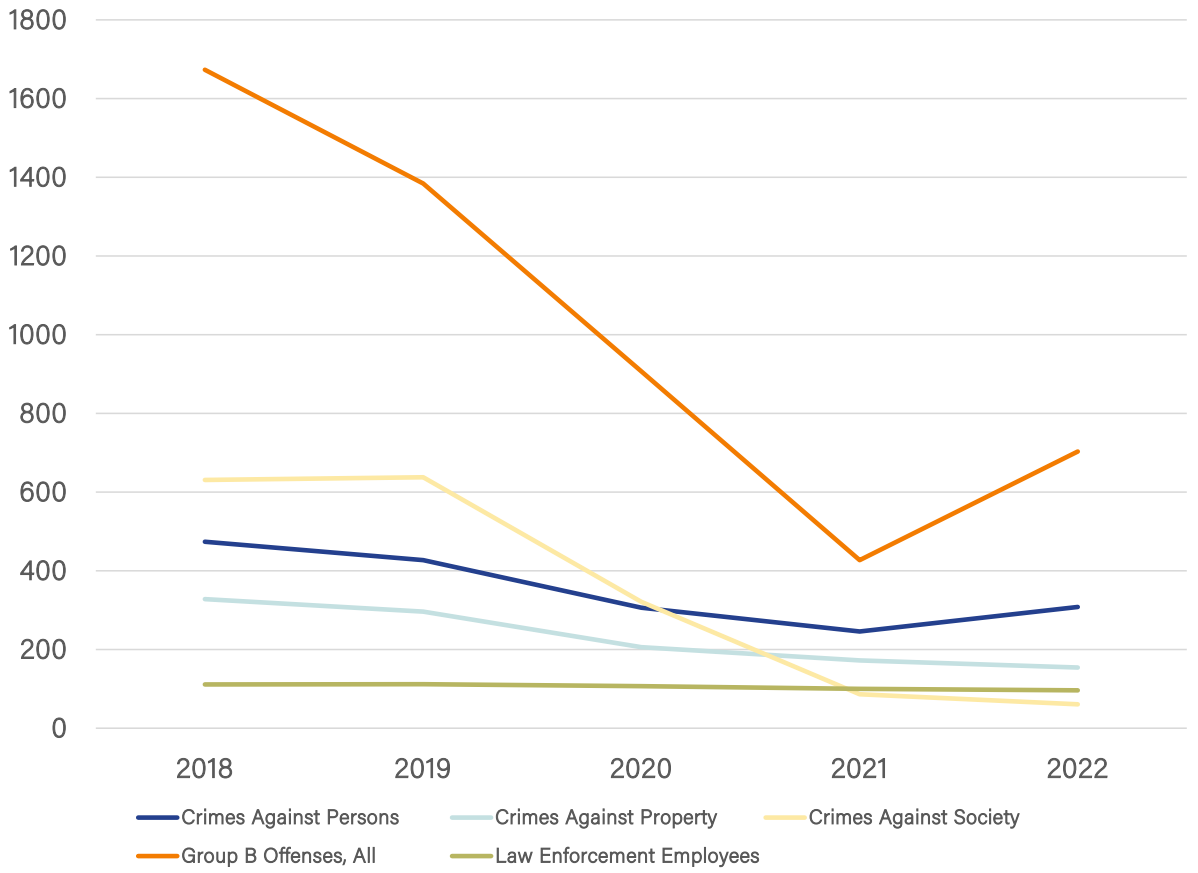
Public safety – specifically, crime – has remained a top concern for the community for several years. However, positive progress is being made: according to Virginia State Police (VSP) data, the overall crime rate and annual arrests have been declining for the past several years.

As part of Governor Glenn Youngkin's Partnership for Petersburg initiative, VSP patrols began assisting Petersburg law enforcement with neighborhood patrols in mid-2022. In the initial phases of the law enforcement surge, shootings decreased by 12%, aggravated assaults and homicides were reduced by 50%, and 24 juveniles were detained for crimes involving firearms – indicating high and early success.

The Virginia State Police NIBRS Agency Crime Overview includes more detail about Group A and Group B offenses. Group A offenses are more serious, while Group B offenses tend to be less serious. Group A offenses are divided into three categories: Crimes Against Property, Crimes Against Persons, and Crimes Against Society. Click here to explore Petersburg's data.

VSP and City law enforcement worked together to use metrics in their approach to patrols, and the data collected as the partnership progresses can provide greater insight into long-term solutions for fighting crime. Continuing to collect and analyze data over time – and doing so in an efficient and transparent manner – is essential in creating a roadmap for the future and fighting crime in a sustainable and effective manner. The City should review CAD and RMS software and procedures for data collection to streamline data collection. Crime data should be mapped through Geographic Information Systems (GIS) and made available to the public, both to increase transparency and oversee data driven solutions for future crime prevention.

Figure 7.1 | Arrests Made, 2018-2022



SOURCE: Virginia State Police National Incident-Based Reporting System (NIBRS) Agency Crime Overview, Petersburg Bureau of Police

Between 2018-2020, Petersburg had 69 drug overdose deaths per 100,000 people – a rate three times higher than both the state and national averages. In early 2022, the City was awarded $628,050 in opioid funding for treatment, abatement, and recovery, spread out over 17 years. A high priority for the City upon adoption of PetersburgNEXT should be establishing an opioid abatement plan as a critical first step in helping combat high drug overdose rates. Petersburg can also partner with local and regional organizations to promote community training on identifying and responding to drug overdoses. Many of these trainings also provide attendees with free naloxone, commonly referred to as Narcan, which is easy to use and can quickly reverse an opioid overdose. Educating the community and providing resources to combat overdoses can allow the community to partner alongside first responders in combating overdoses, saving valuable time and lives.

During the same two-year period, Petersburg's suicide rate was 19 out of 100,000 – also notably higher than the state average of 13 out of 100,000 and the national average of 14 out of 100,000. In many cases, suicides are the result of unaddressed mental health disorders. Strategies to respond to the growing mental health crisis and prevent suicides include providing mental health care at mobile clinics and community centers, integrating trauma-informed care into all public safety routines, and continuing to provide training for law enforcement and first responders on crisis intervention.

Even more important than responding to overdoses and mental health crises is focusing on how to prevent them. Through partnerships with Bon Secours Southside Medical Center, Central Virginia Health Services (CVHS), and others, Petersburg should develop a Community Paramedicine program that can specifically address drug abuse and mental health, which is often a precursor to drug abuse. The U.S. Health Resources and Services Administration defines community paramedicine as an emerging health care field where emergency medical technicians and paramedics operate in expanded roles to connect underutilized resources to underserved communities. Grant funding to support program activities is available through the U.S. Department of Justice, and private organizations involved in the partnership can also fund equipment and vehicles.

Bon Secours Southside Medical Center

LAW ENFORCEMENT

Bureau of Police

The Petersburg Bureau of Police protects people and property by providing essential law enforcement and public safety services while promoting officer engagement, community involvement, and stability and order through service, accountability, and visibility. The Bureau of Police is accredited through the Virginia Law Enforcement Professional Standards Commission (VLEPSC) and consists of over 120 sworn officers when fully staffed. As of Fiscal Year 2023-2024, the Bureau has 107 funded positions.

The Bureau of Police has Memoranda of Understanding (MOUs), which outline responsibilities for assistance and responses to critical incidents, with all neighboring jurisdictions and the Virginia State University (VSU) police force. MOUs between the Bureau of Police and VSP, U.S. Marshals Service, Drug Enforcement Administration (DEA), Federal Bureau of Investigations (FBI) and the Bureau of Alcohol, Tobacco, and Firearms (ATF) are also in place, building a coordinated response team to address a variety of public safety challenges in Petersburg and the Tri-Cities region.

Building a culture of mutual trust, respect, and responsibility is an important goal of law enforcement work in Petersburg. The Bureau is currently in the process of reinstituting a Chief's Advisory Board, which is comprised of law enforcement professionals and community members alike to advise the Chief of Police regarding administrative and operational policies and procedures. This advisory board is an important asset to Petersburg, as they are focused on safer and more inclusive neighborhoods and serve free of charge. A Chief's Advisory Board should reflect Petersburg's diverse community, including members from each of the City's seven wards, females, racial minorities, and teenagers or young adults. In addition to efforts to renew the Chief's Advisory Board, Petersburg operates a Police Athletic League and holds many community events, including biannual Prescription Drug Take-Back Days and the first ever Gun Buy-Back Day in 2023.

The Chief of Police and a community member at Petersburg High [illegible]

Recruitment and retention of law enforcement officers remains a challenge for the Bureau of Police. The Bureau of Police no longer offers career development programs and incrementally increasing benefits that are comparable to those offered in neighboring localities due to funding constraints, and each officer can receive as many as 30 calls daily – higher than the call rate in neighboring localities. The number of homicides in the City inversely correlates with financial resources and manpower, making a fully staffed police force critical for Petersburg's future. However, the City has increased the police budget by $1.3 million since FY 2020. Much of this increase can be attributed to increased allocations for overtime pay, benefits, and vehicles. Completion of a salary study, which is currently in progress, will be one valuable tool in guiding future budgeting for new positions, benefits, and career development programs. As funding becomes available, emphasis should be placed on an intensive recruiting and retention program that focuses on equity and recruiting underrepresented demographics.

Another emerging challenge for the Bureau of Police is the City's mental health crisis, which strains an already overworked staff. In 2021, 4,000 man-hours – equating to approximately 177 days and $111,000 worth of overtime – were spent on Temporary Detention Order or Emergency Custody Order calls. Addressing the mental health crisis will have positive ripple effects through freeing up law enforcement time to address crimes against property and people, ultimately saving valuable taxpayer dollars.

Table 7.1 | Tri-Cities Area Budget Comparison

City	FY23-24 General Fund	Total Police Budget	% of Total Annual Budget
Petersburg	$84,202,469	$9,430,903	11.2%
Colonial Heights	$70,575,890	$6,865,218	9.72%
Hopewell	$61,431,781	$9,949,058	16.2%

SOURCE: City of Petersburg, City of Colonial Heights, City of Hopewell

Overcoming struggles in recruitment – especially the recruitment of minorities – is an **important goal** for police departments **seeking to promote diversity and foster positive community relationships**. Several strategies Petersburg can leverage in its recruitment and retention processes include:

Community Engagement: Continue to actively engage with minority communities through outreach programs, partnerships, and attending community events. Building trust and relationships with minority communities can enhance the department's reputation and make policing a more attractive career option.

Diverse Recruitment Team: Create a recruitment team that reflects the diversity of the community. Having recruiters who come from diverse backgrounds can help establish rapport and understanding with potential candidates. They can effectively communicate the opportunities and benefits of a career in law enforcement.

Mentorship and Training Programs: Establish mentorship and training programs that provide support and guidance for minority candidates throughout the recruitment process.

Sheriff's Office

The Petersburg Sheriff's Office believes in "Excellence Through Commitment and Service" and serves the community in many ways every day. The Sheriff is a locally elected constitutional law enforcement officer of the Commonwealth of Virginia, as provided in the Constitution of Virginia, and is elected by Petersburg voters every four years. Accordingly, the duties of the Sheriff are not spelled out in any one document, law, or regulation. In addition to general law enforcement, the Sheriff's Office is responsible for the following:

- Providing security for courthouses, courtrooms, trials, and jurors;
- Service of court papers;
- Transporting inmates to and from state institutions, and to and from trial and other court-ordered community services; and
- Engaging with the community through Triad Seniors and Law Enforcement Together (Triad SALT), partnerships with Parks and Leisure Services, and providing security for Petersburg High School athletic events, among other special events.

The Petersburg Sheriff's Office currently has 25 funded positions.

Animal Control

Petersburg Animal Control is part of the Bureau of Police and enforces laws regarding the proper housing and care of animals, investigates cases of neglect or cruelty, and operates an open-door public shelter that houses and cares for animals. The City funds six personnel for Animal Control, which has a facility located on Johnson Road.

In 2022, Animal Control managed 437 stray animals, seized 23 animals, transferred 410 animals, and euthanized 37 animals. 107 animals were adopted, 110 animals were returned to their owners, and 94% of handled animals were released live. Animal Control is very involved in the Petersburg community through regular adoption events, using social media to reunite lost pets with their owners, and partnerships with local businesses and non-profits.

Petersburg Animal Care and Control Facility

FIRE, RESCUE, AND EMERGENCY SERVICES

The Petersburg Department of Fire, Rescue, and Emergency Services was established in 1773. The department staffs four fire stations that provide 24-hour service through a three-platoon staffing system. The department is responsible for providing a variety of public safety services to the community including:

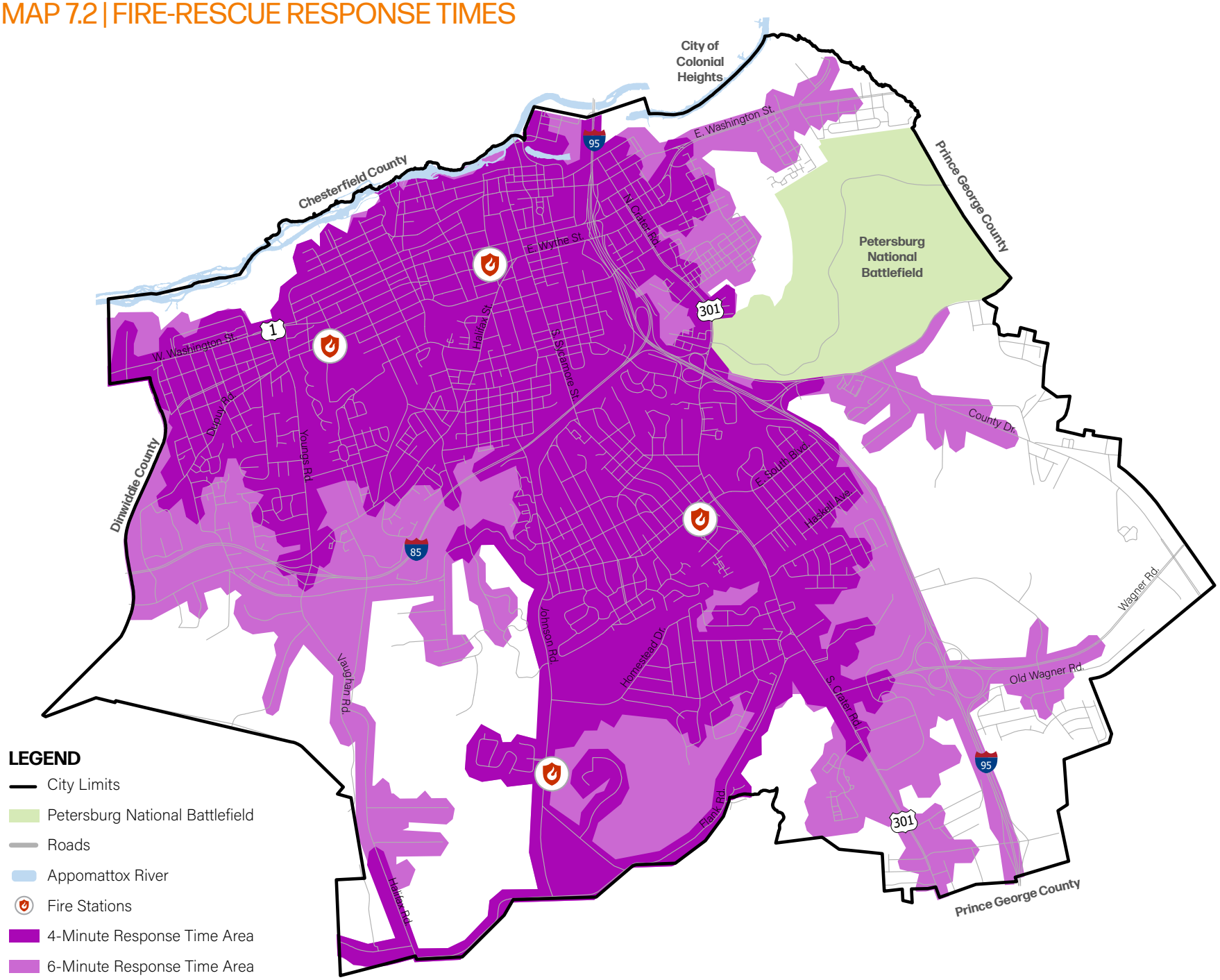
- Dive operations;
- Basic and advanced emergency medical services;
- Fire prevention and property maintenance code enforcement;
- Public fire and safety education;
- Fire suppression;
- Rescue services;
- Emergency management and hazard mitigation; and
- Hazardous materials management.

Fire-Rescue stations are located throughout the City (Map 7.2) and were initially developed to strategically correspond with population growth. When reviewing applications for development, greater consideration should be given to the impact of new residential construction on service delivery, as well as the burden placed on current suppression infrastructure. The department should review and provide comments on all site plan and subdivision submittals. Response times and incident volumes should also always factor into future siting of Fire-Rescue stations, as higher population densities do not necessarily correlate to higher incident volumes.

Petersburg Fire-Rescue Ambulance

Calls for service have increased since 2018, as have requests to provide mutual aid. The most common type of call in 2020 was emergency medical service incidents, followed by general service calls and good intent calls. Response times are another valuable metric to determine the efficiency and equity of service provision. The National Fire Protection Association (NFPA) recommends a six-minute maximum response time for professional fire departments to reach all locations in their jurisdiction. Most areas of Petersburg lie within a six-minute response time; areas that do not are currently being addressed through policies that will ensure response times are brought into compliance (Map 7.2). Within the timeframe of PetersburgNEXT, Fire-Rescue should aim to bring all areas that currently lie within a six-minute response time into a four-minute response time through increased staffing and construction of a new facility in the southeast area near the pharmaceutical campus on Normandy Drive.

MAP 7.2 | FIRE-RESCUE RESPONSE TIMES



SOURCE: City of Petersburg

There are several needs that must be met to continue the provision of high-quality service in Petersburg. Most physical facilities were constructed in the 1940s and 1950s; therefore, renovation and upgrades are pressing needs, specifically those related to HVAC systems and pipes.

New equipment is also needed but can be cost-prohibitive due to lack of funding and high costs. Several grant opportunities provide avenues to obtain funding. The U.S. Federal Emergency Management Agency (FEMA) operates several fire safety grants through the Assistance to Firefighters Grants Program (AFG) and the Staffing For Adequate Fire and Emergency Response (SAFER) program, as does the U.S. Fire Administration. The department submitted an AFG grant in early 2023, which is still pending, and plans to submit a SAFER grant in 2024. Petersburg should regularly pursue grant funding for Fire-Rescue, taking care to show that new equipment will be used to provide continued, high-quality services and protection.

In addition to grant funding, Petersburg should develop replacement plans for apparatus and personal protective equipment. NFPA standards address longevity of equipment; developing a dedicated plan based on NFPA benchmarks can help create a replacement schedule that City leaders use to forecast potential impacts to budgeting.

The Department of Fire, Rescue, and Emergency Services is currently developing a new strategic plan; this will be the Department's first ever strategic plan to specifically guide operations. Petersburg should work to implement the recommendations of the strategic plan upon adoption. It is recommended that the strategic plan be reviewed and updated every five years to monitor progress and update strategies to reflect current needs. If not included in the strategic plan, a community risk assessment is recommended to help further identify which services the Department should prioritize, and how internal operations need to grow or streamline to effectively provide those services. Additionally, reevaluation of mutual aid agreements with surrounding jurisdictions should be pursued to ensure cost-effective and fiscally responsible service provision.

Petersburg Fire-Rescue Fire Truck

EMERGENCY PREPAREDNESS RESOURCES

The following resources are just a few of the many resources available to inform community members of how they can **prepare for and recover from emergency situations**. Click the titles to learn more.

- **After the Fire**: FEMA and U.S. Fire Administration guidelines on how to recover after a house fire
- **Build an Emergency Kit**: Identifying a collection of basic items that can be used during an emergency
- **Virginia Department of Emergency Management:** Statewide resource hub, including educational materials and guidance on emergency preparedness
- **Food Safety in a Disaster or Emergency**: Federal resource providing guidance on food safety before, during, and after a natural disaster or emergency situation

Emergency Preparedness and Disaster Recovery

The City's Office of Emergency Management proactively plans for hazards, works to reduce threats, and prepares Petersburg citizens to respond to and recover from a disaster. The Deputy Fire Chief serves as the director of Emergency Management in Petersburg. As climate change will inevitably lead to a rise in severe weather events such as thunderstorms, tornadoes, and flooding, it will be increasingly important for the Office of Emergency Management and Petersburg's public safety officials to ensure they are not only prepared to respond in the moment when disaster strikes, but also prepared to lead the community to a full, swift, and equitable recovery in the aftermath. This includes both Fire-Rescue and law enforcement – as climate change leads to more frequent and more intense natural disasters, collaboration between law enforcement and Fire-Rescue is only going to increase.

There are several ways Petersburg can continue to ensure the community remains ready and resilient in the face of future emergencies (see Chapter 8 for additional information):

- **Mitigation:** Acting to either prevent or reduce the cause, impact, or consequences of disasters. *Review and update the City's Emergency Preparedness and Response Procedure.*
- **Preparedness:** Planning, training, and educating for events that are unable to be mitigated. *Continue provision of regular emergency preparedness and disaster recovery training, including scenario training. Continue educating the community on emergency preparedness, including what to have on hand in the event of an emergency, potential evacuation routes, and who they can call when in need of immediate assistance. Maintain a permanent location to serve as an Emergency Operations Center during Citywide disasters and designate two potential back-up facilities.*
- **Response**: Immediate action in the aftermath of a disaster. *Include mental health and social assistance professionals in post-disaster recovery and collaboration efforts.*
- **Recovery**: Restoration efforts that occur simultaneously with normal operations.

JUDICIAL SYSTEM

Petersburg Circuit Court

The Petersburg Circuit Court is a trial court that oversees civil and criminal court cases in Virginia's 11th district, which consists of the City of Petersburg and the Counties of Amelia, Dinwiddie, Nottoway, and Powhatan. All jurisdictions contribute funding to cover expenses and personnel. While the function of the judicial system is outside the purview of a Comprehensive Plan, there are several issues with the physical Court facilities that need to be addressed to ensure consistent delivery of safe and high-quality judicial services. The current Circuit Court facilities, located at 7 Courthouse Avenue, are dated and need renovations to ensure not only efficient operations but also the safety of staff and the general public.

Petersburg General District Court

The Petersburg General District Court is located at 35 E. Tabb Street and is responsible for administering traffic, criminal, and civil courts, in addition to mental commitments, protective orders, bond hearings, pre-trials, and preliminary hearings.

In 2023, Petersburg authorized the sale of $34 million in general obligation bonds to construct a courthouse expansion for the General District and Juvenile and Domestic Relations Courts at E. Bank and N. Sycamore Streets, advancing new and safe facilities for personnel and the general public alike. Construction is slated for completion in 2026.

One of the biggest challenges the General District Court currently faces is an increasing workload with no increase in staffing levels. Additionally, process improvements through new technology are greatly needed to streamline workload and ensure a balance of efficiency and accuracy. Petersburg should prioritize investment in new technology for record keeping and administrative functions to modernize the Court and optimize operations, serving as a temporary relief from a rising workload until funding for more personnel can be allocated.

Petersburg Courthouse

WHAT IS TRAUMA-INFORMED CARE?

Trauma-informed care is a fundamental aspect of **providing holistic care** to the community in times of crisis. This strategic approach **creates an environment that is sensitive to individuals who experience trauma** and aims to limit potential triggers, thereby protecting mental and emotional health. Trauma-informed care has numerous widespread benefits, including **decreasing the chance that an individual becomes a repeat offender, supporting the recovery of those with serious mental illness, and increasing overall community safety** (U.S. Department of Justice).

There are **several best practices** that Petersburg can incorporate as it continues to provide trauma-informed care to the community:

- Provide timely, transparent, and thorough updates on events and timelines.
- Review policies and procedures to identify and remove any that could be potentially harmful to those with a history of trauma.
- Continue building long-term collaborative partnerships with local and regional organizations.
- Seek additional guidance from subject matter experts who have lived experience.

Riverside Regional Jail

Riverside Regional Jail is located in Prince George County, serving the Cities of Petersburg, Colonial Heights, and Hopewell and the Counties of Charles City, Chesterfield, Prince George, and Surry. Each locality has two representatives on the Riverside Regional Jail Authority (RRJA) board, which oversees RRJA and ensures the continued maintenance and operations of the facility.

Riverside Regional Jail has maintained continuous accreditation by the American Correctional Association (ACA) since 2002. In 2022, the average daily inmate count was 1,093 inmates. This is a 12.43% increase, or 155 more inmates, over 2021. The rated capacity of the jail is 1,372, with 2,311 permanent beds. In early 2022, the Virginia Department of Corrections (DOC) improved the consistency of transporting state-responsible inmates (those 60 or more days past sentencing) to DOC facilities in a timely manner. If the DOC can sustain current practice, expansion needs will be temporarily abated, but will likely become more urgent in the next five to ten years.

Community Corrections

Community Corrections provides Petersburg and Dinwiddie County with a local community-based probation services agency and the criminal judicial system with sentencing alternatives to incarceration for adult misdemeanors or non-violent felonies.

Community Corrections currently has eight funded personnel and serves as a liaison to the six courts in both localities. The office conducts initial screenings for substance use disorders, mental health services, trauma-informed care, and conducts risk assessments to provide appropriate levels of supervision and deliver viable treatment options. Community Corrections meets a widespread need in the region through the provision of trauma-informed care – saving taxpayer money by reducing the likelihood of repeat incarceration – and the City should ensure that funding and staffing needs are met as necessary.

EMERGENCY COMMUNICATIONS

Emergency Communications is located at 37 E. Tabb Street and is the central point for both emergency and non-emergency communications. The Communications Unit facilitates 24/7 communications services, channeling information and service requests to appropriate service elements.

Emergency Communications facilities are currently located at E. Tabb Street, but are in the process of relocating to a facility on Farmer Street. In 2023, Emergency Communications was awarded $3.2 million to upgrade their system technology.

PUBLIC SAFETY AND COMMUNITY WELLNESS

Crime is one of the social determinants of health. Individuals who are exposed to violent crime can develop health problems such as asthma, cancer, and mental disorders. This risk is increased for children and teens, who are particularly susceptible to developing post-traumatic stress disorder (PTSD), depression, and anxiety, even if they only hear about a violent event secondhand (U.S. Department of Health and Human Services). The crime rate also tends to inversely correlate with the number of treatment facilities available to the community (Brookings Institution). Additionally, children are less likely to recreate outdoors in areas with high crime, taking away a valuable element of their social and physical development. The byproduct of eliminating crime will therefore be an increase in overall public health, enhancing quality of life for the entire Petersburg community, especially for youth.

Participants browse vendors at a Health Fair

North Sycamore Street

PUBLIC SAFETY AND LAND USE

The relationship between public safety and land use and development is stronger than may be initially apparent. There are several ways that the built environment can impact crime, emergency response times, and emergency preparedness:

- Blighted or abandoned structures can attract illicit activities.
- Adaptive reuse of old buildings to multi-family residential units can place pressure on dated infrastructure if not regularly maintained, creating safety concerns for residents.
- New development is not always matching the initially strategic locations of Fire-Rescue stations, which can lead to inequity in response times.
- Residential development in or immediately adjacent to floodplains creates health and safety risks during severe weather and flooding.
- Streets with overgrowth, poor lighting, and inadequate pedestrian infrastructure can be conducive environments for crime.

Crime Prevention through Environmental Design (CPTED) is a multi-disciplinary approach that guides how public spaces and communities can be developed in a way that deters crime. The goal of using CPTED to guide land use and development is to reduce both the perception and the reality of crime while building a more unified community and improving overall quality of life. There are ten principles of CPTED, each of which can be implemented through a variety of strategies and design interventions.

The benefits of employing the CPTED approach are numerous. In addition to enhancing quality of life and deterring crime, implementing the CPTED approach can lead to more efficient use of the City's financial and human resources, improved relationship between City government and the community, and a greater sense of community pride and social cohesion.

Crime Prevention Through Environmental Design

Target Hardening: Making potential targets resistant to criminal activity.
Continue joint efforts with Virginia State Police to provide regular and visible patrols throughout Petersburg.

Natural Surveillance: Designing and placing physical elements to eliminate potential hiding places and maximizing visibility.
Evaluate where front setback reductions may be appropriate to create a sense of "eyes on the street".

Land Use and Community Design: The location of land for various uses, along with their density, intensity, and design elements.
Evaluate the extent to which new development proposals incorporate elements of the CPTED approach.

Social Capital: The social networks and norms that the community draws upon to solve common problems, foster civic engagement, and discourage inappropriate behaviors.
Increase the frequency of social programming between law enforcement and the community.

Natural Access Management: Physically guiding people through the use of visual cues and barriers, ultimately creating a pedestrian friendly environment.
Integrate wayfinding elements such as streetlighting, clear signage, and artwork into commercial areas such as Old Towne.

Activity Support:
Planning safe activities in strategic spaces.
Continue to locate farmers' markets, festivals, and special events in large, open community areas.

Natural Imperatives: Ensuring access to necessary goods and services including but not limited to healthy food, physical activity, living-wage jobs, and housing.
Support housing development in areas with ready access to existing employment opportunities.

Order Maintenance: Attending to minor violations and reducing opportunities for inappropriate behavior to foster safe and predictable uses of space.
Post standards of conduct at all City-owned parks and public spaces.

Physical Maintenance: Regularly repairing and maintaining a building or area to allow continued use for its intended purpose.
Partner with neighborhood groups and local non-profits to pick up trash and maintain landscaping in City parks.

Territorial Reinforcement: Using physical elements to mark space and reinforce a positive sense of ownership.
Ensure City parks have functional and well-maintained security fencing around perimeters.

A Safe Petersburg is a Healthy and Thriving Petersburg

Goal Statement: Petersburg prioritizes community safety and wellbeing through consistent, efficient, and equitable public safety service delivery.	
Objectives	**Strategies**
7.1 Identify and meet the personnel, equipment, and facility needs of the City's public safety departments.	7.1.1: Map crime data through Geographic Information Systems (GIS) and make available to the public, both to increase transparency and to oversee data-driven, location-based solutions for future crime prevention.
	7.1.2: Annually monitor personnel and equipment needs of the City's public safety departments to ensure that an optimum level of public safety and protection is maintained for Petersburg's residents, homes, properties, and businesses.
	7.1.3: Provide regular and visible patrols throughout Petersburg through joint efforts with Virginia State Police.
	7.1.4: Implement the recommendations of the Department of Fire, Rescue, and Emergency Services Strategic Plan upon its completion. Review and update the Strategic Plan every five years to monitor progress and update target goals as needed.
	7.1.5: Complete a Strategic Plan for the Bureau of Police. Review and update the Strategic Plan every five years to monitor progress and update target goals as needed.
	7.1.6: Implement the findings of the City-wide salary study upon its completion to improve attraction and retention of additional first responders and law enforcement personnel.
	7.1.7. Develop an intensive recruiting and retention program for the Bureau of Police that focuses on equity and recruiting underrepresented demographics.

Objectives	Strategies
7.2 Facilitate the provision of rapid, effective, and equitable service delivery.	7.2.1: Develop an opioid abatement strategy as a critical first step in helping combat high drug overdose rates.
	7.2.2: Through partnerships with Bon Secours Southside Medical Center, Central Virginia Health Services (CVHS), and others, develop a Community Paramedicine program to specifically address drug abuse and mental health crises.
	7.2.3: Maintain the Petersburg Bureau of Police's accreditation status.
	7.2.4: Bring all areas of Petersburg within a four-minute response time for Fire-Rescue responses through construction of an additional facility in the southeast area of the City.
	7.2.5: Conduct regular training exercises, including scenario training, for law enforcement and first responders to ensure Petersburg is prepared for increased frequencies of climate disasters that could significantly impact the community.
	7.2.6: Include mental health and social assistance professionals in post-disaster recovery and collaboration efforts.
	7.2.7: Review and update the City's Emergency Preparedness and Response Procedure.
	7.2.8: Maintain a permanent location to serve as an Emergency Operations Center during Citywide disasters and designate two potential back-up facilities.
	7.2.9: In response to changing demographics, integrate multilingual public safety staff and services into daily operations.
7.3 Regularly engage the community in public safety efforts to grow a culture of mutual respect and responsibility.	7.3.1: Develop a widespread volunteer "Neighborhood Watch" program for neighborhoods, parks, trails, public areas, and along the pedestrian network leading to and from destinations, and engage existing "Neighborhood Watch" programs to coordinate efforts.
	7.3.2: In partnership with local non-profits and community groups, expand efforts to provide the community with trauma-informed care.
	7.3.3: Staff one full-time School Resource Officer (SRO) in every Petersburg City Public School. Apply for grant funding to help fund positions and consider joint funding between PCPS and the City.
	7.3.4: Install metal detectors at all entrances to Petersburg High School and Vernon Johns Middle School.
	7.3.5: In partnership with local and regional organizations, provide quarterly community training on identifying and responding to drug overdoses.
	7.3.6: Expand social programming between law enforcement and the community through participation in regular programs such as Coffee with a Cop and Gun Buy-Back Days.

Objectives	Strategies
7.4 Recognize the impact of land planning on public safety and community wellness.	7.4.1: Amend the Zoning Ordinance to adopt community design standards that incorporate principles of Crime Prevention through Environmental Design (CPTED) – including but not limited to requirements for lighting and landscaping maintenance – in both residential and commercial areas.
	7.4.2: Prioritize violent crime reduction efforts around schools and in neighborhoods with large populations of children.
	7.4.3: Require public safety officials to provide comment on all site plan and subdivision submittals as one means of ensuring that future growth aligns with the location of facilities and target response time areas.
	7.4.4: Include neighborhood-specific strategies for crime prevention and eradication as a component of future Small Area Plans.

08

ENVIRONMENTAL STEWARDSHIP

Petersburg will commit to fostering resilience, community wellness, and quality of life through protecting and enhancing its natural resources.

"IDENTIFY OPPORTUNITIES FOR **GREEN SPACE** AND **PROVIDE A BALANCE** TO THE INCREASING PRESSURES TO BUILD AND PAVE AREAS IN THE CITY."

- Idea Wall Respondent

08

INTRODUCTION

Protecting Petersburg's environment and natural resources has positive impacts on quality of life both locally and regionally. Environmental stewardship is a critical aspect of encouraging future growth that is both sustainable and intentional. Just as the water quality in Lake Chesdin affects the drinking water in Petersburg, so does the water quality of the Appomattox River affect the localities downstream along the James River and eventually the communities of the Chesapeake Bay. Water quality is an important environmental factor for the region and the state, and its maintenance and improvement in Petersburg is only successfully accomplished through collaborative partnerships at the regional, state, and federal levels.

However, environmental stewardship goes beyond just protecting the Appomattox River and the Chesapeake Bay. Petersburg acknowledges other environmental factors such as urban heat islands, air quality, brownfield cleanup and remediation, hazard mitigation, and the need for renewable energy that also influence quality of life for the community. Environmental justice is also critical: Petersburg's residents have the right to live and thrive in safe, healthy neighborhoods with equal environmental protections and meaningful citizen involvement in equitable development.

This chapter discusses Petersburg will continue protecting local water quality and the Chesapeake Bay, proactively protect natural resources and prepare for natural disasters, and bolster its resilience and sustainability efforts to protect residents and property owners from the long-term effects of climate change.

COMMUNITY FEEDBACK: ENVIRONMENTAL STEWARDSHIP

- The natural environment ranks as Petersburg's fifth most valued asset.
- Flooding in low-lying areas, a high heat index, and lack of tree canopy were cited by the community as major concerns.
- The Appomattox River is a valuable resource, but there are concerns about development and pollution impacts; for example, sedimentation, construction waste dumping, and trash dumping.
- Petersburg should expand resources for environmental education, especially for youth.

EXISTING ENVIRONMENTAL CONDITIONS

Topography and Climate

Petersburg is situated on the Appomattox River at the fall line, the natural boundary between the Piedmont physiographic province to the west and the Coastal Plain in which the City lies. The underlying bedrock is primarily Petersburg granite. The Coastal Plain is characterized by relatively level or gently rolling topography, with steeper slopes occurring along rivers and streams. Petersburg's humid subtropical climate has hot, humid summers and cool to mild winters, with evenly distributed precipitation throughout the year.

Soils

Most of the soil found in and around Petersburg are members of the ultisol order of soils. These are reddish, clay-rich, acidic soils that occur through the southeastern United States and support a mixed forest vegetation prior to cultivation. They are naturally suitable for forestry, can be made agriculturally productive with the application of lime and fertilizers, and are generally stable materials for construction projects.

Table 8.1 | Climate Data

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Average High Temp. (°F)	49°	52°	60°	71°	78°	86°	89°	88°	82°	72°	62°	53°
Average Low Temp. (°F)	27°	29°	36°	46°	56°	65°	69°	68°	62°	49°	38°	32°
Average Number of Precipitation Days	6	7	8	7	9	8	8	7	6	6	6	6

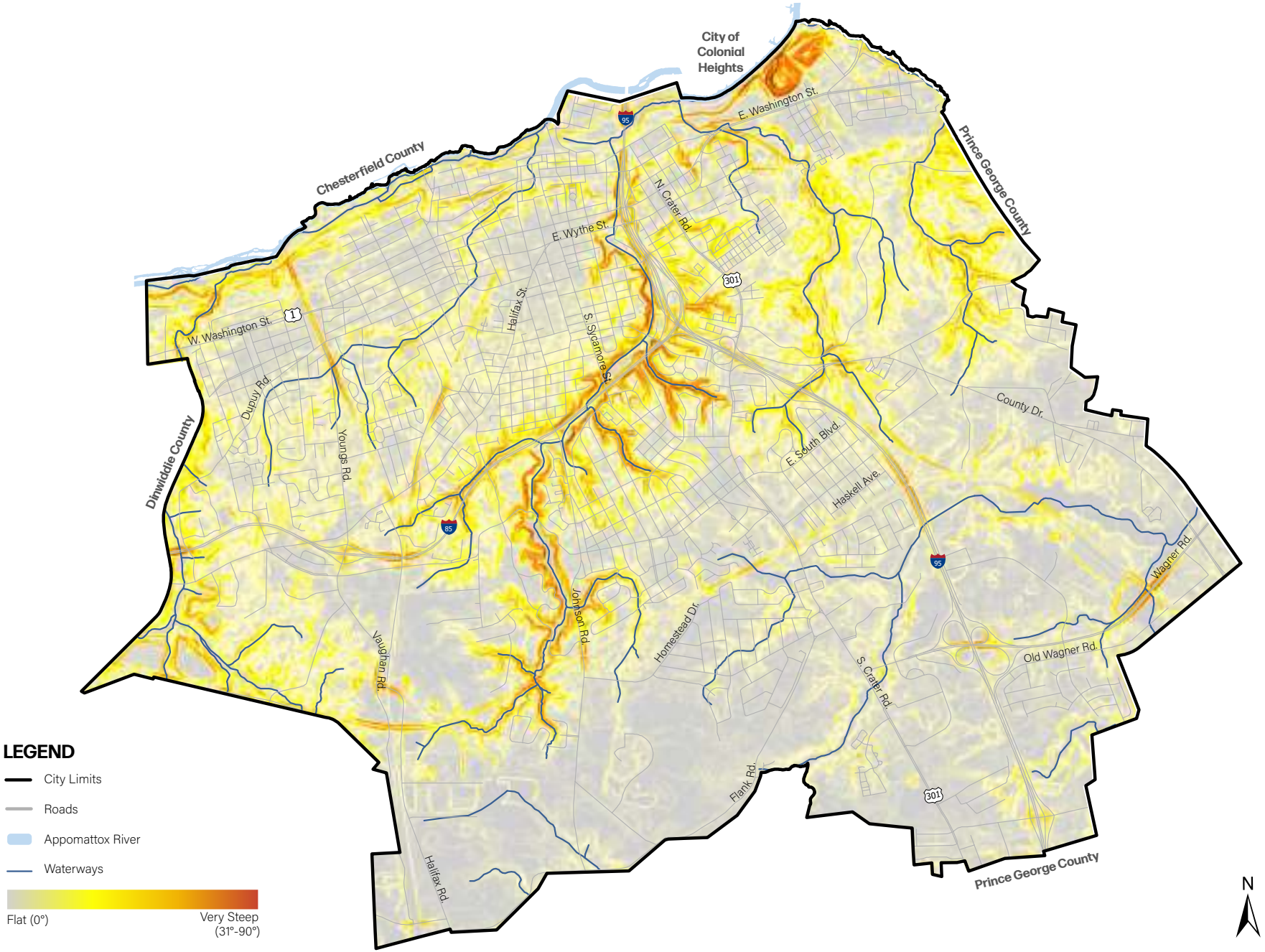
SOURCE: National Oceanic and Atmospheric Administration

Soil Constraints

While most of the city is connected to public sewer systems, there are still parts of Petersburg that rely on onsite sewage disposal systems, which provide sewage treatment and disposal for developments that are not connected to city sewer lines. Most systems distribute sewage effluent into the soil through absorption fields. Factors such as soil permeability, a high water table, depth of impermeable soil layers, existing vegetation, and flooding may affect the ability of the natural soil to absorb effluent.

The ability to absorb effluent from septic tanks is an important quality for soil. A soil's failure to absorb effluent may result in the outflow from septic tanks in the area accumulating to an unhealth degree, leading to potential issues for the water supply. The absorptive qualities of Petersburg's soil correspond roughly with the hydrology of the soil. Higher than average hydrology is also a good predictor of whether an area contains wetlands or not. While much of the soil is not ideally suited for distributing effluent, this does not necessarily preclude the ability of septic systems to function. Site soil surveys should be conducted prior to any potential development to determine suitability for septic systems and identify constraints.

MAP 8.1 | STEEP SLOPES



Wildlife at the Appomattox River

Understanding the underlying soil's impacts on building materials such as concrete and steel is important to long-term planning and development. Structural foundations that intersect more than one soil type are more susceptible to corrosion than if contained within a single soil type. For concrete, the rate of corrosion is based on sulfate and sodium content, moisture content, soil acidity, and texture. For steel, corrosion factors include soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. Generally, soils east of Interstate 95 and north of Interstate 85 are more corrosive to concrete, while other areas of Petersburg are more corrosive to steel. Site soils should be surveyed and assessed prior to any proposed development or redevelopment to determine if underlying soils can support it.

Groundwater and Surface Waters

Groundwater underlying the city is part of the Coastal Plain Regional Aquifer system. While the local public water supply does not use groundwater and there are no community wells within City limits, there are approximately 50 private wells using groundwater.

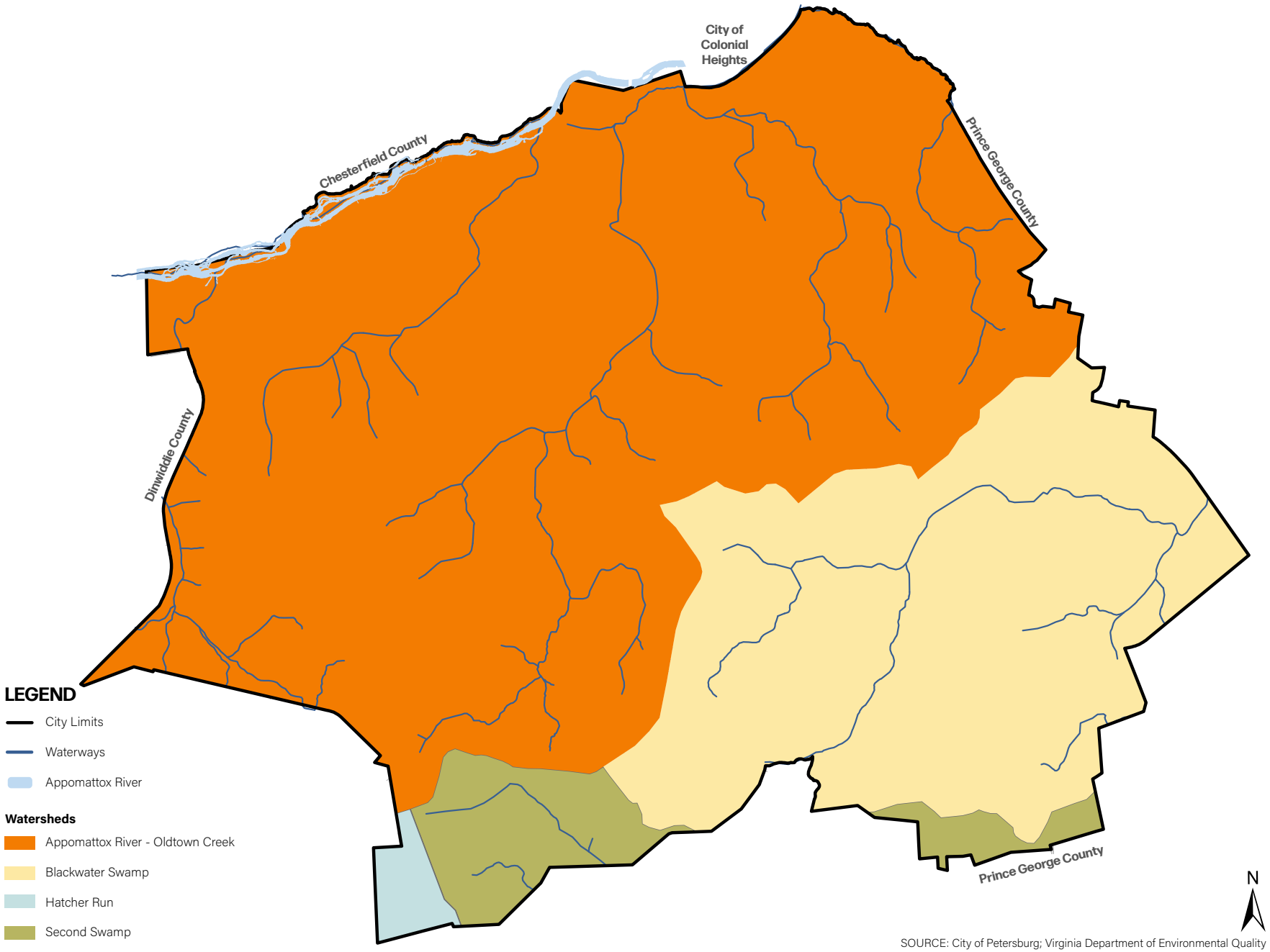
Surface waters are any bodies of water above ground, including lakes, rivers, streams, and reservoirs. Approximately 0.22 acres of surface waters are contained within City limits, and Petersburg's northern border lies along four miles of the Appomattox River. Other major water bodies include Lake Wilcox, Blackwater Swamp, Second Swamp, Poor Creek, Brickhouse Run, Lieutenant Run, and Rohoic Creek. While most of the City lies within the James River basin, which drains to the Chesapeake Bay, the southeast portion lies within the Chowan River basin.

Wetlands

Wetlands are some of the most ecologically vibrant habitats in the world and are comparable to rainforests and coral reefs in terms of their biodiversity. They provide fish and wildlife habitats, natural water quality improvement, floodwater storage, shoreline erosion protection, and natural beauty.

Petersburg has both tidal and non-tidal wetlands. Tidal wetlands are flat, vegetated areas that occur in inland coastal areas and are subject to regular flooding by the tides. Petersburg's tidal wetlands can be found along the Appomattox River and Poor Creek. Non-tidal wetlands occur inland and are not subject to tidal influences. These freshwater wetlands typically consist of trees, shrubs, and grasses and can be found along the southern City limits.

MAP 8.2 | WATERWAYS AND WATERSHEDS



SOURCE: City of Petersburg; Virginia Department of Environmental Quality

Appomattox River

PROTECTING WATER RESOURCES

What Is the Chesapeake Bay Preservation Act?

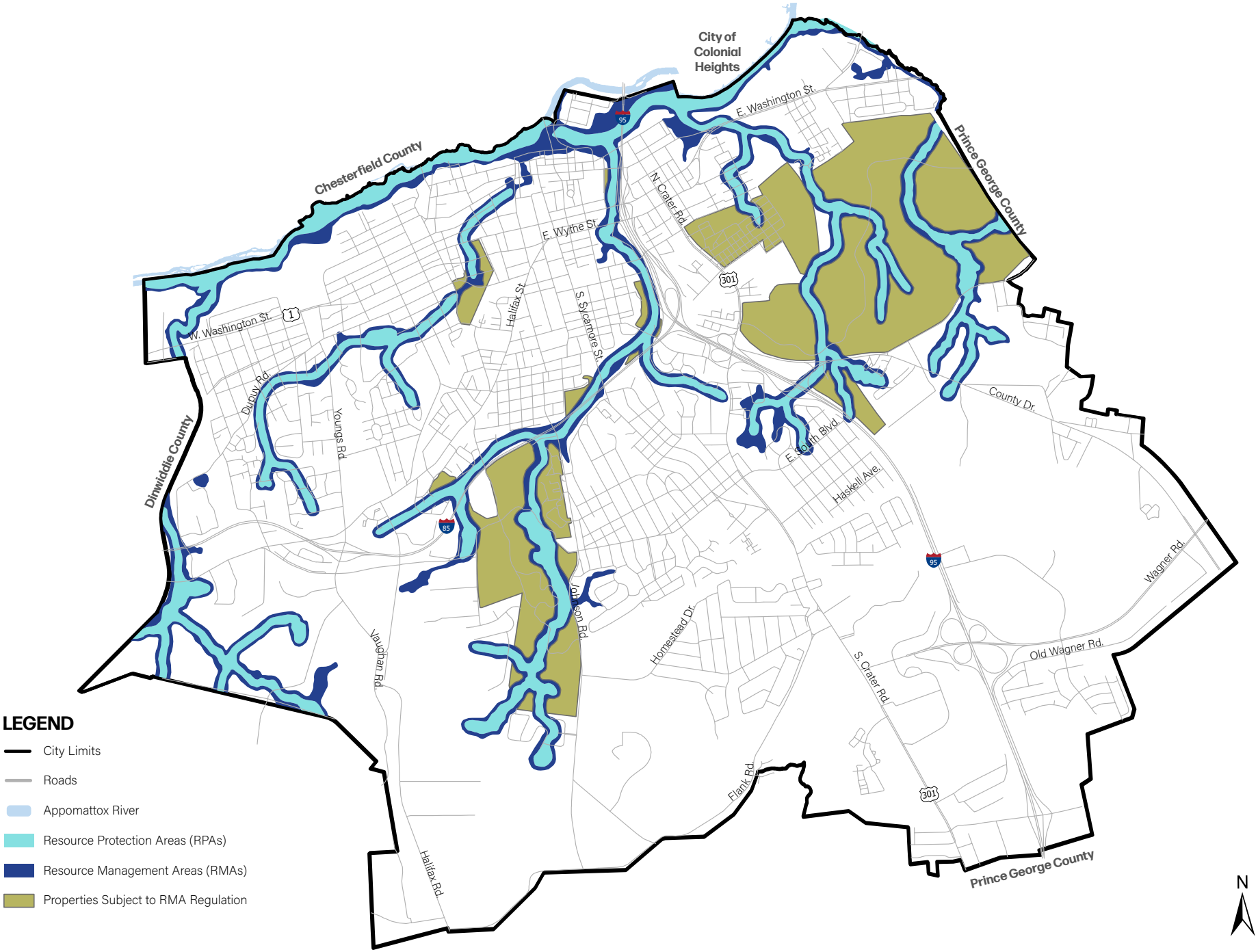
The Chesapeake Bay Preservation Act (also referred to as CBPA, Bay Act or The Act) is mandatory for all localities listed in the Code of Virginia Section 62.1-44.15:68. Enacted to protect the water quality of the Chesapeake Bay and its tributaries, the Act requires the implementation of practices that minimize disturbance of environmentally sensitive areas, known as Chesapeake Bay Preservation Areas (CBPAs). CBPAs consist of Resource Protection Areas (RPA) and Resource Management Areas (RMA). RPAs include tidal and nontidal wetlands, water bodies with perennial flow, tidal shores, and a 100-foot buffer. RMAs include areas lying 100 feet landward of and contiguous to the RPA, any area in a flood zone with 1% chance of flooding per year, and hydric soils adjacent to water bodies with perennial flow (Map 8.3).

The Bay Act requires certain criteria that local governments must adopt and implement in administering their Bay Act programs, including Comprehensive Plan elements, accompanying maps, and zoning and subdivision requirements. The Bay Act is enabled through the following legislation:

- Chesapeake Bay Preservation Act (Section 62.1-44.15:67-79, Code of Virginia)
- Chesapeake Bay Preservation Area Designation and Management Regulations (9VAC25-830, Virginia Administrative Code)

The Virginia Department of Environmental Quality (DEQ) Local Government Assistance Program oversees the implementation of the Bay Act by localities. Petersburg's Chesapeake Bay Preservation Ordinance (Chapter 122, Article II of the City Code) limits development in the RPA to water-dependent uses, redevelopment, new principal structures and necessary utilities on parcels recorded prior to October 1, 1989, that have suffered a loss of buildable area, private roads and driveways, or regional flood control or stormwater management facilities. Certain exemptions, buffer encroachments, and buffer modifications are also permitted. Each of these uses, activities, or facilities can be approved under certain conditions through an administrative process overseen by the Director of Planning and the Director of Public Works. Other activities or structures proposed within the RPA require approval of an exception following a public hearing by the City Board of Zoning Appeals. Any land disturbance in the RPA requires approval of a site-specific determination of the CBPA boundaries at the time of development, a water

MAP 8.3 | RESOURCE PROTECTION AND RESOURCE MANAGEMENT AREAS



SOURCE: City of Petersburg

quality impact assessment, and mitigation for the encroachment of the 100-foot buffer area elsewhere on the parcel.

Development within CBPAs, inclusive of the RMA and the RPA, is required to minimize land disturbance and impervious surface to only that which is necessary for the proposed use or development, and to preserve indigenous vegetation to the extent practicable. In addition, compliance with the City's Erosion and Sediment Control and Stormwater Management Ordinances and full development plan review is required for land disturbance exceeding 2,500 square feet. The plan of development review process requires approval of a site plan in accordance with the provisions of the Zoning Ordinance or a subdivision plat in accordance with the Subdivision Ordinance prior to any clearing or grading of the site or the issuance of a building permit to ensure compliance with all applicable requirements of the City's Chesapeake Bay Preservation ordinance.

The following items are also required in addition to a site plan or subdivision plat:

- Environmental site assessment, inclusive of a site-specific CBPA determination
- Landscaping plan
- Stormwater management plan
- Erosion and sediment control plan
- Water quality impact assessment, inclusive of vegetative mitigation for the area of land disturbance within the RPA

Impacts on Water Quality

Surface waters and the potable water supply are susceptible to contamination from everyday activities and land development. Nonpoint source pollution is water pollution that is not confined to a single source and may derive from construction activities, soil erosion, household chemicals, and pet waste. The four main forms of nonpoint source pollution are sediments, nutrients, toxins/toxicants, and pathogens. Point source pollution can be traced to a single source, such as a wastewater treatment plant or industrial discharge pipe.

Public Works activity at a sensitive environmental habitat

Groundwater is particularly susceptible to contamination in areas where abandoned wells and underground storage tanks exist. Water flowing into uncapped abandoned wells can feed pollutants directly to the groundwater supply, and petroleum remnants can leak from underground storage tanks.

City residents and business owners can improve local water quality by taking advantage of the urban cost-share program offered through Virginia's Soil and Water Conservation Districts. The Virginia Conservation Assistance Program (VCAP) provides financial reimbursement to property owners who install specific conservation practices, including but not limited to rainwater harvesting, conservation landscaping, rain gardens, and permeable pavement installation. Residential, business, public, and private locations that are non-agricultural are eligible. Most practices are eligible for up to 75% cost share and some practices provide a flat incentive payment up to the installation cost.

While much of Petersburg is urban, areas of agricultural activity still exist in the southwest portion of the city. Agricultural activities can contribute to nonpoint source pollution by introducing excess nutrients, toxins/toxicants, and sediments derived from animal waste, pesticides, and erosion into local waterways. Implementing best management practices, or BMPs, can help minimize negative impacts from agriculture to preserve the long-term health of local water resources. These can include nutrient management plans, conservation tillage, cover crops, erosion control measures, and more that can be catered to the needs of the site and operation. Similar to VCAP, cost-share funding programs are available through Virginia's Soil and Water Conservation Districts for over 70 agricultural conservation practices to support farmers who install agricultural BMPs on their properties.

Sediments are soil particles carried by rainwater into streams, lakes, rivers, and bays. By volume, sediment is the greatest pollutant. It is caused mainly by erosion resulting from bare land, some farming practices, and construction and development.

Nutrients are substances that help plants and animals live and grow. The main concern is excessive amounts of two nutrients: nitrogen and phosphorus.

Toxins are chemicals that may cause human and wildlife health concerns. They include organic and inorganic chemicals, metals, pesticides, household chemicals, gasoline, motor oil, battery acid, roadway salt, and other pollutants.

Pathogens are disease-causing microorganisms present in human and animal waste. Most pathogens are bacteria.

Waterfront access point

Impaired Waterways

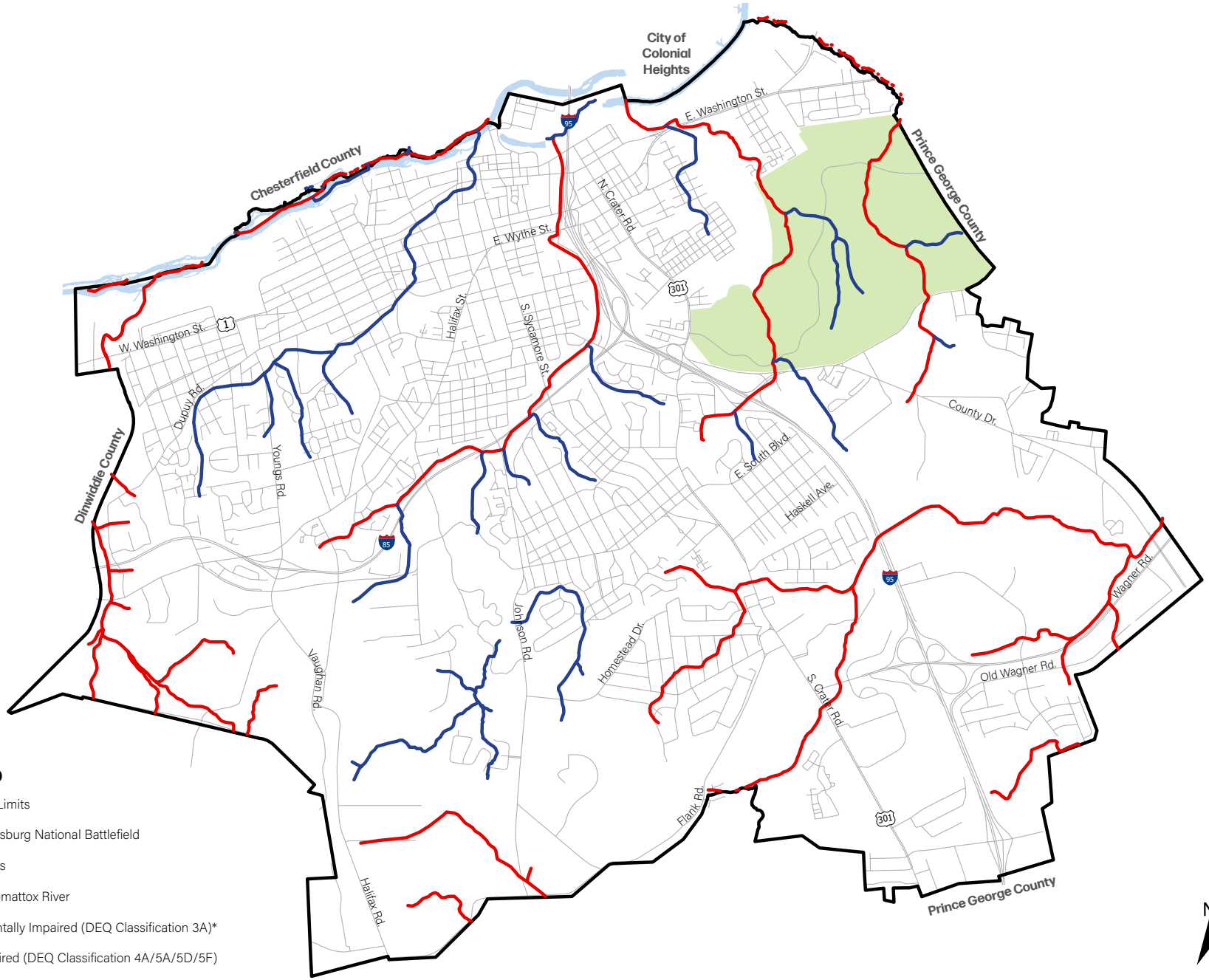
In response to requirements under the Federal Clean Water Act, DEQ tests Virginia's rivers, lakes, and tidal waters for pollutants to determine if they can be used for swimming, fishing, and drinking. When water quality monitoring data shows that state waters do not meet water quality standards, clean-up plans called Total Maximum Daily Loads (TMDLs) are developed by DEQ. TMDLs determine the total amount of a pollutant that a waterbody can receive and still meet water quality standards. These waters are called "impaired" and are listed in the Virginia Water Quality Assessment Integrated Report. Table 8.2 and Map 8.4 show waterways that are currently considered impaired by DEQ; those with "High" TMDL development priority are included on DEQ's 2-year priority list for 2023-2024.

Table 8.2 | Impaired Waterways

Waterbody	Impairment Category	Impairment Cause	EPA Approved TMDL Date (if available)	TMDL Development Priority
Appomattox River	Fish Consumption	PCBs in fish tissue	N/A	High*
Appomattox River	Recreation	E. coli	8/30/2004	Low
Wilcox Lake	Recreation	Harmful algal blooms	N/A	Low
Harrison Creek	Recreation	E. coli	N/A	Low
Poor Creek	Recreation	Fecal coliform	N/A	Low
Rohoic Creek	Aquatic Life	Benthic macroinvertebrates bioassessments	N/A	High*
Lieutenant Run	Recreation	E. coli	N/A	Low
Blackwater Swamp	Recreation	E. coli	7/9/2010	Low
Second Swamp	Recreation	E. coli	7/9/2010	Low
Unnamed Segments in Blackwater Swamp Watershed	Fish Consumption	Mercury in fish tissue	N/A	Low
Unnamed Segments in Lower Appomattox/ Ashton Creek Watershed	Fish Consumption	Mercury in fish tissue	N/A	Low

SOURCE: 303(d) Integrated Report 2022, Virginia Department of Environmental Quality
*Listed on DEQ's TMDL Program 2-year List of Prioritized Impaired Waters for 2023-2024

MAP 8.4 | IMPAIRED WATERWAYS



LEGEND

- City Limits
- Petersburg National Battlefield
- Roads
- Appomattox River
- Potentally Impaired (DEQ Classification 3A)*
- Impaired (DEQ Classification 4A/5A/5D/5F)

* Category 3A - no data are available within the data window of the current assessment to determine if any designated use is attained and the water is not currently listed as impaired.

N

SOURCE: Virginia Department of Environmental Quality

Water Quality Master Plan

Petersburg received technical assistance support from the National Fish and Wildlife Foundation's (NFWF) Chesapeake Bay Stewardship Fund to develop and implement a Geographic Information System (GIS) and Water Quality Master Plan to identify opportunities and implementation strategies to protect local streams and the Chesapeake Bay. As a small MS4 in the tidewater region of Virginia, regulatory mandates such as the General Permit for Discharges from Small Municipal Separate Storm Sewer Systems, the Virginia Stormwater Management Regulations, the Bay Act, and the Erosion and Sediment Control Law mandate the City's water quality control program. Further, the Chesapeake Bay total maximum daily load (TMDL) dictates that all pollution control measures are in place by 2025 to fully restore the Bay and its tidal rivers.

Progress in achieving substantial pollutant load reductions requires a significant amount of planning, strategy development, and funding. Petersburg has recently implemented a stormwater utility. The newly dedicated funding source has provided Petersburg with the ability to address long-overdue repairs and upgrades to existing drainage infrastructure, continue to meet existing regulatory requirements, and plan for new regulatory requirements including local water quality protection and Chesapeake Bay TMDL target load reductions.

The goals of the Water Quality Master Plan are to develop a finite list of strategically located implementation projects throughout the City's watersheds resulting in maximum positive impacts to the water quality of receiving streams; and to prioritize projects for implementation so that funding can be identified in subsequent fiscal years for design and construction.

Chesapeake Bay Watershed Implementation Plan Phase III

Watershed Implementation Plans (WIPs) are roadmaps for how Chesapeake Bay states and Washington, D.C., in partnership with federal and local governments, will attain the Chesapeake Bay TMDL. Virginia's Phase III Watershed Implementation Plan (WIP III) was completed in August 2019 to achieve nutrient and sediment reductions needed to restore the Chesapeake Bay and its tidal tributaries. It details best management practices, along with programmatic actions, necessary to achieve state basin planning targets for nitrogen and phosphorus.

The WIP III effort benefited from significant achievements from earlier WIPs, and local cooperation and input from Soil and Water Conservation Districts and Planning District/ Regional Commissions who forged a strong foundation while guiding development of new state initiatives Virginia is expected to meet EPA nutrient reduction targets by 2025, and is currently working to address additional challenges in point and nonpoint source water pollution through regional collaboration in the WIP Program.

Petersburg is an active participant in the WIP III Program both through its own efforts in pollution reduction and through collaboration with Crater Planning District Commission (CPDC) and other regional locality staff and stakeholders. These stakeholders meet monthly to discuss grant opportunities, environmental policies and regulations, and other efforts to improve water quality in the Appomattox River, James River, and ultimately the Chesapeake Bay.

Click here to learn more about - and read - Virginia's Phase III Watershed Implementation Plan!

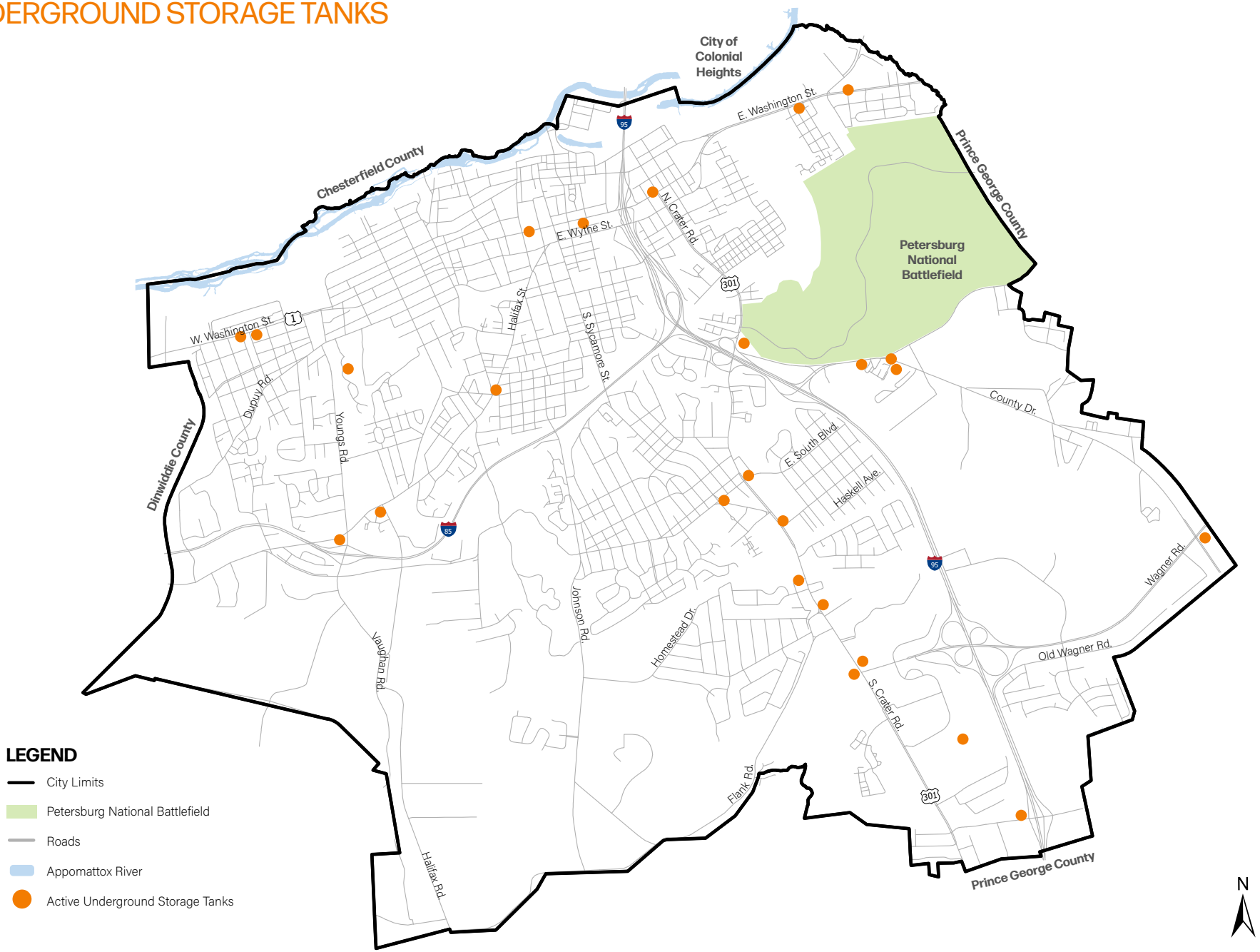
Potential Contaminants – Underground Storage Tanks and VPDES Sites

Underground storage tanks (USTs) often contain substances that are hazardous to the environment, such as gasoline, diesel, and acetone. When left unmonitored in abandoned USTs, these chemicals can leak into the ground and contaminate surrounding groundwater and surface waters. If a storage tank is no longer being used, then proper steps must be taken to fill it in with concrete or other substances which will prevent the tank from leaking harmful substances. As of 2023, there are 26 known active commercial USTs within Petersburg's city limits (Table 8.3 and Map 8.5). Petersburg has been highly proactive in removing storage tanks upon request or when they present a potential liability; 34 storage tanks have been removed or filled in by the city in the last three decades.

Table 8.3 | Active Underground Storage Tanks

ID	Facility Name	Address
1	7 Eleven	225 E. South Blvd.
2	7 Eleven	701 S. Crater Rd.
3	Amoco	2013 E. Washington St.
4	Barksdale Oil Company	2755 S. Crater Rd.
5	BP	1932 E. Washington St.
6	BP	2016 W. Washington St.
7	Elliott Sadler Race-In Shell Station	3140 S. Crater Rd.
8	Exxon Mobile Express II	2205 S. Crater Rd.
9	Jims Handy Mart	2156 County Dr.
10	Liberty Mart	140 E. Washington St.
11	Little Food Mart	902 Halifax St.
12	Marathon Food Mart	615 E. Washington St.
13	Market Place Sunoco	110 W. Washington St.
14	Miller Mart	1200 Courthouse Rd.
15	New Dixie #228	328 Rives Rd.
16	Parhams Service Center	1901 S. Sycamore St.
17	Petersburg Area Transit	309 Fairgrounds Rd.
18	Petersburg Food Market	1500 E. Washington St.
19	Petersburg Market Place	2706 S. Crater Rd.
20	Pure Quick Serve	1804 W. Washington St.
21	Raceway 6702	2058 County Dr.
22	Salem & Sons	1908 Boydton Plank Rd.
23	Southside Regional Medical Center	200 Medical Park Blvd.
24	Sunoco	2127 County Dr.
25	Valero Food Mart	1740 Boydton Plank Rd.
26	Wawa	3199 S. Crater Rd.

MAP 8.5 | POTENTIAL POLLUTION SOURCES - UNDERGROUND STORAGE TANKS



The Clean Water Act of 1972 established the National Pollutant Discharge Elimination System, a program intended to limit the quantity of pollutants infiltrating the water supply of streams, rivers and bays all across the country. DEQ implements and administers this program as the Virginia Pollutant Discharge Elimination System (VPDES). The agency monitors all point source discharges to surface waters, dischargers of stormwater from Municipal Separate Storm Sewer Systems (MS4s), as well as dischargers of stormwater from industrial activities.

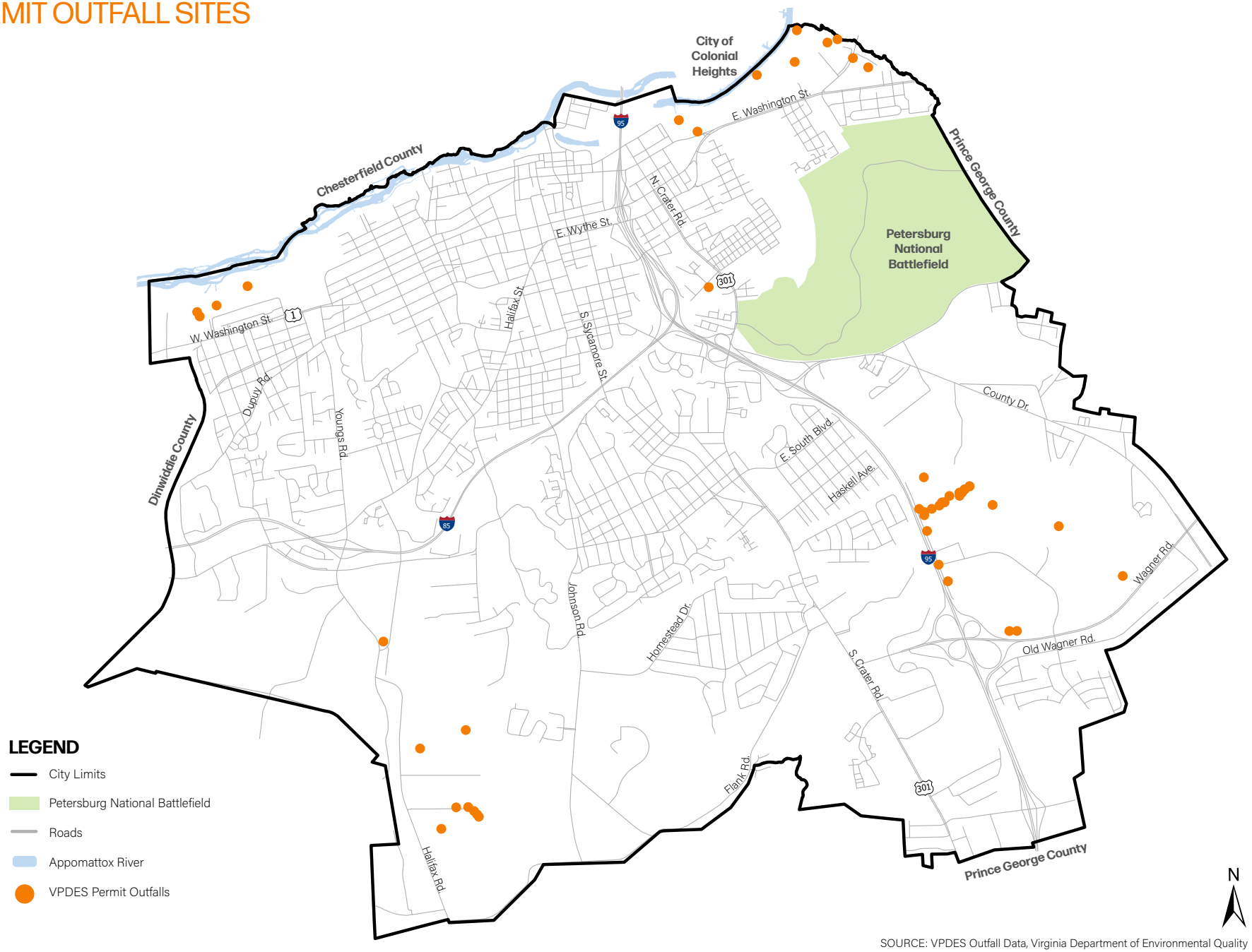
To better regulate potential point source pollution, DEQ issues individual permits to municipal and industrial facilities alike. These can be industrial sites, large gas stations, hospitals, water treatment facilities, large schools, or any number of other facilities that pose a documented or potential danger to the local environment. There is one major VPDES site within Petersburg's city limits: the SCWWA facility at 900 Magazine Road. Minor VPDES sites within City limits include 49 outfalls at 14 sites (Map 8.6). Knowing where discharges occur near water bodies can help identify pollution sources of impaired waterways, groundwater, and the potable water supply.

Table 8.4 | VPDES Permit Outfall Sites

ID	Facility Name	Address
1	Allan Myers Petersburg Asphalt Plant	2070 Bessemer Rd.
2	AMPAC Fine Chemicals	2820 Normandy Dr.
3	Amsted Rail Company	2580 Frontage Rd.
4	Atlantic Iron and Metal	36 Mill Rd.
5	Barksdale Oils, Inc.	1041 E. Bank St.
6	BleachTech	3501 Halifax Rd.
7	Boars Head Provisions Company Inc - Petersburg	1950 Industrial Pl.
8	Dominion Chemical Company	2050 Puddledock Rd.
9	International Paper	2333 Wells Rd.
10	Norfolk Southern Automotive Distribution Center	999 Wagner Rd.
11	Norfolk Southern Thoroughbred Bulk Transfer Terminal	1381 E. Washington St.
12	South Central Wastewater Authority	900 Magazine Rd.
13	Tri City Regional Disposal and Recycling Services	390 Industrial Dr.
14	Valmont Coatings Virgina Galvanizing	3535 Halifax Rd.
15	Virginia Abrasives	2700 Normandy Dr.

SOURCE: VPDES Outfall Data, Virginia Department of Environmental Quality

MAP 8.6 | POTENTIAL POLLUTION SOURCES - VPDES PERMIT OUTFALL SITES



SOURCE: VPDES Outfall Data, Virginia Department of Environmental Quality

BROWNFIELDS AND SITE REMEDIATION

Brownfields are properties in which redevelopment or reuse is made difficult by the presence of hazardous materials, pollution, or contaminants. In 2000, the U.S. Environmental Protection Agency (EPA) assessed City-owned brownfields on Commerce Street and High Street, eventually awarding Petersburg a $200,000 grant to revitalize these areas. Since then, these former industrial sites have been adaptively reused for multi-family housing. Redevelopment of brownfields such as these improves the economic viability of Petersburg's historic core, helps remediate blight, and improves the environmental quality of the Appomattox River.

The Titmus Optical site, Brenco site, and Columbia Gas Sites were all part of the Voluntary Remediation Program (VRP). This program encourages hazardous substance cleanups that might not otherwise take place, and represents a way for site owners or operators to voluntarily address contamination sites with support from DEQ. The main objectives of the program are site redevelopment and enhanced environmental outcomes. The program is not intended to serve as an alternative to or refuge from applicable laws but rather a means for site owners and operates to measure and redress past damage.

When remediation is properly completed, DEQ issues a Satisfactory Completion of Remediation certificate. This certification provides assurance that the remediated site will not become subject to DEQ enforcement action later, provided new issues are not discovered. The program eases the sale and reuse of industrial and commercial properties across Virginia, providing economic benefits to communities. Participation in the program additionally decreases potential environmental liabilities of reusing or further developing extant commercial properties. The Titmus Optical and Brenco sites have both received certificates of completion, while the Columbia Gas site is still enrolled in the program.

Brenco

Titmus Optical

Columbia Gas

Titmus Optical

The Titmus Optical Company was founded in 1908 and was initially a glasses and jewelry store with a small area for manufacturing lenses in the back. By 1927, a factory was established for full-time manufacturing of eyewear products. Additional expansions over the next several decades resulted in a sprawling complex comprised of 24 interconnected buildings totaling approximately 208,000 square feet. Upon taking ownership of the site in 1995, the City of Petersburg conducted an Environmental Site Assessment (ESA), which identified trichloroethene and its degradation products in the site's groundwater. A manmade chemical, trichloroethene is used as a solvent for various industrial and chemical uses. Once used as a sedative, it dulls neurochemical processes for eight hours upon inhalation (evaporating into the air at room temperature). Studies strongly suggest that long-term contact could have serious negative health effects, especially for pregnant women.

A year later, the Titmus building was classified as site #00148 in Virginia's Voluntary Remediation Program. After additional investigation, DEQ determined the contamination of the site's groundwater did not present a danger to the surrounding water system and issued the Titmus building its first certificate of completion for the VRP on September 4th, 1996, under the condition that the site's groundwater be strictly prohibited from use as drinking water.

In 2009, developers began to explore the possibility of converting sections of the Titmus building into loft apartments. Residential use carries a higher bar for investigation of potential environmental dangers, so an even more thorough investigation than what had occurred previously was required. This survey discovered arsenic, silver, chromium, lead, naphthalene, and the previously detected trichloroethene in the soil at levels potentially harmful to human habitation. To mitigate the risk posed by these materials, DEQ mandated the installation of vapor mitigation systems that would prevent the dangerous materials in the air from accumulating to levels hazardous for the building's residents. These devices were installed in early 2010, and in August 2011, the site received its second VRP certificate.

Brenco

Amsted Rail Company's Brenco Division has been operating in Petersburg since 1949. A manufacturer of railroad components, Brenco's presence reflects Petersburg's historic importance as a railroad hub. While the company's main property is at 2580 Frontage Road, the company also possesses a property at 1964 Puddledock Road that served as a manufacturing facility and warehouse, ceasing active operations in 1970 (though continuing to operate as a warehouse until the late 2000s). In 1994, Brenco contracted a consulting firm to determine the extent of environmental damage on the site, which proceeded to discover quantities of lead, cadmium, barium, chromium, and other potentially harmful materials in the copious amounts of waste material stored at the site, though only lead was discovered in quantities exceeding the EPA's toxicity thresholds.

Brenco mitigated the lead contamination by mixing 20% to 25% Cement Kiln Dust (CKD) as a stabilizing agent to the lead contaminant waste material. To avoid any groundwater contamination during this process, the Puddledock site was dewatered through a series of specially built wells, allowing the excavation of the waste material to proceed with no danger of contamination. During the stabilization process, Brenco utilized 12,766 tons of CKD to stabilize 62,078 tons of contaminated material, which was then sent to a nearby landfill. After the completion of this endeavor, the site received its VRP certificate from DEQ.

Columbia Gas Company

Before natural gas became widely available through the interstate pipeline system, it was manufactured from coal and/or oil at a gas plant in many communities. Petersburg's old gas plant fulfilled this role until approximately the mid-20th century, when new energy sources and improved natural gas infrastructure rendered the plant's business model obsolete. The old plant was later acquired by Columbia Gas. Columbia Gas never operated the plant in its traditional capacity, but in 1993, it was discovered that some residual contaminants of the old gas plant were affecting the environment. Further investigation revealed that residuals from the former gas operations had affected soils and groundwater, with pollution going into adjacent Lieutenant Run.

Coal tar was the primary gas manufacturing byproduct of the old plant's industrial model. When the plant was in production, the tar was sold for use in roofing and in road tar. Once the plant closed, some tar was left on the property in underground structures. Over time, residual elements of this tar had leaked out of their containment and migrated as far as Bank Street, where they threatened underground utility lines such as gas, water, sewer, and communications cables. To counter this, Columbia Gas has since removed or cleaned gas plant residuals from underground structures, halted the seepage into the creek by excavation of affected bank material and placement of loose stone, and placed clean soil over portions of its property. Although these steps greatly lessened the danger the former plant posed to the groundwater, Columbia Gas must address sources of gas plant residues deeper in the subsurface, including under Bank Street, in order to receive full VRP certification. This is due the fact that there are concerns that these gas plant residues could prove a danger to utility workers conducting repairs.

Aerial view of Columbia Gas site

COASTAL ZONE MANAGEMENT

The Virginia Coastal Zone Management (CZM) Program is a **network of state agencies and coastal localities that implement state coastal protection laws**. It works to **protect, restore and strengthen Virginia's coastal ecosystems and economy**. DEQ serves as its lead agency. The program is funded by the National Oceanic and Atmospheric Administration's (NOAA) Office for Coastal Management under the federal Coastal Zone Management Act. Since 1986, this program has worked with local partners and funded scores of projects on Virginia's Eastern Shore including eelgrass, oyster, bay scallop and songbird habitat restoration; acquisition of critical coastal habitat for migratory birds; construction of ecotourism infrastructure; and development of special area management plans.

Petersburg is **an active participant** in the CZM Program through **collaboration with the Crater Planning District Commission and other Crater-region localities** in the Coastal Zone, along with numerous stakeholders including area nonprofits and state agencies. City staff and these stakeholders meet monthly to discuss progress towards CZM goals, local and regional resilience priorities, grant opportunities, policy options, and hazard mitigation, especially in regards to flooding.

COASTAL RESOURCE MANAGEMENT

Coastal ecosystems reside where the land and water meet and are naturally very complex. They perform a vast array of functions by way of shoreline stabilization, improved water quality, and habitat for fish and aquatic life; from which humans derive direct and indirect benefits.

The science behind coastal ecosystem resource management has revealed that traditional resource management practices limit the ability of the coastal ecosystem to perform many of these essential functions. The loss of these services has already been noted throughout coastal communities in Virginia as a result of development in coastal zone areas coupled with common erosion control practices. Beaches and dunes are diminishing due to a reduction in a natural sediment supply. Wetlands are drowning in place as sea level rises and barriers to inland migration have been created by construction of bulkheads and revetments. There is great concern in Virginia that the continued armoring of shorelines and construction within the coastal area will threaten the long-term sustainability of coastal ecosystems under current and projected sea level rise.

In the 1980s, interest arose in the use of planted wetlands to provide natural shoreline erosion control. Today, a full spectrum of living shoreline design options is available to address the various energy settings and erosion problems found. Depending on the site characteristics, they range from marsh plantings to the use of rock sills in combination with beach nourishment.

Research continues to support that these approaches combat shoreline erosion, minimize impacts to the natural coastal ecosystem and reinforce the principle that an integrated approach for managing tidal shorelines enhances the probability that the resources will be sustained. Therefore, adoption of new guidance and shoreline best management practices for coastal communities is now necessary to insure that functions performed by coastal ecosystems will be preserved and the benefits derived by humans from coastal ecosystems will be maintained into the future.

Streambanks & Shoreline Erosion

Erosion along river and stream banks can negatively impact Petersburg's land and water resources. Sediments carried into waterways after heavy rains can clog natural ecosystems and introduce excess nutrients and pollutants, further damaging delicate habitats. Structures built nearby are also susceptible to damage as the ground gradually erodes into the waterway. Streambank erosion is exacerbated by the destruction of vegetation on riverbanks and the removal of sand and gravel from the stream bed. Ideally, rivers and streams should have gently sloping and fully vegetated banks.

Where shoreline stabilization is necessary, a full spectrum of living shoreline design options is available. Depending on the site characteristics, they range from marsh plantings to the use of rock sills in combination with beach nourishment. Living shoreline approaches combat shoreline erosion, minimize impacts to the natural coastal ecosystem, and reinforce the principle that an integrated approach for managing tidal shorelines enhances the probability that the resources will be sustained. Use of these approaches is reinforced by 2020 state legislation changes that acknowledge living shorelines as the primary method for stabilizing shorelines.

SHORELINE MANAGEMENT

In 2011, the Virginia Assembly passed legislation to amend Code of Virginia Section 28.2-1100 and Section 28.2-104.1 and added Section §15.2-2223.2 to codify a **new directive for shoreline management in Tidewater Virginia**. In accordance with Section 15.2-2223.2, all local governments are required to include in the next revision of their comprehensive plan guidance prepared by the Virginia Institute of Marine Science (VIMS) regarding coastal resource management and, more specifically, guidance for the appropriate selection of living shoreline management practices. The legislation establishes the policy that living shorelines are the preferred alternative for stabilizing eroding shorelines.

This guidance, known as **Comprehensive Coastal Resource Management Guidance**, is being prepared by VIMS for localities within the Tidewater region of Virginia and shared through their Comprehensive Coastal Resources Management Portal (CCRMP). It outlines **where and what new shoreline best management practices should be considered, and where coastal modifications are necessary to reduce shoreline erosion and protect our fragile coastal ecosystems**. This guidance includes a full spectrum of appropriate management options which can be used by local governments for site-specific application and consideration of cumulative shoreline impacts. The guidance applies a decision-tree method using a based resource mapping database that will be updated from time to time, and a digital geographic information system model created by VIMS.

Click here to learn more!

An informal study performed in May 2021 identified three potential areas of erosion along the Appomattox River, as noted in Map 8.7. These sites were differentiated by the level of vegetation listed in the Center for Coastal Resource Management's (CCRM) GIS tool.

- **Site A**, on the west side of Pocahontas Island, was noted as having partial vegetation along the riverbank. Erosion characteristics include dry cracked soil, exposed tree roots, severely overhanging riverbank, and brown water with vegetation floating in the current.
- **Site B**, under the I-95 bridge, is located between an area noted as having partial vegetation and an area noted as having total vegetation. Erosion characteristics include flat "beachy" riverbank with some overhang, dry sandy soil, and some exposed plant roots.
- **Site C** was near an area the CCRM identified as having total vegetation along the riverbank. Erosion characteristics include greatly reduced riverbank overhang, moist smooth soil, and reduced grass and soil in water.

STORMWATER MANAGEMENT

Stormwater runoff is the water that flows off of roofs, driveways, parking lots, streets, and other hard - or impervious - surfaces during rain events. Water that is not absorbed into the ground flows as runoff into ditches, culverts, catch basins and storm sewers, and can enter local waterways without treatment for volume, sediments, and/or pollutants. Pollutants carried by stormwater runoff can include fertilizers, pesticides, pet waste, sediments, oils, salts, trace metals, and trash.

Stormwater runoff needs to be managed just as any other natural resource in order to maintain the quality of Petersburg's rivers and lakes. Stormwater also needs to be managed to minimize damage that may occur when stormwater runoff exceeds the capacity of the pipes and open channels used to carry stormwater to the City's rivers and streams.

A high concentration of impervious surfaces such as pavement and buildings can exacerbate runoff issues. Research by the Center for Watershed Protection has revealed a strong relationship between impervious surfaces and local water quality. When natural land is converted into impervious cover, a greater fraction of annual rainfall is converted into surface water runoff and a smaller volume is able to infiltrate into the soil and recharge groundwater aquifers. This increased surface runoff volume causes higher peak flows that can erode stream channels and lower the baseflow of local waterways, resulting in habitat degradation.

Historically, Petersburg has performed maintenance of the stormwater collection system, which includes cleaning, repair, and replacement of the City's stormwater infrastructure; however, in 2014 the City was designated a Phase II Municipal Separate Storm Sewer System (MS4) by DEQ. This designation was also given to other Virginia localities of similar size having a storm sewer system that discharges – directly or indirectly – to a protected river, bay, or other body of water. As a Phase II MS4, the City is responsible for stormwater discharges to receiving waters through an MS4 (VPDES) General Permit administered by DEQ.

MAP 8.7 | SHORELINE EROSION

SOURCE: City of Petersburg

The permit requirements are very extensive, generally covering six areas called Minimum Control Measures:

- Public education and outreach
- Public participation
- Illicit discharge detection and elimination
- Construction site stormwater runoff control
- Post-construction stormwater management in new development and development on previously developed lands
- Pollution prevention/good housekeeping for municipal operations

Petersburg passed a Stormwater Management Ordinance in 2014 in compliance with state legislation mandating the establishment of a local stormwater management program. As part of its stormwater management program, the City operates and maintains drainage facilities located within the public right-of-way or public easements, and is also responsible for the water quality of natural streams as designed by Virginia and the EPA. However, it does not maintain facilities that are located on private property or that are controlled by other jurisdictions.

INFRASTRUCTURE AND THE ENVIRONMENT

Historically, communities have used **gray infrastructure** – systems of gutters, pipes, and tunnels – to move stormwater to treatment areas or straight into local waterways. Complications from gray infrastructure include **aging facilities and inadequate capacity to manage large volumes of stormwater**. As an alternative, many communities are turning to **green infrastructure systems**.

Green infrastructure incorporates both the natural environment and engineered systems to **achieve stormwater management that also promotes environmental quality**. On the local level, green infrastructure practices can include **rain gardens, permeable pavement, green roofs, and rainwater harvesting systems**. At the largest scale, the preservation and restoration of natural landscapes are critical components of green infrastructure.

Environmental site design (ESD) involves small-scale stormwater management practices, non-structural practices, and better site planning to mimic natural hydrologic runoff characteristics and minimize the impact of land development on water resources. The **low impact development (LID) approach**, which is included in ESD, consists of combining hydrologically-functional site design with pollution prevention measures to reduce site and development impacts and to compensate for the degradation of water quality. The ultimate goal of LID is to maintain a developed site's stormwater runoff, peak runoff rates, and frequency to imitate pre-development runoff conditions at the source, rather than just at the end of pipe treatment. **Use of ESD and LID practices can aid developers in meeting state stormwater requirements while using installations that are more in harmony with the environment.**

FISHERIES, DOCKS, AND PIERS

According to the Virginia Department of Wildlife Resources, the Appomattox River boasts a wide range of fish species, including largemouth and smallmouth bass, Kentucky spotted bass, redbreast sunfish, bluegill, flier, crappie, pickerel, striped bass, and walleye. While there are no commercial fisheries in Petersburg, recreational fishing is permitted at Patton Park, Rotary Park at Pocahontas Island, and Lake Wilcox, as well as City-owned Appomattox Riverside/Ferndale Park in Dinwiddie County. These and other waterfront access points, including docks and piers, are identified in Table 8.5 and Map 8.8.

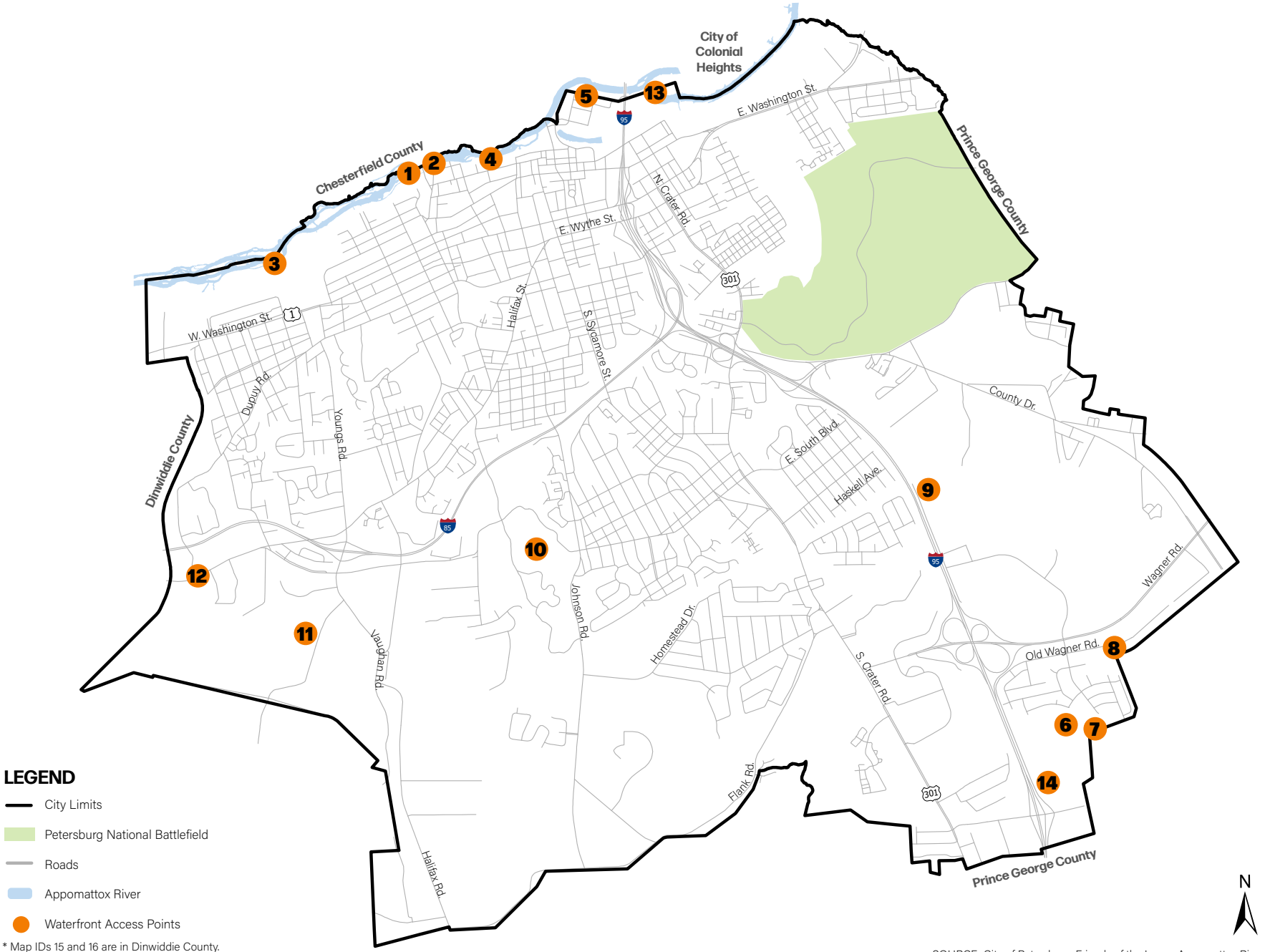
While the number of private docks and piers in Petersburg may be minimal, the cumulative impacts to the surrounding aquatic ecosystem may be significant, particularly in high densities. Virginia's Clean Marina Program can educate private owners on dock and pier dimensions, building materials, and other ways to preserve Virginia's waterways. Clustering development away from shorelines can retain the waterfront area as community open space and provide a community pier. Larger minimum lot sizes for waterfront property can reduce the concentration of piers and docks and thereby disperse their impact. All relevant state and federal regulations should be referenced when siting new docks and piers.

Table 8.5 | Waterfront Access Points

Map ID	Facility Name	Location	Owner	Open/ Accessible to Public?
1	Battersea bridges	Appomattox River near 540 University Blvd. & 527 University Blvd.	City of Petersburg	Yes
2	Unimproved kayak launch	Appomattox River near 527 University Blvd.	City of Petersburg	Yes
3	Unimproved waterfront trail	Appomattox River from University Blvd. to City limits (Dinwiddie County)	City of Petersburg	Yes
4	Harvell Dam (former site)	Appomattox River, 620 Johnson Lane	City of Petersburg	No
5	Natural canoe/kayak launch	Appomattox River, Rotary Park on Pocahontas Island	City of Petersburg	Yes
6	Boathouse on lake	Near Berkeley Manor Park	Berkeley Estate Holding Company LLC	No
7	Square concrete dock on lake	Berkeley Manor Park	City of Petersburg	Yes
8	Private pond access	Private residence, Old Wagner Road	Private	No
9	Dock on Blackwater Swamp	Brenco, Frontage Road	Brenco Inc.	No
10	Dock/ramp	Wilcox Lake	City of Petersburg	Yes
11	Dock/boat house	Private residence, Squirrel Level Road	Private	No
12	Dock	Private residence, Boydton Plank Road	Private	No
13	Paved ramp	Appomattox River, SCWWA Plant	South Central Wastewater Authority	No
14	Dock	Private Home, Frontage Road	Private	No
15	Unimproved boat launch to pond/canal	Appomattox Riverside/Ferndale Park (Dinwiddie County)	City of Petersburg	Yes
16	Wooden fishing pier	Appomattox Riverside/Ferndale Park (Dinwiddie County)	City of Petersburg	Yes

SOURCE: City of Petersburg, Friends of the Lower Appomattox River

MAP 8.8 | WATERFRONT ACCESS POINTS



SOURCE: City of Petersburg, Friends of the Lower Appomattox River

RESILIENCE AND SUSTAINABILITY

Resilience is the capacity to anticipate threats, reduce the community's vulnerability, and respond to and recover from hazardous events and chronic stresses. A community can be vulnerable as a result of its physical location and infrastructure, particularly as climate change influences more extreme weather patterns. Social factors such as access to transportation or widespread health challenges can also increase vulnerability. A resilient community, on the other hand, is one that is able to adapt, endure, and thrive in the face of change, uncertainty, and adversity. From hurricane preparedness to appropriate land-use policies to infrastructure protection systems, there are many programmatic and planning steps localities can take to increase their resilience.

The Resilience Adaptation Feasibility Tool (RAFT) is a collaborative, community-driven process and full-service tool developed to help Virginia's coastal localities improve resilience to flooding and other coastal storm hazards while thriving both economically and socially. Originally launched in 2015, the project is a partnership between the Institute for Engagement & Negotiation at the University of Virginia (UVA), the Institute for Coastal Adaptation and Resilience at Old Dominion University (ODU), and the Center for Coastal Studies at Virginia Tech (VT). The RAFT Scorecard aims to help localities become proactive in increasing their resilience to coastal storm hazards. Petersburg is one of 30 localities and tribes evaluated with The RAFT Scorecard. Petersburg's RAFT Scorecard rates the city at 46 out of a possible 100. A score below 50 indicates "Low Resilience" with many opportunities for improvement.

To improve resilience potential, Petersburg should focus on priorities in the following areas:

- Incorporate all Petersburg residents into resilience planning efforts.
- Diversify Petersburg's economic base.
- Develop landscape plans and standards to protect and expand urban green spaces while mitigating the water quality, air quality, and heat impacts of development.
- Connect people to goods and services, as well as critical infrastructure through transit and broadband.

Figure 8.1 | The Resilience Cycle

SOURCE: Petersburg RAFT Scorecard 2022

FEMA'S COMMUNITY RATING SYSTEM

All homes and business owners in high-risk areas with mortgages from federally regulated or insured lenders are required to buy flood insurance. Flood insurance is recommended for all property owners and renters in moderate- to low-risk areas, although not federally required. The Community Rating System (CRS) is **a voluntary incentive program that recognizes and encourages community floodplain management practices that exceed the minimum requirements of the National Flood Insurance Program (NFIP)**. The three goals of the CRS program include:

- Reducing and avoiding flood damage to insurable property;
- Strengthening and supporting the insurance aspects of the National Flood Insurance Program; and
- Fostering comprehensive floodplain management.

Over 1,500 communities participate nationwide. In CRS communities, **flood insurance premium rates are discounted to reflect the reduced flood risk resulting from the community's efforts.** Potential community discounts on premiums **range from 5% to 45%**.

Flooding

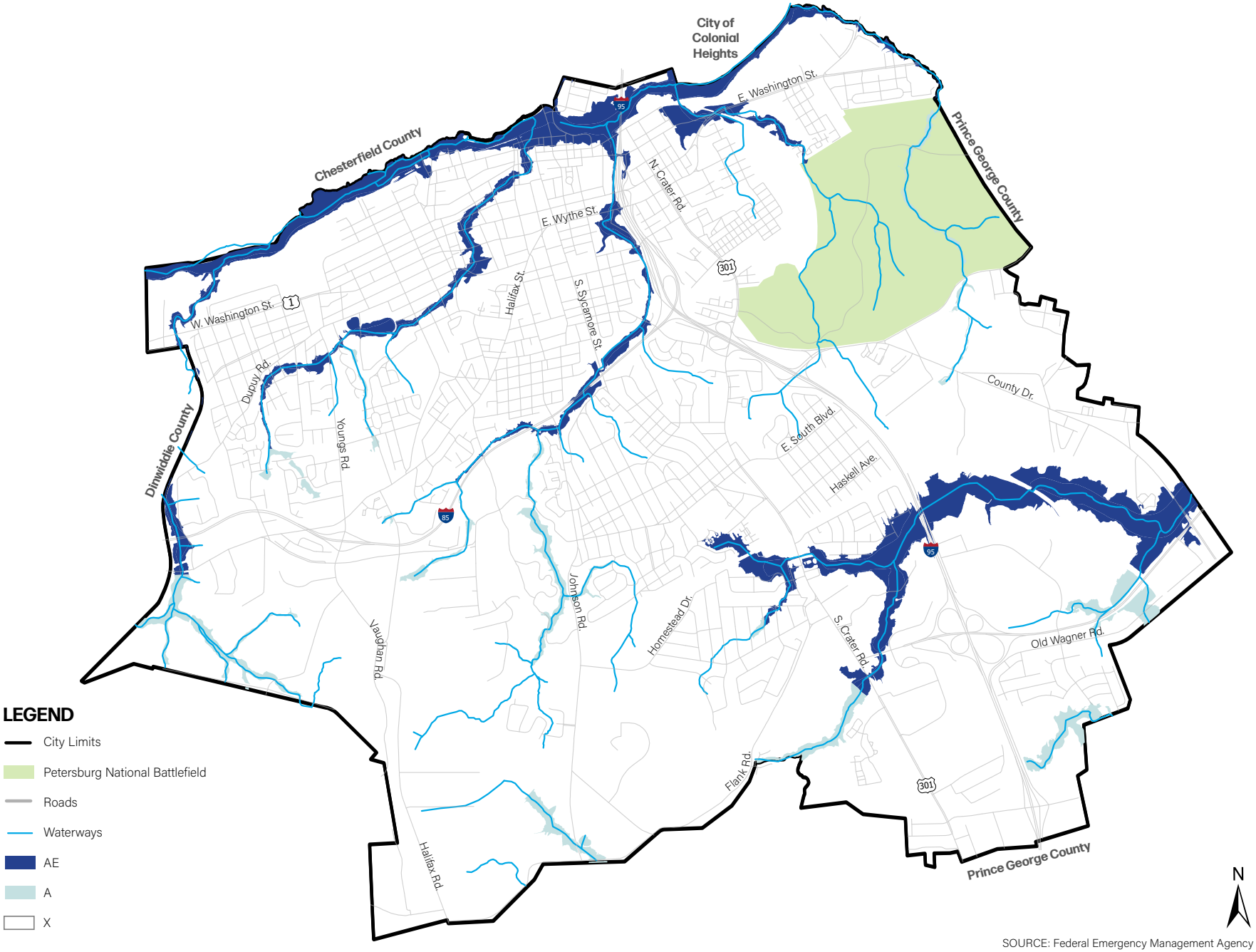
Petersburg contains tidal and tributary floodplains adjacent to rivers and streams (Map 8.9). These important floodplain areas help reduce the impacts of flooding by slowing and temporarily storing floodwaters during large storm events. Floodplain areas are protected from activities that would degrade their usefulness as a flood conveyance system. The primary way this is accomplished is through the City's Floodplain Management Ordinance (City Code Chapter 58, Article II). These regulations establish the criteria by which development is either allowed or prohibited in the floodplain, with the intent of preventing or minimizing the loss of life and property.

Local dams can also pose a flooding risk should there be a dam break. The Virginia Dam Safety Act and Virginia Impounding Structure Regulations require that precautionary measures are taken for new development proposed within mapped dam break inundation zones. If the state determines that a proposed plan of development would change the spillway design of an existing dam, the locality shall not permit the development to move forward within the mapped dam break inundation zone unless the developer agrees to alter the plan so that it does not alter the spillway design of the dam, or the developer contributes payment necessary to upgrade the dam structure. State statutes also outline requirements for new dam or water impoundment facility proposals.

Knowing which areas of the city are susceptible to flooding is crucial for wisely planning future development. Having clear information on where flooding can be expected helps property owners take proper steps to flood-proof their buildings, helps insurance agencies assess rates, and offers builders insight on potential building restrictions and standards. Petersburg can further assist landowners by participating in the Federal Emergency Management Agency's (FEMA) Community Rating System to improve floodplain management practices and reduce local flood insurance premiums.

Appendix D includes additional information related to flooding and floodplain management throughout Petersburg.

MAP 8.9 | FLOOD HAZARD AREAS



SOURCE: Federal Emergency Management Agency

Sea Level Rise

Sea level rise is primarily caused by water being added to oceans through the melting of ice sheets and glaciers, as well as the expansion of seawater as it warms. Other causes can include ground settling, upstream flood control, erosion, and regional ocean currents. While Petersburg is inland from the Chesapeake Bay and Atlantic Ocean, its location on the tidal Appomattox River means that sea level rise could impact the area in future years. Planning for sea level rise in the form of land use and policy decision making should use estimates of sea level rise that are based on observational data and a range of scenarios for future conditions. Such values can be used to help implement zoning overlay districts or new building requirements.

Adapt Virginia (AdaptVA) is an information gateway and tool provided by Virginia Institute of Marine Science (VIMS) that provides education, data, and resources on climate change adaptation. AdaptVA projections show that by the year 2040, Petersburg could see the Appomattox River rise approximately 1 to 3 feet in the vicinity of Pocahontas Island. This could increase to approximately 3 to 6 feet by 2100. Sea level rise projections should be factored into development regulations and policies, guiding new development away from locations that could experience flooding from sea level rise. Road access to existing properties that could be impacted by sea level rise should also be considered; road improvements and alternative access points should be planned for existing roads that could become submerged due to sea level rise, particularly in the Pocahontas Island area.

Air Quality

Much of the greater Richmond metropolitan region is an ozone non-attainment zone, meaning that air quality has not met National Ambient Air Quality Standards (NAAQS) for ozone. The Ozone Advance program is a collaborative effort between federal, state, and local governments as well as area stakeholders to develop an Action Plan for the region. Action Plans encourage programs and practices that facilitate emission reductions of ozone and fine particulate precursors so that citizens may continue to benefit from health air quality.

Leaders in Virginia and the Richmond-Petersburg area and Virginia developed the Richmond-Petersburg Ozone Advance Action Plan to promote continued good air quality. The Action Plan provides detailed information on the air quality in the Richmond-Petersburg area, along with action items to reduce emissions. Updated reports are submitted annually to DEQ and the EPA. Other local-level actions, such as following traffic reduction measures outlined in Chapter 9 and encouraging compact, pedestrian-oriented development can also go a long way in improving air quality Citywide.

Click here to read the Richmond-Petersburg Area Ozone Advance Action Plan!

Noise Pollution

Noise pollution can negatively impact quality of life. While noise cannot be wholly prevented, especially in a largely urban area such as Petersburg, the highest potential for impactful levels of noise related to land uses can be addressed in the best interests of the community through amendments to the Zoning Ordinance. Examples of use-based performance standards that would serve to limit adverse impacts of noise include maximum decibels, minimum setbacks, enhanced buffering adjacent to residential districts, and hours of operation.

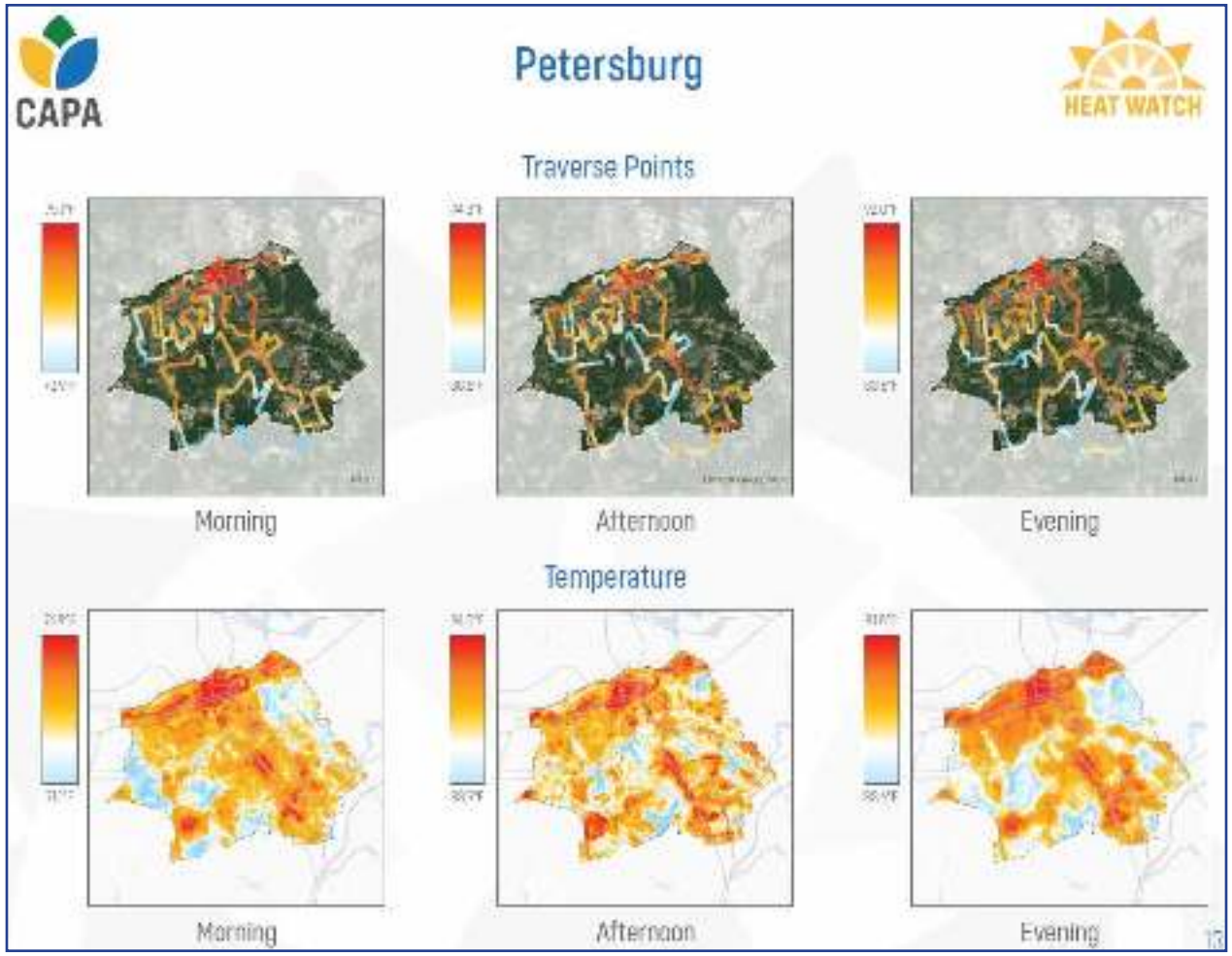
Urban Heat Islands

Heat islands are urbanized areas that experience higher temperatures than outlying areas. The concentration of buildings, roads, and infrastructure that are typical of urban areas absorb and re-emit the sun's heat more than natural landscapes such as forests and water bodies. Average temperatures of heat islands are 1-7°F higher than average during the day and 2-5°F higher than average at night.

Due to the heat island effect, people who live in cities are more at risk for heat-related illnesses than those in suburban or rural areas. Historically inequitable distribution of landcover resulted in more heat-absorbing buildings and surfaces in inner city or lower-income neighborhoods, with little to no relief provided through trees and greenery. Urban heat islands are often linked to demographic factors such as income and race, and also follow historic redlining patterns (see Chapter 4).

Local heat mapping has been published through the Heat Watch Project, a collaborative effort between 12 colleges and universities in Virginia, including Virginia State University (VSU). Heat Watch volunteers collected highly detailed near-surface air temperature data for the purpose of correlating land characteristics such as asphalt parking lots, community green spaces, and topography to

Figure 8.2 | Petersburg Urban Heat Data



SOURCE: CAPA Heat Watch Program and Dr. Sarah M. Witiak, Virginia State University

Petersburg Sports Complex

temperatures. In Petersburg, areas with the highest temperatures correlate to areas lacking tree canopy. Increasing tree and vegetation cover lowers surface and air temperatures by providing shade and cooling. Trees and vegetation can also reduce stormwater runoff and protect against erosion. City-wide efforts to plant more trees, with priority focused on areas with the highest temperatures, can be bolstered by grant programs focused on increasing urban tree growth.

The Virginia Department of Forestry, in cooperation with the U.S. Department of Agriculture (USDA), offers the Urban and Community Forestry Grant Program. This program encourages local government and citizen involvement in creating and supporting long-term, sustained urban forestry projects and programs at the local level. Matching grants up to $50,000 and non-matching grants up to $250,000 are possible. Project categories include:

- Extreme heat mitigation
- Support for local government programs
- Tree maintenance and invasive plant removal
- Workforce development programs
- Demonstration projects
- Non-profit organization support
- Planning and education

Petersburg should also pursue Tree City USA recognition, which provides communities with a four-step framework to maintain and grow their tree cover:

- Maintain a tree board or department
- Adopt a community tree ordinance
- Spend at least $2 per capita on urban forestry annually (approximately $66,800 for Petersburg)
- Celebrate Arbor Day

Click here to explore the Petersburg Heat Watch Interactive Map!

What Is Environmental Justice?

Communities have the right to live and thrive in safe, healthy environments with equal environmental protections and meaningful citizen involvement in equitable development. Environmental justice (EJ) seeks to eliminate the negative impacts of environmental health hazards on low-income and Black, Indigenous, and people of color (BIPOC) communities. Residents of unrepresented neighborhoods have been systemically disregarded in land use planning processes, allowing them to live, work, and play in close proximity to major pollution sources such as waste treatment plants, landfills, industrial facilities, fuel pipelines, and road infrastructure. These communities have also historically received less investment in trees and urban green spaces, recreation areas with shade, stormwater infrastructure, and safe multimodal transportation options, which have all contributed to health outcomes of higher disease rates and lower life expectancy.

Addressing past injustices and deconstructing systems that continue to permit, or even encourage, environmental inequities start with land use decisions. Equitable development is a place-based approach for encouraging environmental justice, woven with goals of affordable housing, accessible transportation networks, and community revitalization. To help address environmental inequities in pursuit of equitable development, Petersburg will:

- Have regular, meaningful public engagement to stay in tune with the evolving needs of the community, including holding neighborhood meetings to get feedback on major development proposals.
- Review the Zoning Ordinance for opportunities to strengthen buffer, screening, and setback standards of industrial districts to protect surrounding residences and environmental features.
- Creatively repurpose unused buildings for affordable housing, community hubs, and community-based services.
- Incorporate considerations for resilience and hazard mitigation in infrastructure improvements and priorities, particularly in flood-prone areas.
- Proactively monitor the status of known and potentially hazardous sites, and pursue funding for site remediation when needed.

Reducing Energy Consumption and Promoting Renewable Energy

According to the EPA, nearly one-third of the energy used to run typical government buildings goes to waste. Incorporating energy management strategies to improve energy efficiency can lower energy costs and help reduce greenhouse gas emissions. The Energy Star program provides free tools to help local governments identify and assess existing buildings for efficient energy management, and to make goals to improve long-term energy use:

- **Environmental:** Increased efficiency can lower greenhouse gas emissions and other pollutants, as well as decrease water use.
- **Economic:** Improving energy efficiency can lower individual utility bills, create jobs, and help stabilize electricity prices and volatility.
- **Utility System Benefits:** Energy efficiency can provide long-term benefits by lowering overall electricity demand, thus reducing the need to invest in new electricity generation and transmission infrastructure.
- **Risk Management:** Energy efficiency also helps diversify utility resource portfolios and can be a hedge against uncertainty associated with fluctuating fuel prices.

There may also be opportunities to install urban solar facilities throughout the city. These facilities can be incorporated onto buildings and rooftops, unused parking lots, or on brownfield sites, among others. By repurposing these spaces for solar panels, Petersburg can maximize its energy generation capacity without encroaching on valuable ecosystems. Urban solar facilities reduce the carbon emissions associated with traditional energy sources. According to a study conducted by the International Renewable Energy Agency (IREA), every megawatt-hour of solar energy generated avoids approximately 600 kilograms of CO_2 emissions. Implementing solar farms on a large scale can significantly contribute to achieving carbon neutrality targets set by cities globally.

The SolSmart program can help guide Petersburg's progress in urban solar energy leadership. SolSmart provides no-cost technical assistance to help local governments follow national best practices to expand solar energy use in their jurisdictions. These communities are recognized at Bronze, Silver, Gold, and Platinum designations after implementing requirements related to permitting and inspections, planning and zoning, government operations, community engagement, and market development. The Zoning Ordinance, along with related permits and policies, should be reviewed and updated to maximize solar potential in Petersburg, at a scale that complements the established community character.

In 2019, Petersburg joined the Commercial Property Assessed Clean Energy (C-PACE) Program. C-PACE is an innovative clean energy financing tool that provides 100% upfront capital to property owners who want to upgrade their commercial and multi-family buildings with energy efficiency, renewable energy, and water management systems. The Virginia PACE Authority administers the program for Petersburg.

C-PACE uses unique financing methods to allow more projects to incorporate energy improvements and principles of green development. Click here to learn more about the C-PACE program!

Natural Hazards

Natural hazards such as severe storms, tornadoes, and flooding can occur with little warning. Climate change can exacerbate these issues with higher temperatures, stronger storms, and changing weather patterns. The impacts to resident safety, property, the economy, and quality of life can be substantial. Hazard mitigation planning is a process undertaken to reduce the loss of life and property by lessening the potential impact of future disasters.

Petersburg collaborates with the Crater Planning District Commission (CPDC) on the regional Richmond-Crater Multi-Region Hazard Mitigation Plan (HMP). The HMP helps ensure the region is poised to minimize the disruption which often accompanies disasters, thereby increasing resilience.

Hazard Mitigation Plan Strategies for Petersburg

- Complete application for StormReady Program.
- Continue participating in the National Flood Insurance Program, including enforcement of zoning and building codes.
- Work with VDOT, private utilities, and/or private homeowners to trim, remove, and/or add trees where appropriate.
- Partner with parent-teacher associations and local schools to implement existing curriculum related to natural hazards.
- Distribute brochures and use other means to educate the public regarding preparedness and mitigation.
- Consider participating in FEMA's Community Rating System.
- Conduct regular review of repetitive loss and severe repetitive flood loss properties from FEMA.
- Inspect and clear debris from stormwater drainage system. Partner with VDOT to ensure non-City owned ROWs are also clear.
- Install quick connects for generators at critical facilities. Ensure existing generators are working at all times with regular maintenance & inspections.
- Finish implementation of Reverse 911 system.
- Work with state partners and neighboring localities to monitor and implement Next Generation 911 GIS data standards.
- Install high water mark signage along bridges and other structures to indicate dangerous water levels along creeks and rivers in flood-prone areas.
- Protect public and private structures from natural hazard damage, including acquiring, relocating, retrofitting or elevating floodprone property.
- Investigate all public utility lines to evaluate their resistance to flood, wind, and winter storm hazards.
- Use available statewide, regional, or county advanced warning systems and associated resources to prepare in case of a hazard event.

SOURCE: Crater Planning District Commission and PlanRVA

Resilience Plan

As part of requirements per the Grant Manual for the Virginia Community Flood Preparedness Fund, a resilience plan was developed for Petersburg and includes the following elements:

- Projects focused on flood control and resilience.
- Nature-based infrastructure to the maximum extent possible.
- Considerations of all parts of a locality regardless of socioeconomics or race.
- Coordination with other local and inter-jurisdictional projects, plans, and activities and aclearly articulated phasing for plan implementation.
- Data based on the best available science, incorporating climate change, sea level rise, storm surge (where appropriate), and current flood maps.

The Resilience Plan also incorporates several regional plans by reference, including the Richmond-Crater Multi-Regional Hazard Mitigation Plan. This plan, and other associated plans, should be considered when implementing priorities and strategies for water quality, flooding, resilience, and hazard mitigation planning.

Harbor Redevelopment

The Petersburg Harbor along the Appomattox River was a bustling center of trade for nearly 300 years, from the mid-1600s until the early 1900s. The Harbor boasted factories, wharves, barges, and leisure craft, and transported cargo (primarily tobacco products) throughout the region. While few remnants of the once-thriving harbor exist today, its strategic location linking Old Towne to the waterfront brings fresh opportunities for redevelopment and public-private partnerships, particularly as an outdoor venue and event space for festivals and community gatherings.

Progress on the Harbor redevelopment must be mindful of environmental impacts. Dredging of the riverbed in the past has uncovered hazardous materials, which need to be recovered and properly disposed of. Development plans should incorporate best practices for banks and shorelines to stabilize any sensitive areas, encourage native vegetation, and protect the riverbank from future degradation. As discussed in this Chapter and in Appendix D, implementing these measures to protect water quality and prevent shoreline erosion is vital to the health of the Appomattox River and surrounding ecosystems.

Celebrating and Protecting Our Natural Resources and Environment

Goal Statement: Petersburg will commit to fostering resilience, community wellness, and quality of life through protecting and enhancing its natural resources.	
Objectives	**Strategies**
8.1 Protect local water quality and the Chesapeake Bay through enforcement of the Chesapeake Bay Preservation Area (CBPA) ordinance.	8.1.1.: Annually review the CBPA ordinance to incorporate new best practices and state code requirements.
	8.1.2: Review and implement Total Maximum Daily Load (TMDL) Action Plans to address water quality improvements for local impaired waterbodies. Update Action Plans as needed to meet ongoing TMDL requirements.
	8.1.3: Track progress and implementation of all projects described in the Water Quality Master Plan, and any revisions thereof.
	8.1.4 Address water quality concerns by continuing to require Water Quality Impact Assessments (WQIAs) for any proposed land disturbance, development, or redevelopment location within Resource Protection Areas (RPA), or within Resource Management Areas that will impact the RPA.
8.2 Proactively protect waterways, groundwater, and sensitive environments through best practices and site design.	8.2.1: Amend the Zoning Ordinance to bolster requirements and incentives to incorporate low impact development and environmental site design into development applications.
	8.2.2: Work with the Virginia Department of Environmental Quality (DEQ), Department of Conservation and Recreation (DCR), and Virginia Department of Health (VDH) to identify existing or potential sources of surface and groundwater pollution and take action to prevent or control the effect of the sources.
	8.2.3: Through coordination with the Virginia Department of Health (VDH), protect water resources from onsite sewage disposal system failure through permitting and regulatory tools, including requiring VDH approval for plats showing onsite systems and requiring septic tanks to be pumped every five years.
	8.2.4: Actively pursue removal or sealing of abandoned underground storage tanks.
	8.2.5: Require submission of environmental inventories in order to protect environmentally sensitive lands; to save or most efficiently use permeable soils; and to limit impervious cover.
	8.2.6: Ensure that water dependent facilities such as docks and piers are located and constructed in an environmentally sensitive manner and include adequate marine sanitation facilities in accordance with federal and state regulations, including but not limited to the Virginia Marine Resources Commission (MRC), the Army Corps of Engineers (USACE), and Virginia Department of Environmental Quality (DEQ).

Objectives	Strategies
8.3 Refer to the guidance presented in Petersburg's Comprehensive Coastal Resource Management Portal (CCRMP) prepared by VIMS to guide regulation and policy decisions regarding coastal resource management and shoreline erosion control.	8.3.1: Utilize VIMS Decision Trees for onsite review and subsequent selection of appropriate erosion control/ shoreline best management practices: http://ccrm.vims.edu/decisiontree/index.html.
	8.3.2: Utilize VIMS' CCRMP Shoreline Best Management Practices for management recommendation for all tidal shorelines in the jurisdiction.
	8.3.3: Require biennual staff training on decision making tools developed by the Center for Coastal Resources Management at VIMS.
	8.3.4: Identify creative public outreach opportunities to educate citizens and stakeholders on new shoreline management strategies, including Living Shorelines.
	8.3.5: Follow the development of integrated shoreline guidance under development by VMRC, and implement any recommended strategies.
	8.3.6: Evaluate the use of a locality-wide regulatory structure to encourage a more integrated approach to shoreline management.
	8.3.7: Evaluate the feasibility of cost share opportunities for construction of living shorelines.
	8.3.8: Preserve available open spaces adjacent to marsh and wetlands to allow for natural protection of water quality, flood mitigation, and the protection of biodiversity and habitat.
	8.3.9: Implement a policy where VIMS' Shoreline Best Management Practices and living shorelines are the recommended adaptation strategies for erosion control in accordance with Code of Virginia § 28.2-104.1. Departures from these recommendations by an applicant wishing to alter the shoreline should use the best available science to show that a living shoreline approach is not suitable.
	8.3.10: In collaboration with the Virginia Department of Environmental Quality (DEQ), implement shoreline erosion mitigation measures at Petersburg's identified shoreline erosion sites.
8.4 Proactively reduce flooding risks to residents and property owners.	8.4.1: Formally participate in the Federal Emergency Management Agency's (FEMA) Community Rating System to implement flood protection policies beyond minimum requirements and earn community discounts on flood insurance premiums.
	8.4.2: Locate new development and critical facilities and infrastructure outside of current flood zones and areas projected to be impacted by sea level rise in the future.
	8.4.3: Annually review the Floodplain Management ordinance to incorporate new best practices and Code of Virginia requirements.
	8.4.4: Provide education and outreach materials on hazard preparedness, flood management, sea level rise, and recommended mitigation steps to homeowners and private businesses.
	8.4.5: Implement recommendations from the Wilcox Lake Dam study to protect the area within the dam break inundation zone.

Objectives	Strategies
8.5 Improve environmental resilience and sustainability efforts to protect residents and property owners from the long-term effects of climate change.	8.5.1: Reduce the heat island effect by proactively installing new native trees throughout the city, with priority areas determined by heat island temperatures using heat mapping data from Virginia State University (VSU) and the Heat Watch project; consider pursuing Tree City USA designation to help implement this strategy.
	8.5.2: Require the use of native plantings in all public landscaping and amend the Zoning Ordinance to provide more specific requirements for landscaping, including prioritizing native species and prohibiting invasive species.
	8.5.3: Amend the Zoning Ordinance to require preservation of the existing mature tree canopy to the extent possible, especially in residential neighborhoods.
	8.5.4: Collaborate with regional partners to proactively implement strategies from Hazard Mitigation Plan, Petersburg Resilience Plan, and Richmond-Petersburg Ozone Advance Action Plan.
	8.5.5: In collaboration with the Crater Planning District Commission, implement regulations to help meet Coastal Zone Management resilience and water resource protection goals.
	8.5.6: Amend the Zoning Ordinance and related policies to encourage siting of solar facilities on rooftops, brownfields, and areas of existing unused impervious surface. Meet SolSmart Bronze goals through the Standard Criteria pathway to help implement this strategy.
	8.5.7: Demonstrate leadership in sustainability by proactively siting and installing solar panels on City-owned municipal buildings.
8.6 Promote public knowledge of and involvement in the City's environmental programs and initiatives.	8.6.1: Create an easily accessible, user-friendly information clearinghouse in both physical and digital formats for environmental regulations and resources, including but not limited to permitting requirements, submittal checklists, frequently asked questions, and grant/program resources.
	8.6.2: Work with Appomattox River Soil and Water Conservation District to annually promote urban/suburban and agricultural cost-share programs available for funding best management practices (BMPs) to improve site-specific water quality/quantity issues.
	8.6.3: Conduct annual public outreach and provide resources for water quality and efficiency best practices, green infrastructure, the responsible use of fertilizer, proper disposal of animal waste, and other actions that conserve water and improve water quality.

09 MOBILITY + TRANSPORTATION

Petersburg's community is equitably connected through a well-designed, well-maintained, and multi-modal regional transportation network.

"**DEVELOP INFRASTRUCTURE** around natural resources to make visitors come..."

- Community Survey Respondent

09

INTRODUCTION

Twenty years from today, Petersburg envisions a vibrant, equitably connected community, recognizing that transportation impacts quality of life, regional connectivity, economic development, and the environment. A well-designed and well-maintained transportation system that provides a variety of transportation modes – including walking, biking, public transportation, and driving – is vital to Petersburg's health. The City prioritizes increasing reliable access to destinations for employment, education, recreation, and socialization as part of providing a safe, equitable, and affordable transportation network.

This chapter focuses on Petersburg's existing transportation network, including an analysis of the trends related to the safety and efficiency of the network. The data presented and analyzed here supports key issues and opportunities related to mobility and transportation and helps to guide objectives and strategies to fulfill Petersburg's existing and future transportation needs. The following principles are intended to guide transportation – and land use – decisions to benefit the residents and visitors of Petersburg:

- Prioritize the needs of the community in establishing and maintaining an interconnected, multi-modal transportation system.
- Preserve and support land use plans, including the Future Land Use Map and small area and neighborhood master plans.
- Improve community health, reduce traffic congestion, and reduce vehicle emissions through walking and biking infrastructure and transit improvements.

COMMUNITY FEEDBACK:
MOBILITY + TRANSPORTATION

- Petersburg's location at the crossroads of Interstates 85, 95, and 295 was identified as one of the City's top strengths.
- Bike lanes and bike parking are both needed Citywide, but especially in Old Towne, at bus stations, and in parks.
- A high percentage of Petersburg residents don't own cars and are suffering from social determinants such as high crime and health challenges that make mobility difficult. Safe transportation alternatives are therefore important investments for this population.
- Survey respondents identified the three most desired transportation improvements in Petersburg as road maintenance, sidewalks and crosswalks, and pedestrian and bicyclist safety.

WHERE ARE WE NOW?

Functional Classification

Petersburg's streets are divided into five categories by the Virginia Department of Transportation (VDOT) based on both the type of service they are intended to provide and how they are currently designed (Map 9.1):

- **Local Street:** Provides direct access to adjacent land uses and does not carry through-movement traffic. High pedestrian and biking volumes are anticipated.

- **Collectors:** Collectors gather and funnel traffic from local roads to arterials. Collectors often serve large residential and shopping areas. Pedestrian, bicycle, transit, and vehicular activity are all anticipated.

- **Minor Arterials:** Interconnect larger arterials while carrying moderate trip travel at higher speeds than collectors. Pedestrian and bicycle activity may be expected and will necessitate intentional design to ensure safety and comfort.

- **Principal Arterials:** Provide a high degree of vehicular mobility for shorter distances of travel through urban centers and rural areas.

- **Interstate Highways:** Designed to be fully access controlled, while serving the highest vehicular traffic volumes traveling long distances. Freight activity expected. Pedestrian and bicycle access is prohibited.

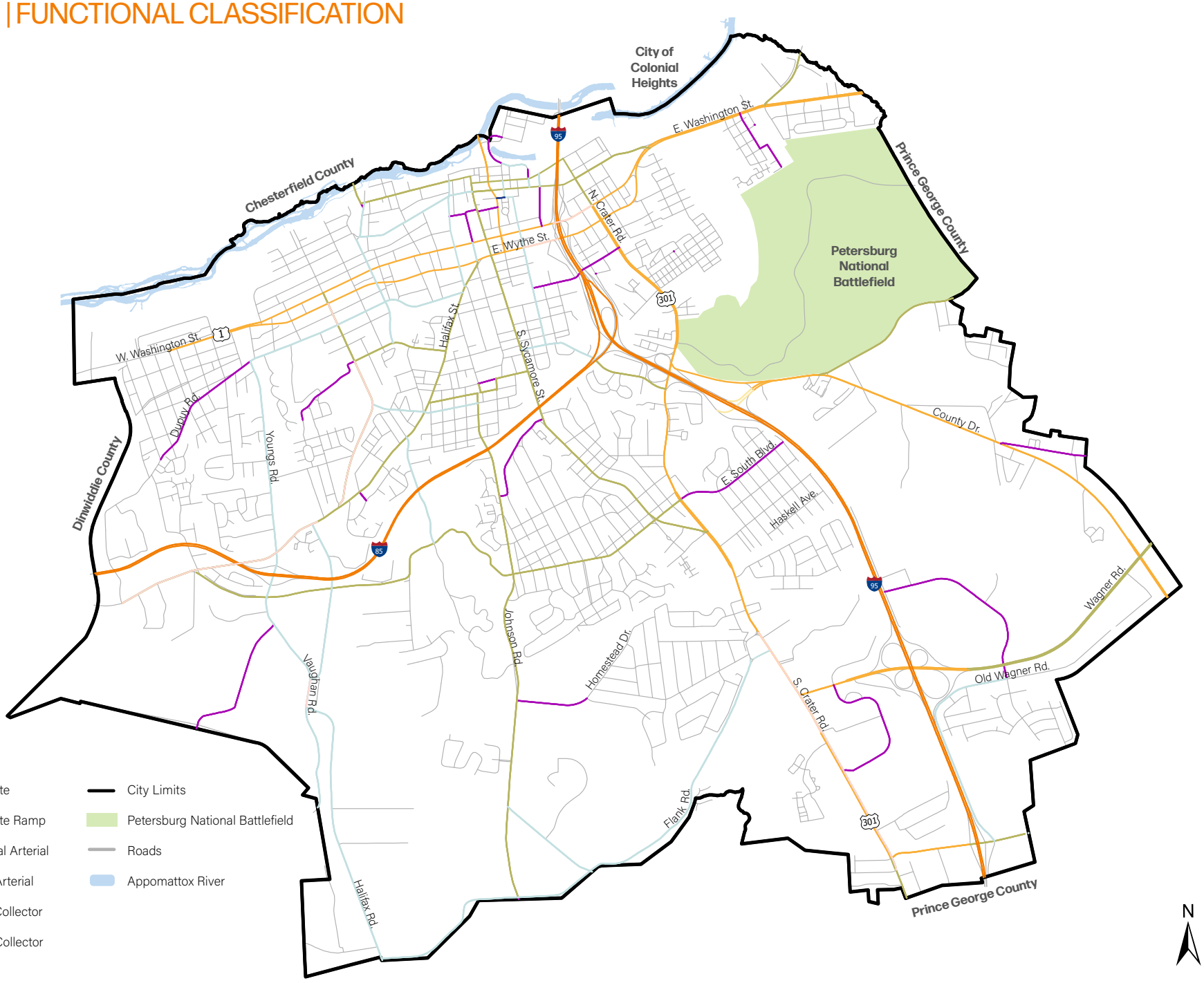
The Department of Public Works is responsible for maintaining 395 lane miles of roadways within the City of Petersburg, while VDOT is responsible for maintaining interstate highways.

Traffic Volume

The Average Annual Daily Traffic (AADT) map (Map 9.2) highlights the nature of travel in Petersburg and is largely consistent with the functional classifications of Petersburg's roads. E. Washington Street (Rt. 36), S. Crater Road (U.S. Rt. 301), and portions of Wagner Road are the most heavily traveled routes in Petersburg, along with Interstates 85 and 95.

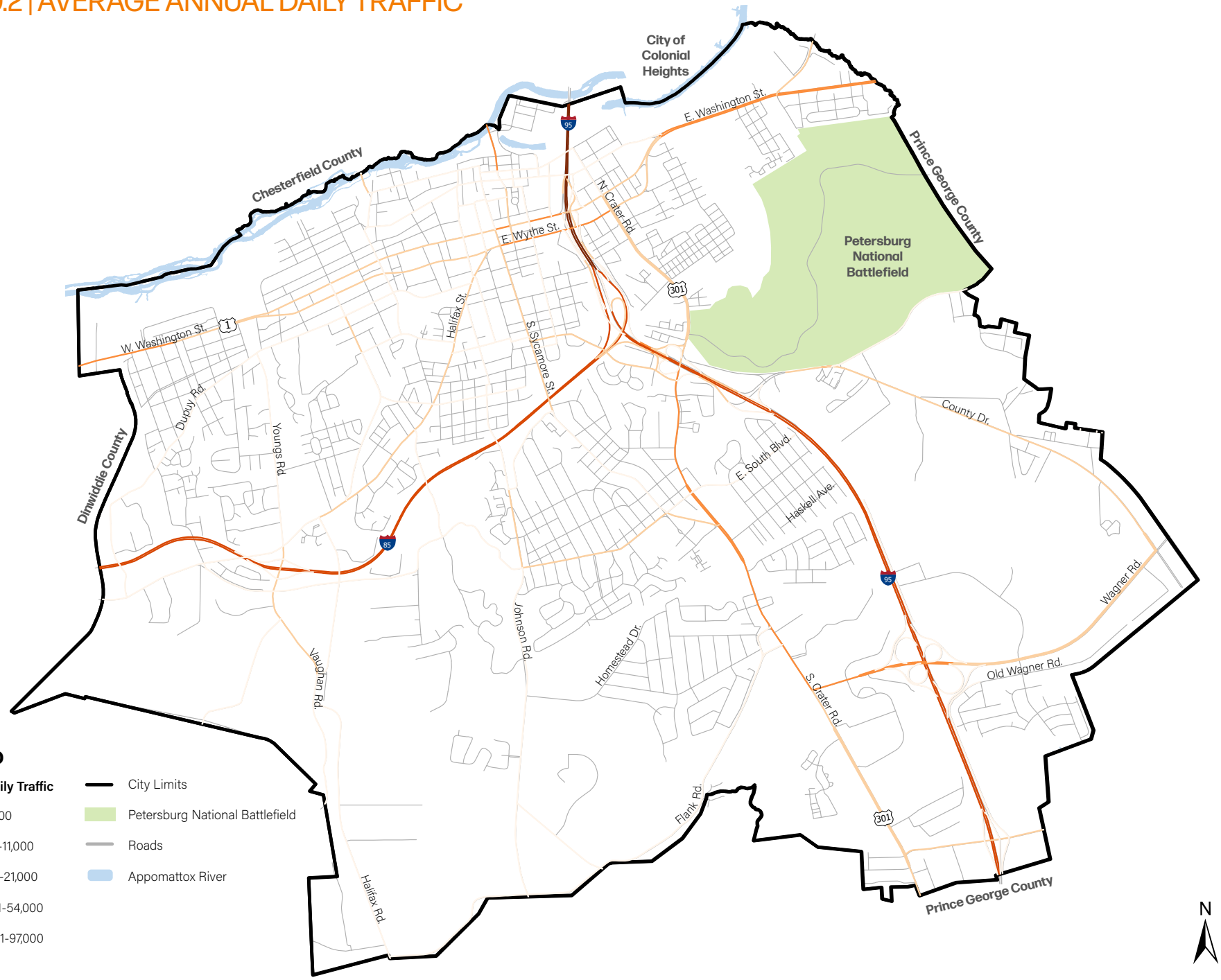
Directional sign at the intersection of N. Market Street and W. Old Street

MAP 9.1 | FUNCTIONAL CLASSIFICATION



SOURCE: Virginia Department of Transportation

MAP 9.2 | AVERAGE ANNUAL DAILY TRAFFIC



SOURCE: Virginia Department of Transportation

Road Safety

In 2022, there were a total of 896 crashes in Petersburg. Out of the total crashes, 57 (6.4%), resulted in at least one fatality or severe injury. Most severe crashes occurred along the City's minor and principal arterials, while fatal crashes occurred along a variety of roadways. High concentrations of crashes occurred at the following intersections:

- Wagner Road & S. Crater Road;
- Interstate 85/95 Exit 52 (Southbound; Ramp at E. Washington St.);
- Wagner Road & County Drive;
- S. Crater Road & E. Wythe Street; and
- Graham Road & S. Crater Road.

Bridges and Culverts

The maintenance, improvement, and replacement of bridges and culverts throughout Petersburg is a high priority to ensure vehicle safety and maintain reliable and efficient access for heavy emergency vehicles and industrial traffic. Bridges and culverts are both classified as good, fair, or poor, depending on their physical condition. Ongoing repairs of bridges and culverts should be considered routine maintenance in addition to other roadway improvement projects. Repairs to bridges and culverts identified as being in poor condition should be a top priority to prevent both further degradation and weight limit reductions. Funding through VDOT's State of Good Repair program may be available to support such repairs.

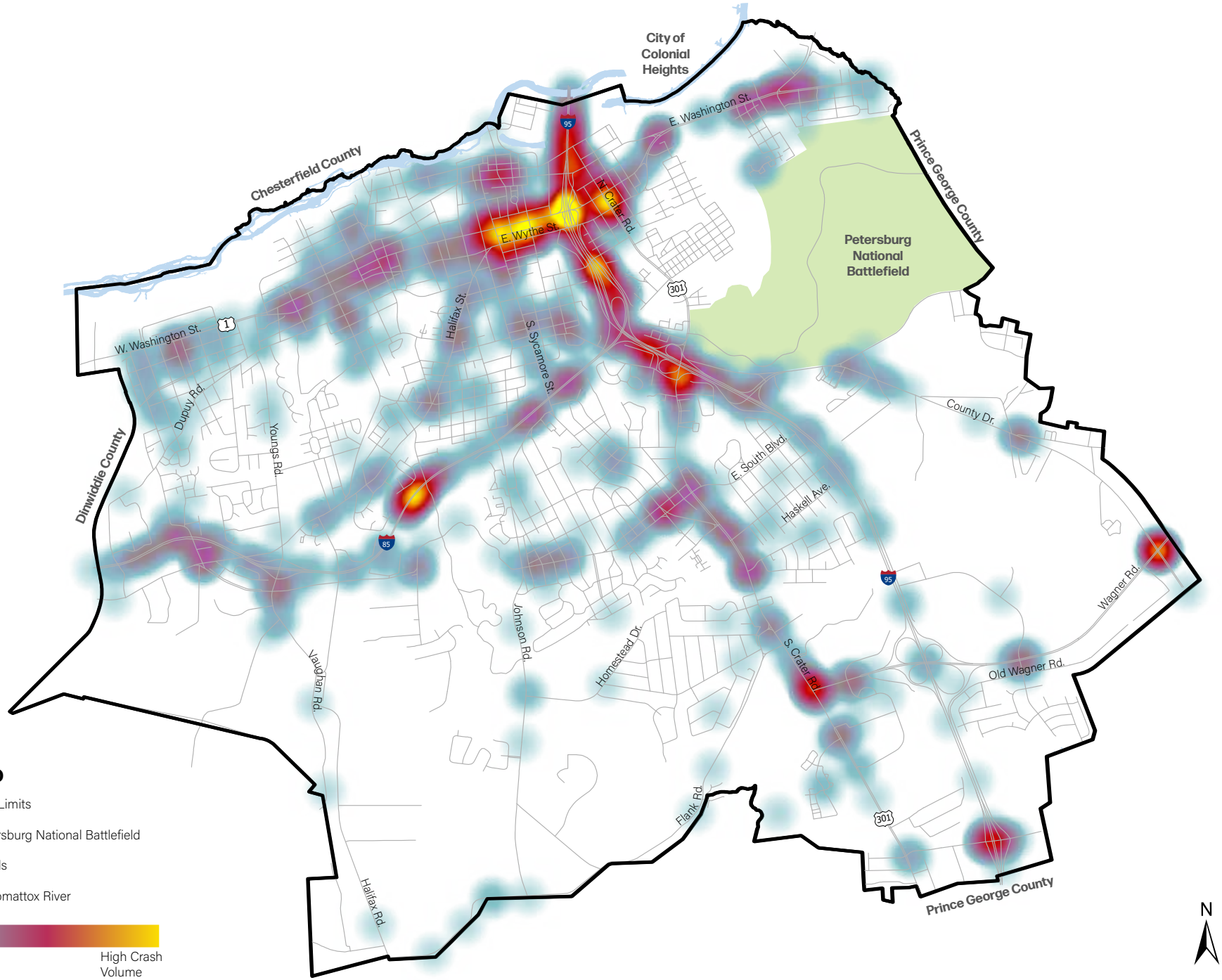
Planning Assumptions

Anticipated transportation network improvements in Petersburg are based on the following planning factors and assumptions (see Chapter 2):

- Relatively stable population over the next 20 years;
- Employment growth in Petersburg and the Tri-Cities region, including the pharmaceutical campus, Fort Gregg-Adams, and the emerging warehousing and distribution industry;
- Investment along the lower Appomattox River, including extensions of the Appomattox River Trail, Fall Line Trail, and East Coast Greenway;
- Growth of historic tourism and eco-tourism;
- The need to build equity and community health by providing expanded access to alternative transportation; and
- Climate change and the need for transportation infrastructure that is both environmentally friendly and resilient in the face of natural disasters.

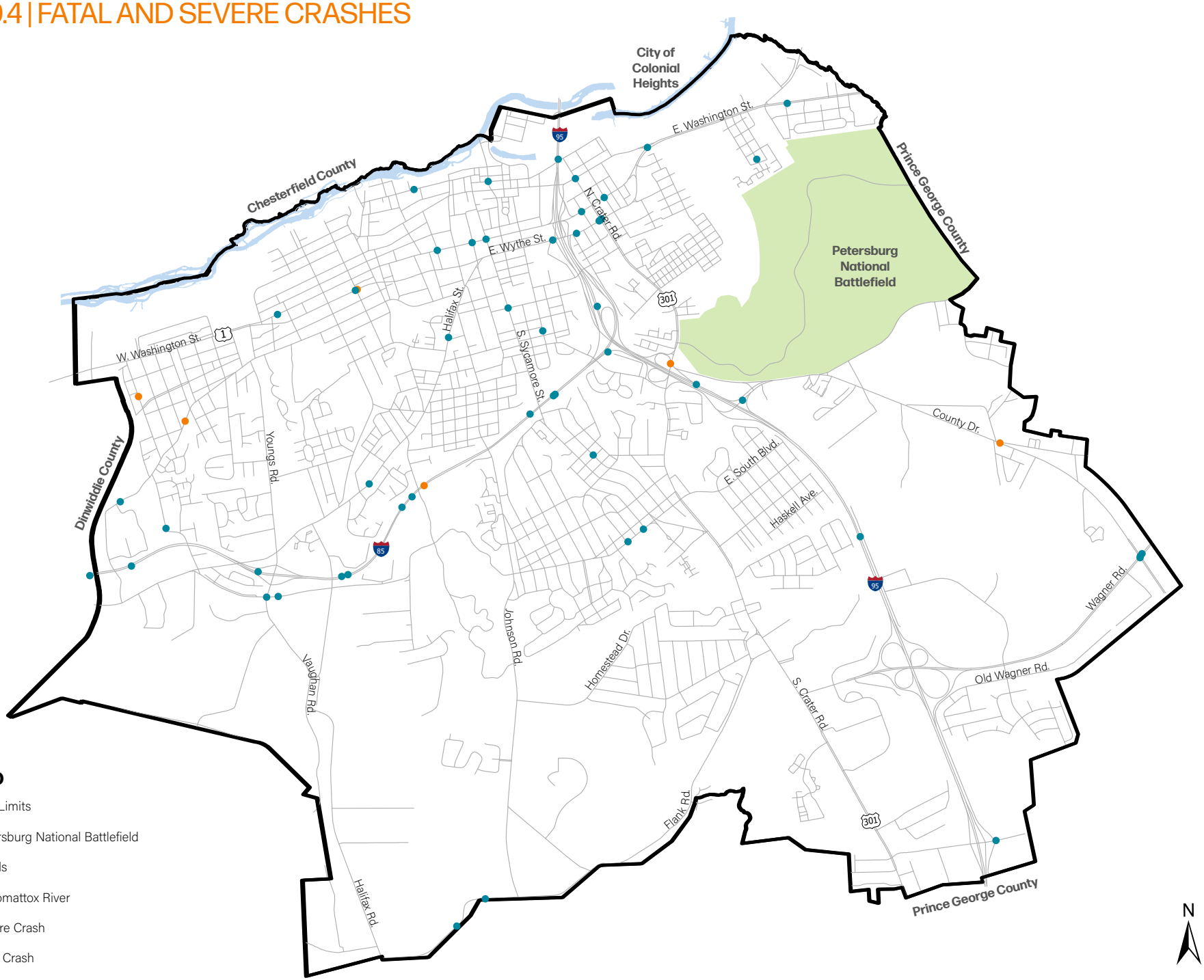
Participation in a road safety event
Photo Credit: Petersburg Healthy Options Partnerships (PHOPS)

MAP 9.3 | CRASH VOLUME



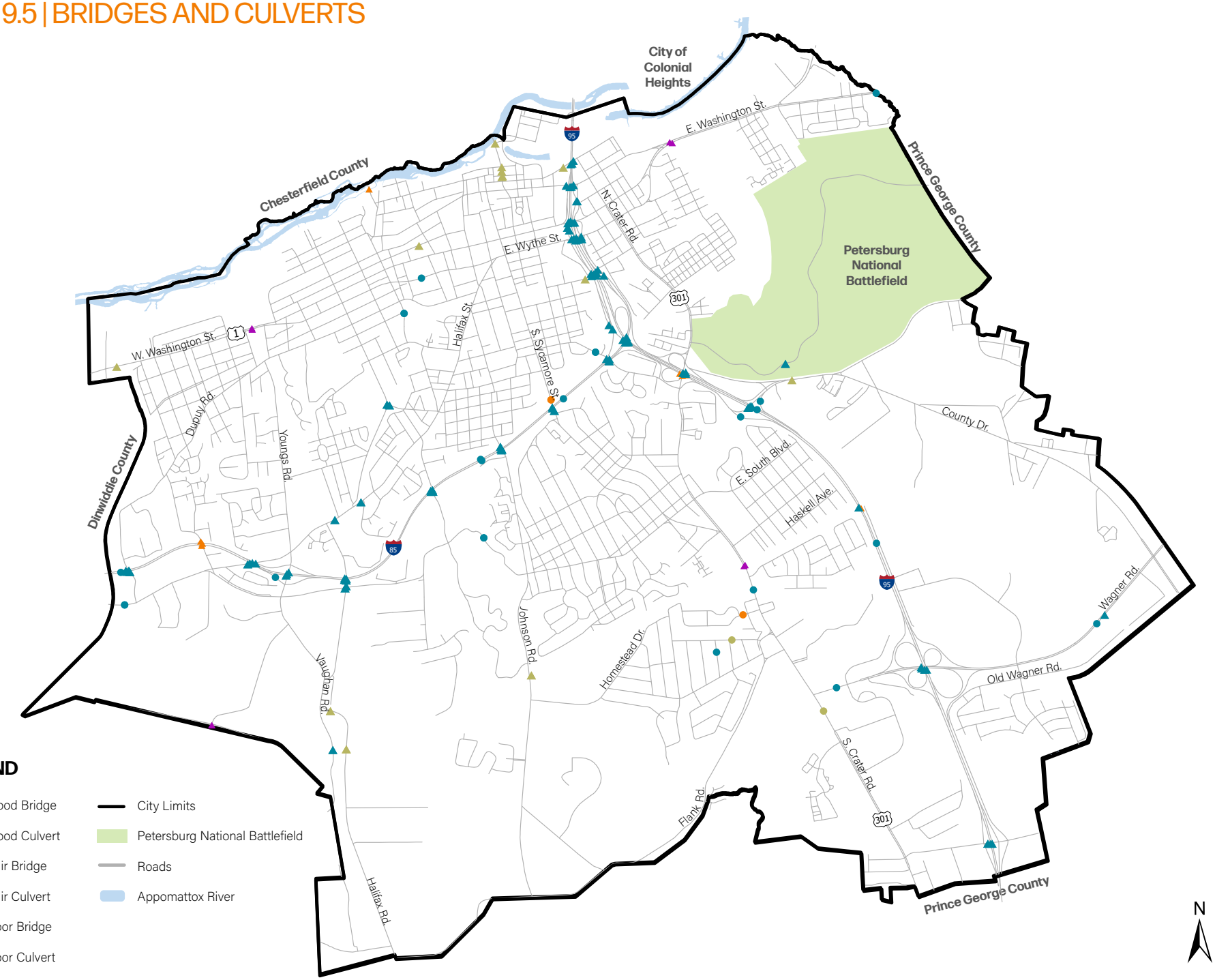
SOURCE: Virginia Department of Transportation

MAP 9.4 | FATAL AND SEVERE CRASHES



SOURCE: Virginia Department of Transportation

MAP 9.5 | BRIDGES AND CULVERTS



SOURCE: Virginia Department of Transportation

MOBILITY AND COMMUNITY HEALTH + WELLNESS

How community members move from one place to another has **major implications for public health and quality of life**. Transportation provides access not only to physical and mental healthcare, but also provides residents with access to social outlets, full-service grocery stores with fresh and healthy food, and employment and education. The **specific transportation mode** also is important, as it **directly impacts individual physical and mental health**.

Active transportation, such as walking and biking, has been found to have a direct and specific relationship to residents' health by providing an opportunity for regular physical activity. **Benefits** of regular physical activity include **decreased body fat levels, prevention or management of disease, and reduced levels of stress**.

Prolonged exposure to **high levels of automobile emissions** can lead to asthma and lung disease, **making the need for active transportation and greenways even more important** for a community like Petersburg where two interstates travel through City limits.

Studies have correlated **longer amounts of time spent commuting** to and from work in a personal automobile with **poor mental health**.

When considering future transportation investments, Petersburg should **carefully assess the potential impact on community health**, evaluating factors such as **level of pollution**, **ability to facilitate physical activity**, and ability to **connect residential neighborhoods with amenities** such as healthcare, grocery stores, and community gathering spaces.

SOURCES: CDC, American Health Association

A MULTI-MODAL NETWORK

What Is a Multi-Modal Transportation Network?

A multi-modal transportation network is a system where community members can readily access a variety of safe and efficient transportation options, including personal automobiles, public transportation, passenger rail, biking, walking, ridesharing, shared mobility, and aviation. The ability to choose a safe mode of transportation to access basic needs, education, employment, recreation, and socialization is an important factor in being able to build individual wealth and enhance quality of life for the community overall.

Streets

A safe, efficient, and reliable street network is an important piece of Petersburg's transportation system. While effective and seamless vehicular movement is the primary goal of the street network, consideration should also be given to how the network contributes to Petersburg's livability and overall quality of life.

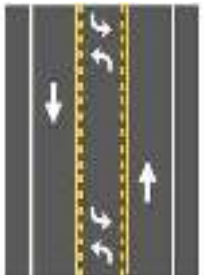
The Division of Street Operations within the Department of Public Works is responsible for maintaining Petersburg's 395 miles of streets, including asphalt repair, sidewalk repair, and drainage system management. The Department does not currently have a road maintenance plan that identifies road condition, a repaving schedule, or prioritizes

locations for maintenance or upgrades. It is highly recommended to create a plan with an emphasis on preventative maintenance to make efficient use of staff time and financial resources.

In addition to street maintenance and quality, there are several other challenges that should be addressed to create a safer, more efficient, and truly multi-modal street network. Personal automobiles create emissions and congestion, leading to negative impacts on both personal safety and the natural environment. Heavy truck traffic is a major component of Petersburg's transportation volume due to the presence of the freight trucking and warehousing industries, but can further increase congestion and impact safety and operations throughout the street network. Speeding is an additional concern in Petersburg as it endangers all users of the road, especially pedestrians and bicyclists. In 2022, 216 crashes, or 24.1% of all total crashes, involved speeding.

There are several design-oriented strategies that Petersburg can implement to create a safer and more efficient street network for all users of the road, including:

- **Road Diets:** Reducing the number of lanes in a road – for example, from four lanes to two lanes – and converting former lanes into protected bicycle/ pedestrian travelways or green space.
- **Curb Extensions:** Adding slight extensions of curbs at intersections to prevent right- and left-turns at high speeds.
- **Complete Streets:** Streets that integrate a variety of design elements, such as protected medians, frequent crosswalks, separated sidewalks and bike lanes, and frequent signal lighting to ensure safety for all users of the road
- **Roundabouts:** Circular intersections that allow continuous vehicular flow in one direction, eliminating the need for stoplights. Benefits include reducing congestion, slowing vehicle speeds, and reducing the likelihood of crashes.
- **Chicanes:** Offset curb extensions on low-volume streets that create gentle curves in the road, slowing traffic and providing opportunities for landscaping and green space.
- **Pedestrian Signal Timing:** Programming pedestrian signals at crosswalks to have a gap between a red light and a safe walking signal can reduce the likelihood of crashes caused by a vehicle running a red light.



Road Diet

Chicane

Curb Extension

Roundabout

Photo Credit: Virginia Department of Transportation

Additionally, Code of Virginia Section 46.2-882.1 allows speed cameras in highway work zones and school zones. While speed cameras have a high up-front cost, they limit racial profiling in traffic stops and free up law enforcement resources. Petersburg should place speed cameras in school zones – prioritizing zones around Walnut Hill Elementary School, Vernon Johns Middle School, and Petersburg High School – to protect children, pedestrians, and bicyclists in school zones during school zone hours. These can also be a temporary solution until protected pedestrian and bicycle infrastructure or road diets are installed.

Parking

Parking facilities are beneficial in providing opportunities for automobile users to travel from one destination to another. These facilities can be sited, designed, and used strategically to reduce their developed footprint and be aesthetically pleasing additions to the community. However, many parking facilities in Petersburg – especially in Old Towne and in commercial areas – are privately-owned vacant lots, leading to challenges with reuse and maintenance. Large, unmaintained parking areas contribute to the "heat island" effect (see Chapter 8), generate larger amounts of stormwater runoff, and contribute to issues with blight and trash.

There are several ways Petersburg can monitor its parking supply and encourage smart use of property for parking. A parking study or inventory in Old Towne can help the City be aware of surpluses and deficiencies. Amending the Zoning Ordinance to reduce parking minimums and require installation of bike racks at parking areas in multi-family residential, commercial, and mixed-use districts is another strategy. These parking standards encourage people to use an alternative method of commuting, generating positive benefits for both the individual and the overall environment.

Many of Petersburg's residents commute outside the City for employment (see Chapter 2). Reducing single-occupancy vehicles on roadways is a goal to reduce traffic congestion, lower vehicle emissions, and promote safe and streamlined commute times. Park-and-ride lots are one valuable solution for promoting these outcomes. One park-and-ride lot is currently available on Union Street. VDOT has studied other locations for park-and-ride lots in the past; recommend establishing a secondary park and ride lot due to the large number of out-commuters in Petersburg.

Petersburg Area Transit's parking facility in Old Towne
Photo Credit: Petersburg Area Transit

Passenger and Freight Rail

Railroad owned and operated by both Norfolk Southern and CSX runs through Petersburg. Collier Yard, a CSX-owned railroad yard in the southwest area of the City near the Petersburg Interstate Industrial Park, is an important piece of regional freight rail infrastructure and provides an attractive economic incentive to industrial companies.

Amtrak provides passenger rail service to Petersburg residents through the Petersburg station in nearby Ettrick. The station is about a 5-minute drive, an 18-minute bus ride, and a 30-minute walk from Old Towne. Daily roundtrip trains on five Amtrak routes – the Northeast Regional, Carolinian, Palmetto, Silver Star, and Silver Meteor – service the station. The Petersburg Amtrak station had 33,311 boardings and alightings in Fiscal Year 2022. This number has grown since Fiscal Year 2010, indicating increased regional demand for passenger rail travel.

The U.S. Department of Transportation (DOT) recently awarded a $6.4 million grant to update the Petersburg station with significant improvements to the train station, parking, and lighting. Other projects include improved ADA accessibility, a new and safe platform, and a covered walkway. These improvements will significantly enhance the quality of train travel for the community and provide much needed mobility accommodations for the physically disabled and older adults. Petersburg can continue its supportive partnerships with regional, state, and federal agencies to leverage grant funding for other station improvements that may become necessary during the timeframe of this Plan. Petersburg can also continue advertising Amtrak as a cost- and time-effective mode of regional and national travel.

Table 9.1 | Amtrak Ridership at Comparable Stations

Comparable City	FY2022 Station Boardings & Alightings
Ashland	21,894
Lynchburg	48,326
Staunton	4,748
Williamsburg	48,803
Petersburg	**33,311**

SOURCE: U.S. Bureau of Transportation Statistics

A higher-speed rail line running from Washington, D.C. to Florida is proposed to run through the northern area of Petersburg along the CSX line. This higher-speed rail line, called the Southeast Corridor, will provide area residents with new connections to other cities in Virginia and along the East Coast, opening doors for lower-cost interstate travel. A stop is planned at the Petersburg Amtrak station; a third rail is also planned to accommodate potential additional frequencies between the Richmond metropolitan region and Raleigh, North Carolina. Petersburg should partner with VDOT, the Virginia Department of Rail and Public Transportation (DRPT), the Southeast Corridor Commission, and its neighboring locations to support the development and implementation of this project through participation in planning committees and boards.

Petersburg Amtrak Station in the Village of Ettrick

Public Transportation

Public transportation is a critical piece of a multi-modal transportation network, especially for children, older adults, veterans, and others who do not have a personal automobile. Petersburg Area Transit (PAT) provides daily bus service to the residents of the Cities of Petersburg, Hopewell, and Colonial Heights, the Village of Ettrick, and the Counties of Dinwiddie and Prince George. PAT's mission is to provide the Petersburg community with safe, reliable, and accessible transit service to expand access to opportunities and enhance quality of life.

PAT transports an average of 57,000 passengers monthly on 13 local routes and one express route. This includes its Richmond Express, which provides express routes to healthcare In Richmond for a target audience of veterans and is also available for clients of all ages. PAT also operates a paratransit program which provides door-to-door specialized transportation services for persons with special needs, veterans, seniors 65 years or older, and individuals with disabilities who are unable to use PAT's fixed route service.

PAT was recently awarded a grant to provide service connecting Petersburg with Emporia. An additional federal grant for $450,000 awarded in 2023 will allow PAT to continue advancing service provision for residents with limited or no transportation options. DRPT will be working with PAT to develop a strategic plan to identify opportunities to expand service to critical community facilities and amenities, such as Bon Secours Southside Medical Center and Virginia State University (VSU). In 2023, PAT announced plans to run new routes to Richard Bland College in Dinwiddie County, opening new opportunities for Petersburg residents to access higher education opportunities. Evaluation of more frequent service opportunities between Richmond and Petersburg should also be pursued during the timeframe of this Plan.

PAT's strategic plan outlines the organization's structure and strategic vision, analyzes system performance and operations analysis, and provides an implementation plan to outline planned improvements and modifications. Missing from this strategic plan is an emergency evacuation plan; an update is needed to address emergency procedures.

Petersburg Area Transit Trolley

PAT is a critical player in advancing transportation equity in the Tri-Cities region. According to data collected for PAT's 2019 Transit Strategic Plan, 63% of transit users were female, 53% did not have a personal automobile, and 46% had an annual income below $15,000. PAT service undoubtedly meets a community need for low-cost, low-barrier transportation. However, there are several challenges that inhibit service provision in the most efficient and equitable manner possible. Many stops do not have shelter, lighting, seating, or trash cans, deterring potential riders due to conditions that are unsafe and unwelcoming to those with physical disabilities. Adding new bus stop amenities was identified by the Tri-Cities Area Metropolitan Planning Organization (TCAMPO) as a significant regional priority. Additionally, service after dark is limited, providing challenges for late-night shift workers who need transportation or those needing to access healthcare after normal business hours. DRPT is currently working with PAT to evaluate service expansion to allow for more non-emergency medical transportation to reduce strain on ambulances and Fire, Rescue, and Emergency Services personnel.

PROMOTING PETERSBURG AREA TRANSIT

PAT is currently offering fare-free transit until further notice on all routes, including para-transit services. This is **an important component of building equity in transportation**, as many of PAT's riders are financially constrained and do not own personal automobiles.

While many community members may be aware of fare-free transit, it is important to **ensure that both regular and potential riders are aware of other aspects of riding PAT**, such as routes and ADA accessibility information. The PAT website and social media pages are infrequently updated and should be regularly updated to help provide awareness about available services, important changes to service, and other policies and procedures. **A phone alert system that sends automated texts or calls to riders when service changes and a website that is independently monitored and maintained by PAT are both currently in progress.**

Click here to read the Petersburg Area Transit strategic plan and view route maps!

Bicyclists riding in front of South Side Depot

Biking and Walking

Developing a safe, well-maintained, and connected network for walking and biking is a vital part of moving Petersburg forward as a healthy and desirable place to live, work, and visit. Additionally, pedestrian and bicycle infrastructure can be leveraged as economic development tools that attract new business, provide tourism destinations for visitors and active transportation to Petersburg's many historical sites, and assist in the physical and mental well-being of residents. Research has found that direct access to a transportation network that includes biking and walking increases property values, in turn leading to increased economic performance. Petersburg's goal for its pedestrian and bike network is a combination of infrastructure on traditional roadways as well as protected infrastructure and trail systems linking people to a variety of destinations.

Community outreach regarding current resident walking and biking activity and challenges to increasing walking and biking was completed in 2019 in collaboration with the Crater Health District, CPDC, Bike Walk RVA, and Friends of the Lower Appomattox River (FOLAR).

- A majority (80%) of survey respondents said they would like to walk and bike more frequently than they currently do.
- When asked what makes walking and biking challenging in Petersburg, 57.8% said unsafe roads, 46.5% said lack of connected biking and walking routes, and 43% said lack of bike lanes, signage, bike racks.
- Most survey respondents (64.7%) indicated that they would be more likely to ride a bike if protected spaces to ride were available.
- A majority (87.7%) of survey respondents desired to see a network of safe biking and walking infrastructure that connects destinations in Petersburg and protects people biking and walking from vehicular traffic.

Bikeways

Bikeways in Petersburg are currently limited. Map 9.6 and Table 9.2 depict current bicycle facilities, as well as proposed locations for new bicycle facilities and bikeways, including shared use paths, protected bike lanes, bike/walk streets, and standard bike lanes. This proposed network was initially developed in 2020 based on the community engagement related to walking and biking and subsequent working group research and findings. Together, existing and proposed bikeways will provide a more interconnected Petersburg through safe and reliable infrastructure, with an emphasis on underserved neighborhoods and closing gaps between existing facilities.

Bikeways are improvements designed to provide for safe bicycle travel on a road, shared-use path, or trail.

SAFE ROUTES TO SCHOOL

VDOT's Safe Routes to School (SRTS) program provides communities with **grant funding and technical assistance** to develop **safe routes for biking and walking through neighborhoods to schools**. The program is federally designated and funded and has the following purposes:

Enable and encourage children, including those with disabilities, to walk and bicycle to school; make bicycling and walking to school a safer and more appealing transportation alternative, thereby encouraging a healthy and active lifestyle from an early age; and facilitate the planning, development, and implementation of projects and activities that will improve safety and reduce traffic, fuel consumption, and air pollution in the vicinity of schools.

SRTS can also include an **educational component** through participation in state and national events such as Walk to School Day and Bike to School Day. This is important for minority neighborhoods, **as minorities tend to be victims of vehicle/pedestrian accidents at higher rates** due to walking more and lack of facilities.

Some SRTS projects **require little or no funds to implement** if some existing infrastructure is already in place. Others, such as constructing a new sidewalk, may require a substantial investment. The Petersburg Active Transportation Work Group, a coalition of local organizations, has been working to **establish a SRTS project near Walnut Hill Elementary School** and recently obtained some of the needed grant funding; the organization plans to apply for full grant funding in 2025. **Petersburg should plan to support SRTS projects through advertising and promotions and providing funding if necessary.**

Over the next 20 years, Petersburg and its partners should pursue funding for two other SRTS projects:

Pleasants Lane Elementary School: Additional sidewalks and crosswalks
Blandford Academy: Additional sidewalks and crosswalks between E. Bank St. and E. Washington St.

MAP 9.6 | PROPOSED BIKEWAYS NETWORK

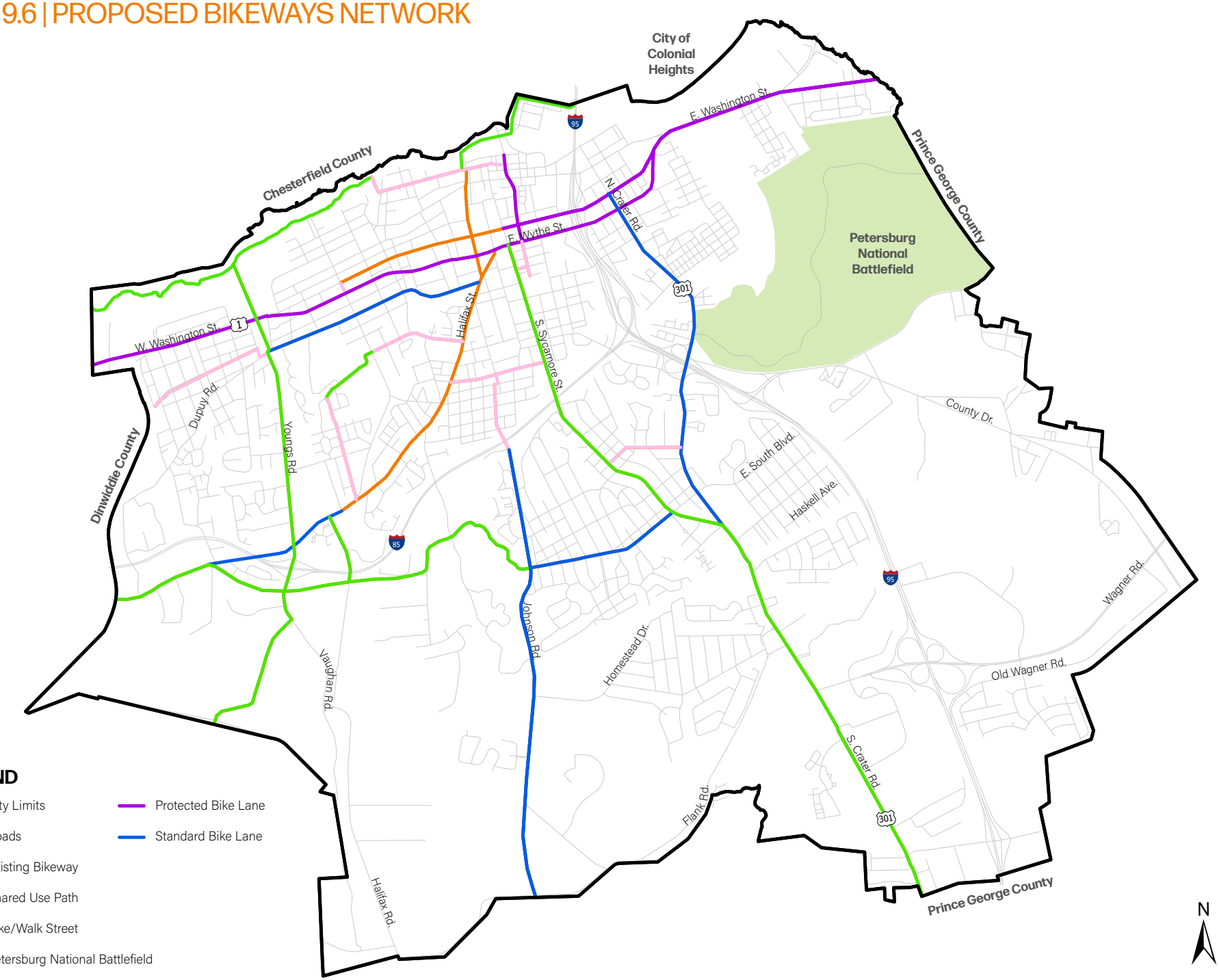


TABLE 9.2 | PROPOSED BIKEWAYS NETWORK

Facility Location	Recommended Facility Type	Endpoints	Appoximate Mileage
Short-Term (0-5 Years)			
Adams St.	Bike/Walk Street	Wythe St., Tulip Alley	0.18
Claremont St.	Bike/Walk Street	S Crater Rd., Sycamore St.	0.44
Farmer St./ Dupuy Rd.	Standard Bike Lane	Halifax St., Youngs Rd.	1.34
Ferndale Ave./ McKenney St./ Dupuy Rd.	Bike/Walk Street	Youngs Rd., City limits (Seaboard St.)	0.83
Defense Rd.	Shared-Use Path	Boydton Plank Rd., Banister Rd./Legends Park Trailhead	1.34
High Pearl St./ St. Matthew St./Harding St.	Bike/Walk Street	Shore St., Johnson Rd.	0.44
Lee Ave.	Bike/Walk Street	Halifax St., S West St.	0.57
Legends Park	Shared-Use Path	Johnson Rd., Banister Rd.	0.89
Patterson St.	Bike/Walk Street	Carver St., Halifax St.	0.55
S. Crater Rd.	Standard Bike Lane	W. Washington St., S Sycamore St.	2.19
South Blvd.	Standard Bike Lane	Johnson Rd., S Sycamore St.	0.92
Tulip Alley	Bike/Walk Street	S Sycamore St., S Adams St.	0.06

Bike/Walk Street

Shared Use Path

Standard Bike Lane

Protected Bike Lane

Facility Location	Recommended Facility Type	Endpoints	Appoximate Mileage
Medium-Term (6-10 Years)			
Appomattox River Trail	Shared Use Path	City limits, Interstate 95	3.25
Adams St.	Buffered Bike Lane	River St., Wythe St.	0.52
Augusta Ave.	Shared-Use Path	S. West St., Shields St.	0.31
Boydton Plank Rd.	Shared-Use Path	City limits, Defense Rd.	0.29
Boydton Plank Rd.	Standard Bike Lane	Defense Rd., Halifax Rd.	0.78
Grove Ave./Old St./Pelham St.	Bike Walk Street	Canal St., Adams St.	0.77
Halifax Rd.	Shared-Use Path	Boydton Plank Rd., Defense Rd.	0.4
Shore St.	Bike Walk Street	S Sycamore St., Halifax Rd.	0.56
Squirrel Level Rd.	Shared-Use Path	Defense Rd., Rail line	1.01
Long-Term (10+ Years)			
Defense Rd.	Shared-Use Path	Boydton Plank Rd., Banister Rd./ Legends Park	1.34
S. Crater Rd.	Shared-Use Path (on street)	S. Sycamore St., City limits	2.13
Sycamore St.	Shared-Use Path	Shore St., S Crater Rd.	1.46
Washington St.	Protected Bike Lane	Atlantic St., City limits	5
Wythe St.	Protected Bike Lane	City limits	5

Appomattox River Trail

Sidewalks

While sidewalks exist throughout Petersburg, many of them are in disrepair, overgrown, or not ADA accessible. Additionally, a lack of street lighting, crosswalks, and pedestrian signals throughout the City can further deter pedestrian activity due to safety concerns. Petersburg should undergo an initiative to map and record the quality of all sidewalks in the City to provide a foundation for data-driven, location-based investment moving forward. Other strategies for promoting a safe, accessible, and connected sidewalk network include amending the Zoning Ordinance to require pedestrian sidewalk connections at all new development or creating a replacement and improvement program as part of a public works road maintenance plan.

Trails and Greenways

Trails are not only a place to recreate and enjoy natural beauty but are also a valuable opportunity for moving from place to place in a safe and enjoyable manner. When planned strategically, trails can provide safe options for making short-distance trips to and from daily needs by foot or long-distance trips for bike tourism.

Greenways are linear corridors providing a typically paved, eight- or ten-foot-wide pathway for walking and biking opportunities alongside natural environmental features such as creeks, groves, and gentle hills. In Petersburg, a connected greenway network would not only provide ample opportunities for pedestrian and bicycle connectivity but would capitalize on the City's abundant historic and natural resources and provide new opportunities for eco-tourism. A greenways plan is recommended to determine potential locations for future greenways and identify steps for acquisition and development; this could be beneficial completed as a regional effort in partnership with the Crater Planning District Commission (CPDC) and the Tri-Cities Area Metropolitan Planning Organization TCAMPO.

Trails and greenway systems present a good opportunity to grow community engagement and build social cohesion, as volunteer groups such as churches and Scout troops can get involved by sponsoring cleanups and building amenities such as trailheads, benches, and kiosks. Tree planting and riparian restoration activities also often occur along trails and greenways, yielding long-term environmental benefits for the community.

Proposed Fall Line Trail Alignment

SOURCE: Virginia Department of Transportation

Appomattox River Trail

The Appomattox River Trail (also discussed in Chapter 5) is a planned 25-mile greenway and blueway trail connecting three cities and three counties in and around the Richmond metropolitan region. Significant efforts are already ongoing to protect the area around the trail, identify new greenways, and make new connections where needed. Future investment along and around the trail is guided by the Appomattox River Trail Master Plan, a guide to locating and prioritizing shared-use trails with coordinated signage systems through Petersburg and the five other localities bordering the lower Appomattox River.

In 2023, FOLAR purchased an 8-acre riverfront tract from CSX Railroad to "close the gap" between existing trail segments on the northeast and northwest sides of Petersburg. The land will be protected through a conservation easement as FOLAR begins the process of trail development at this location. As work continues to progress in developing the trail, Petersburg should make an annual funding commitment for implementation task force and trail maintenance. Petersburg should also work with FOLAR and VDOT to develop and locate appropriate safety and wayfinding signage along the trail and riverbank.

East Coast Greenway

The East Coast Greenway is a planned multi-use path traversing over 3,000 miles from Maine to Florida. Several designated trails for this greenway already exist throughout Virginia along the Interstate 95 corridor. In Petersburg, the greenway is proposed to utilize the Appomattox River Trail and several on-road routes. Petersburg can support efforts to continue development of the East Coast Greenway as another opportunity for passive recreation and regional transportation.

Fall Line Trail

The Fall Line Trail is a 43-mile multi-use trail connecting the Richmond region with start and end points in Ashland at the Trolley Line Trail and Petersburg at Patton Park and intersection with the Appomattox River Trail. Construction is ongoing, and the trail facility will align with existing roadways, abandoned railways, utility transmission corridors, and paths and trails. The trail facility will also be constructed at new locations as identified in the alignment study. Petersburg should inform the community of this upcoming opportunity for enhanced recreation through updating its website to include project information, as well as include progress updates in the City's quarterly newsletter as construction progresses.

Code of Virginia Section 46.1-908.1 provides basic regulations for e-bikes and e-scooters, including **prohibiting operation at speeds in excess of 25 mph for bikes and 20 mph for scooters**; **prohibiting use on interstate highways and roads with maximum speed limits above 25 mph**, and **allowing the use of e-bikes and e-scooters on crosswalks**. Localities also have an option to prohibit usage on sidewalks. While e-bike and e-scooter usage should be limited to bike lanes when possible to promote safety between different users of the road, **allowing on sidewalks is temporarily necessary**. In areas of Petersburg where protected bikeways are not provided and speed limits are too high to be comfortable for people biking to share a travel lane, **using the sidewalk can provide a safer option until dedicated facilities are provided.** While on sidewalks and shared-use paths, bicyclists **must always yield the right of way to pedestrians and give an audible signal before passing a pedestrian.**

Shared Mobility

Shared mobility options provide community members with short-distance transportation options on an as-needed basis. In addition to public transportation, shared mobility also typically includes taxis, private ridesharing such as Uber and Lyft, e-bikes, and e-scooters. Shared mobility benefits a community through increasing transportation options for those without access to a personal automobile and reducing both carbon emissions and traffic congestion.

E-bikes and e-scooters may be of particular interest for future investment due to their widespread benefits. They are cheaper and easier to implement than infrastructure for ridesharing or electric vehicles, easy to ride due to electric motors – benefiting youth and those with physical disabilities – and providing large cost savings when compared to the expense of owning and maintaining a private vehicle. Additionally, pickup and drop-off points for e-bikes and e-scooters can fill gaps in public transit service provision by being strategically located in areas of Petersburg lacking sufficient bus stops.

Providers have also recently begun to address equity gaps in ridership, such as lack of smartphones or lack of a credit card or bank account. Some providers allow calling to pay, and also offer alternative payment programs where, upon qualification, a rider can use a prepaid card or pay with cash at a participating local payment location.

It is important to note that any support of shared e-bike and e-scooter programs must be coupled with Citywide investments in bike lanes, streetlights, and complete streets to ensure that these programs are truly successful in achieving the goal of widespread, equitable, and safe mobility.

Bicyclists riding by Demolition Coffee Co.

Vehicle Electrification and Charging Infrastructure

According to the U.S. Bureau of Labor Statistics, electric vehicles (EVs) accounted for 4.6% of all new vehicle sales in the nation in 2021. This number is expected to increase to between 40% and 50% by 2030. As the transition from gasoline to electrification occurs, infrastructure will need to adapt to meet changing needs. Many gas stations are beginning to offer charging stations in addition to traditional gasoline pumps; Petersburg currently has four EV charging station locations. One of the benefits of adding charging infrastructure is that vehicle charging currently takes much longer than filling it up with gasoline, thus producing a larger set of potential customers for a business. This effect could also be further realized in strategic parts of the city such as Old Towne, near the entrance to Fort Gregg-Adams, and in the Crater Road commercial district to attract travelers generate additional revenue. The City should amend the Zoning Ordinance to require at least one EV charging station at all new commercial or industrial development with over 50 parking spaces.

EQUITY IN TRANSPORTATION

Economic stability and the ability to build wealth are closely linked to whether an individual can access a living wage job with a reliable method of transportation. However, inequities in transportation access for certain groups of people continue to persist in Petersburg. According to the Federal Highway Administration (FHA), transportation equity is intended "to facilitate social and economic opportunities by providing equitable levels of access to affordable and reliable transportation options based on the needs of the populations being served, particularly populations that are traditionally underserved." This goal is especially important in a city such as Petersburg where poverty and crime tend to be concentrated in certain neighborhoods. A Harvard University study found that communities with lower commute times have "less segregation by income and race, lower levels of income inequity, better schools, lower rates of violent crime, and larger share of two-parent households," demonstrating that equitable and reliable transportation is a key aspect of eliminating generational poverty and promoting wealth through new opportunities to access living-wage jobs, healthcare, housing, and education.

Advancing equity in transportation in Petersburg can occur through implementing several strategies, including:

- Ensuring that routes provide efficient and reliable connections between residential neighborhoods, major employers, Bon Secours Southside Medical Center, and institutions of higher education (to *be further addressed in DRPT/PAT strategic study*);
- Continuing to provide free or reduced fares for riders who receive Medicaid or Medicare, are veterans, or who are younger than the age of 18 or older than the age of 60;
- Making bus stops easily identifiable with adequate lighting, signage, benches, and trash cans;
- Extending PAT hours of operation to provide transportation options for late-night shift workers and those needing to access urgent or emergency medical care; and
- Providing protected and accessible pedestrian and bicycle infrastructure that provides direct connections to opportunities for employment, schools, and recreation.

TRANSPORTATION AND LAND USE

Complete Streets

Petersburg is committed to improving transportation equity, enhancing the built environment, and supporting safe, affordable, and reliable transportation options, as defined by the National Complete Streets Coalition. Petersburg recognizes that four of its seven wards are home to its most vulnerable populations, including older adults, children, the unhoused, persons with health challenges, veterans, and persons formerly incarcerated, and therefore should focus its transportation efforts on completing its transportation network for all users using a "Complete Streets" concept.

Complete Streets are designed to enable safe and efficient access for pedestrians, bicyclists, transit users, and motorists at the same time and within the same right of way. A complete street may include sidewalks, bike facilities, transit lanes, frequent and safe crosswalks, median islands, accessible pedestrian signals, curb extensions, narrower travel lanes, roundabouts, and other design interventions to facilitate safe multi-modal travel. A complete street's design is not prescriptive, but instead is determined within the context of a street's function and location.

As Petersburg continues to grow, redevelop, and repair its streets, it should ensure all new construction, rehabilitation, maintenance, and all other operations-related activities consider the needs of all users of all abilities. The City will prioritize its neighborhoods and portions of the built environment with aging infrastructure and those suffering from long-term deferred maintenance.

Petersburg recognizes the many benefits that can arise from having a more complete transportation network and from designing space to encourage pedestrian and bicycle travel. Active transportation modes like walking and biking can produce several positive effects for Petersburg, including:

- Reducing automobile traffic;
- Increasing visits to local businesses;
- Improving air quality;
- Conserving energy;
- Reducing chronic diseases; and
- Increasing social cohesion.

Photo Credit: National Complete Streets Coalition

Complete streets are included in the CDC's recommendations for building healthy and active communities.

Priority locations for future, full complete streets are identified below; a comprehensive study is needed to not only discuss the scope of these projects in greater detail, but to also provide a foundation for applying for grant funding through VDOT's SMART Scale and Transportation Alternatives programs.

- Washington & Wythe Streets
- N. Adams Street
- N. Sycamore Street
- S. Crater Road
- Halifax Street
- Homestead Drive

Petersburg worked alongside the National Complete Streets Coalition and Smart Growth America in 2016 to develop a draft Petersburg Complete Streets Policy. The policy should be reviewed for any needed updates to match recent demographic trends and adopted within a year after PetersburgNEXT adoption.

Urban Development Areas (UDAs)

Urban Development Areas (UDAs) are defined by Code of Virginia Section 15.2-2231 as designated areas that may be sufficient to meet projected residential and commercial growth in the locality for a period of at least 10 but not more than 20 years. These areas are likely appropriate for development at densities of at least four single-family homes, six townhouses, or 12 apartments per acre, and must incorporate principles of Traditional Neighborhood Design (TND) into future development or redevelopment.

Designating UDAs can improve future efficiency of the transportation network through promoting compact development patterns, multi-modal transportation options, and reducing the amount of time required for trips to access daily needs. Additionally, designating areas as UDAs can facilitate the process of obtaining grant funding for infrastructure improvements, especially those related to pedestrian and bicycle safety and accessibility. The Virginia General Assembly has directed that transportation improvements that support UDAs be consistent with the needs assessment contained in VTrans 2040 and are required for consideration in the SMART SCALE statewide prioritization process for project funding.

Crosswalk in Old Towne

Petersburg Bus Terminal

Petersburg has designated a UDA along the S. Crater Road corridor, beginning at the S. Crater and S. Sycamore intersection and going south to the Prince George County line. The UDA is designated on the Future Land Use Map (FLUM) in Chapter 10, and has a set of planning and development principles to achieve the intent of the area as set forth by the Code of Virginia.

To learn more about what UDAs are and the process of designating them in Virginia, click here!

Transit-Oriented Development (TOD)

Transit-oriented development (TOD) is a land use pattern where the land around public transportation facilities is developed in a dense and walkable manner with a mix of residential, commercial, and civic uses. TOD is beneficial in reducing commuting times and vehicular congestion, facilitating biking and walking, and providing the community with enhanced access to goods, services, and employment opportunities.

The areas near the Petersburg Bus Terminal in Old Towne and the railroad crossing on S. Crater Road near Food Lion are a prime locations for future TOD. The Bus Terminal is an important as a local and regional hub for public transportation, and there is potential for the railroad crossing at S. Crater Road to be a future commuter rail station. The surrounding land uses at both locations should facilitate higher density residential development, sidewalks and bike lanes, commercial uses, and other uses that may provide greater densities of residential and/or employment development. Additional land use considerations and designations are addressed in Chapter 10 of this Plan.

LOOKING AHEAD

VTrans

VTrans is the state's multimodal surface transportation plan developed by the Commonwealth Transportation Board (CTB) in partnership with the Virginia Office of Intermodal Planning and Investment (OIPI). VTrans identifies mid-term needs, long-term risks and opportunities, and strategic actions to advance multimodal transportation in the state. VDOT allocates funds to projects based on their alignment with the goals of the VTrans Plan.

VTrans prioritizes:

- Optimized return on investments;
- Safe, secure, and resilient transportation systems;
- Efficiency in delivering programs;
- Considering operational improvements and demand management first;
- Promoting performance management, transparency, and accountability;
- Improved coordination between transportation and land use; and
- Efficient intermodal connections.

VTrans mid-term needs and priorities in Petersburg (Map 9.7) were last identified in 2021 and identify several different needs, the most common of which include public transit access, bicycle access, and transportation demand management.

Six-Year Improvement Plan (SYIP)

CTB allocates public funds to transportation projects over six fiscal years under the Six-Year Improvement Program (SYIP). There are 29 projects under the SYIP (FY 24) in Petersburg. The SYIP is updated annually by VDOT and therefore will include different projects over the 20-year life of PetersburgNEXT. Petersburg will continue annual evaluation of projects included in the SYIP and work with VDOT to ensure their successful completion.

Petersburg's current SYIP is included as Appendix B.

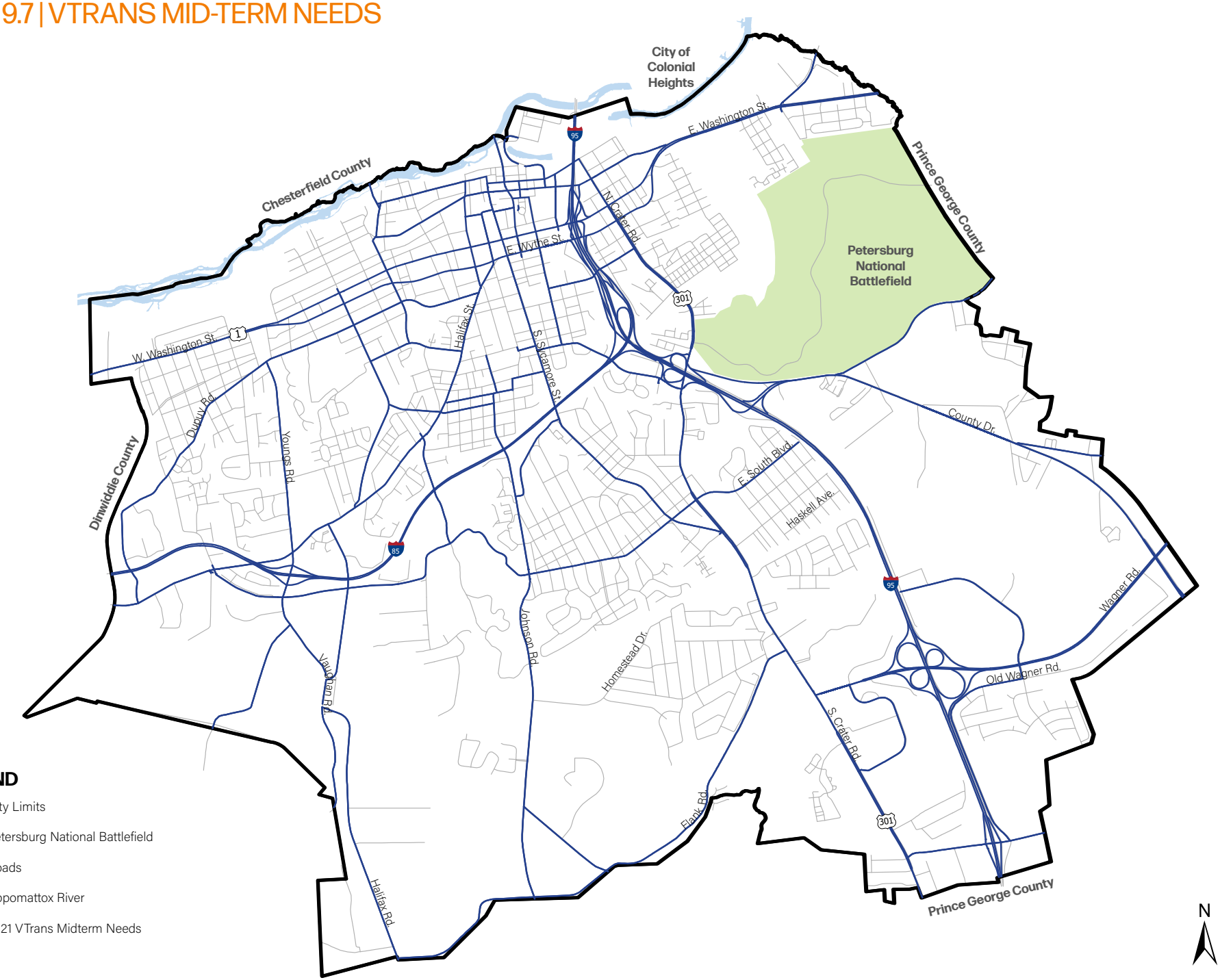
Click here to explore the VTrans interactive map and learn more about VTrans mid-term needs and priorities in Petersburg and around the Commonwealth.

Petersburg enjoys **strong partnerships with its regional and state partners**, including CPDC, TCAMPO, VDOT, and DRPT. These partners are instrumental in assisting Petersburg as it continues to build a **safe, sustainable, and equitable transportation network**.

Additional studies provide resources and recommendations for the future of transportation in Petersburg. They should be **reviewed and followed where harmonious with the recommendations of PetersburgNEXT**:

- Appomattox River Trail Master Plan
- CPDC Comprehensive Economic Development Study (CEDS)
- CPDC 2019 Coordinated Human Services Mobility Plan
- Downtown Master Plan (in progress)
- DRPT Transit Equity and Modernization Study
- Interstate 85 Technical Memorandum
- PAT Transit Development Plan
- Washington Street Road Safety Audit
- TCAMPO Plan 2045
- VDOT Pedestrian Safety Action Plan

MAP 9.7 | VTRANS MID-TERM NEEDS



Priority Transportation Projects

Based on existing conditions, analysis of opportunities, and recent planning factors and assumptions, Petersburg's transportation needs and priorities are in the following focus areas:

- Safety;
- Operations; and
- Alternative Transportation (public transit, bicycle, pedestrian).

Priority transportation projects have been identified by examining Petersburg's existing and future transportation needs while taking into consideration community input and existing information from the plans and programs included in this Chapter. These projects can be considered implementation priorities of their own in addition to the strategies included at the end of this chapter. The projects are intended to be consistent with the SYIP, CTB approved road alignments, and VTrans needs for Petersburg.

Table 9.3 provides a list of the transportation projects that Petersburg should prioritize and undertake to better connect the community to important destinations and services within and outside the City. Priority projects illustrated in Map 9.8; the project numbers listed in the table corresponds with the numbers on the map.

TABLE 9.3 | PRIORITY TRANSPORTATION PROJECTS

Project ID	Project Name	Project Description	Cost Estimate*	Improvement Type
Short-Term (0-5 Years)				
1	South Side Depot Restoration	Restore the South Side Depot as a historically significant piece of transportation infrastructure. Upon restoration, the South Side Depot will function as a tourism and visitor center for the City, with a potential partnership with the Petersburg National Battlefield.	$713,000	Enhancement
2	S. Sycamore Street ADA Accessibility	Improve ADA accessibility along S. Sycamore Street through upgrading and installing sidewalks, crosswalks, and pedestrian signals.	$500,000	Safety, Alternative Transportation
3	Halifax Road/ Collier Yard Access Improvement	Determine alternatives for improving access from Halifax Road to vacant property at the south end of Collier Yard, with the goal outcome of improving intermodal freight and economic development.	N/A	Operations
4	Puddledock Road/E. Washington Street Intersection Improvements	Synchronize traffic signals, adjust the stop bar location, and pursue further upgrades as needed to provide for better operations and enhance safety.	$2,120,000	Safety, Operations, Congestion
5	Petersburg Area Transit (PAT) Bus Stop Amenities	Purchase and install benches, bus stop signs, trash cans, and passenger shelters at PAT bus stops.	$159,000	Alternative Transportation
6	Short-Term Bikeways	Complete bikeways at all the locations identified in Table 9.2 as a short-term implementation priority.	$10,000,000	Alternative Transportation
7	Washington and Wythe Streets - Two-Way Streets	In partnership with VDOT and TCAMPO, select and proceed with an alternative for converting Washington St and Wythe St between Atlantic Street and Amelia Street to two-way roads to improve safety and traffic flow for vehicles and pedestrians.	TBD by study (in progress)	Safety, Operations, Congestion
8	S. Crater Road/Wagner Road/Rives Road Corridor Improvements	Implement the findings of the VDOT Project Pipeline Study to improve safety, congestion, transportation demand management, and alternative transportation accessibility along the S. Crater Road, Wagner Road, and Rives Road corridor.	TBD by study (in progress)	Safety, Operations
9	Interstate 95/ Interstate 85 Interchange Study	Implement the findings of the ongoing Interstate 95/ Interstate 85 interchange STARS study.	TBD by study (in progress)	Operations, Congestion

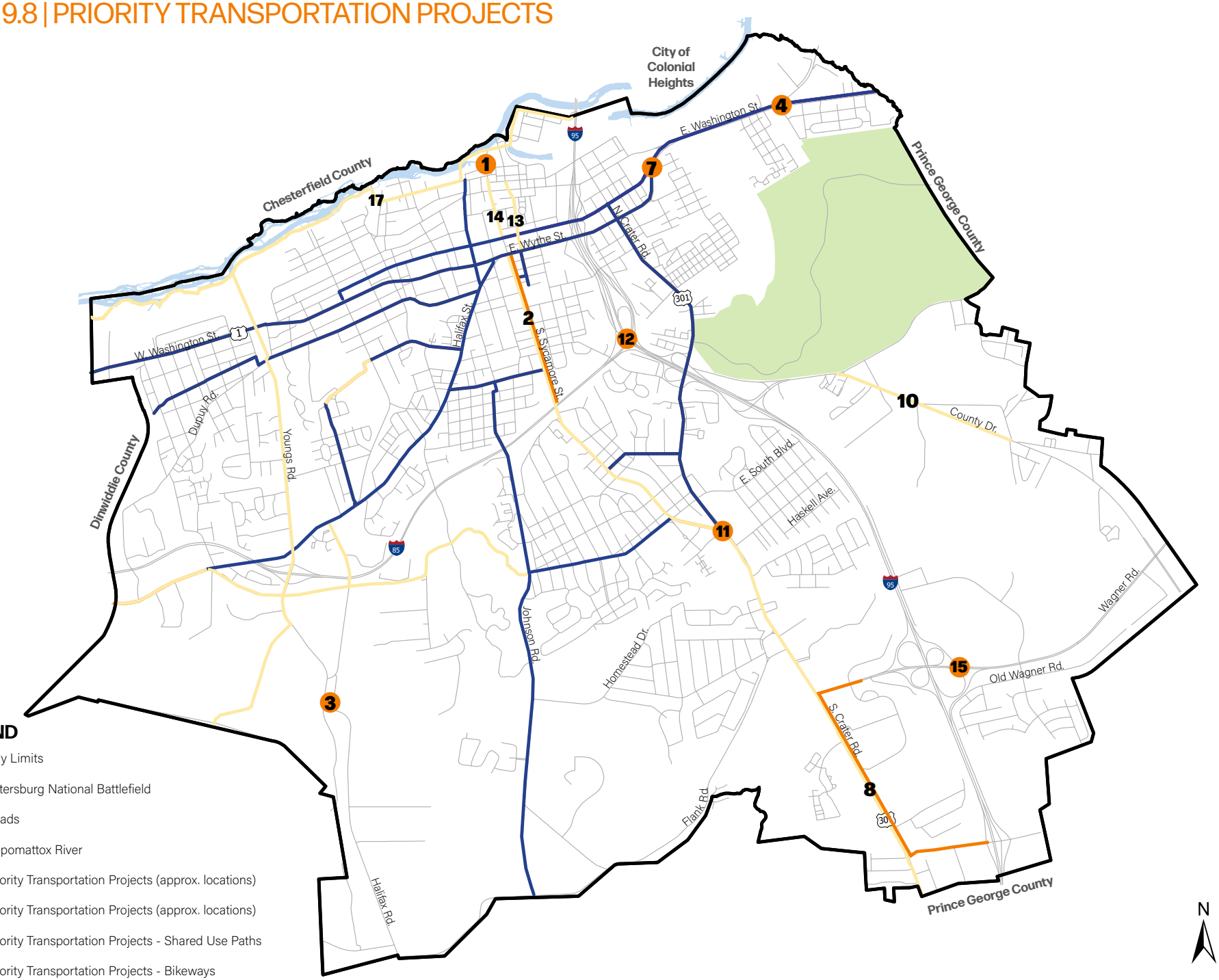
* Cost estimates are planning-level estimates developed based on estimates from available plans/studies and analysis of comparable projects. They are intended to be high-level in nature; official costs will vary based on completion date and project scope.

Railroad crossing in Old Towne

Project ID	Project Name	Project Description	Cost Estimate*	Improvement Type
Long-Term (6-15 Years)				
10	County Drive Improvements	Add a protected shared-use path on one side of County Drive in the vicinity of Fort Gregg-Adams and the Petersburg National Battlefield.	N/A	Operations, Alternative Transportation
11	S. Sycamore Street & S. Crater Road Intersection Realignment	Evaluate alternatives to realign the S. Sycamore Street & S. Crater Road intersection with the goal of alleviating congestion and reducing both pedestrian and vehicular crashes.	N/A	Safety, Operations
12	Interstate 85/ Interstate 95 Interchange Improvements	Evaluate alternatives to improve northbound travel on Interstate 85 to southbound travel on Interstate 95; goal is to reduce travel time and reduce the number of off-road crashes.	N/A	Safety, Congestion
13	N. Adams Street Complete Street	Convert N. Adams Street between Bollingbrook Street and E. Wythe Street to a complete street.	$5-10,000,000	Safety, Alternative Transportation
14	N. Sycamore St. Complete Street	Convert N. Sycamore Street between Old Street and E. Washington Street to a complete street.	$7-12,000,000	Safety, Alternative Transportation
15	Park and Ride Lot	Construct an additional park-and-ride lot at the Interstate 95/Wagner Road interchange.	$7,000,000	Congestion, Alternative Transportation
16	Mid-Term and Long-Term Bikeways	Complete bikeways at all the locations identified in Table 9.1 as mid-term and long-term implementation priorities.	$20,000,000	Alternative Transportation
17	Appomattox River Trail	Fund and complete the planned Appomattox River Trail from end-to-end in Petersburg.	$37,000,000	Alternative Transportation
18	I-95 Northbound to I-85 Southbound Evaluation	Reevaluate Feasibility Study from 2014 to determine other cost effective alternatives for roadway improvements. Study should focus on improving operations on Interstate 85, Interstate 95, and the C-D lanes between I-85/I-95/US 301. Target outcomes are reducing travel time and frequency of rear-end crashes.	N/A	Safety, Congestion

* Cost estimates are planning-level estimates developed based on estimates from available plans/studies and analysis of comparable projects. They are intended to be high-level in nature; official costs will vary based on completion date and project scope.

MAP 9.8 | PRIORITY TRANSPORTATION PROJECTS



LEGEND

- City Limits
- Petersburg National Battlefield
- Roads
- Appomattox River
- Priority Transportation Projects (approx. locations)
- Priority Transportation Projects (approx. locations)
- Priority Transportation Projects - Shared Use Paths
- Priority Transportation Projects - Bikeways

NOTE: Priority Project IDs 5 and 9 are not shown on the map as they are proposed to occur at numerous locations throughout the City.

N

Moving People and Goods Safely, Efficiently, and Equitably

Goal Statement: Petersburg's community is equitably connected through a well-designed, well-maintained, and multi-modal regional transportation network.

Objectives	Strategies
9.1 Ensure the existing transportation network remains safe, reliable, and efficient.	9.1.1.: Include ongoing repairs of bridges and culverts as routine maintenance in addition to other roadway improvement projects. Prioritize repairs to bridges and culverts in poor condition to prevent further degradation and the need for weight limit reductions.
	9.1.2: Complete a repaving schedule for Public Works that establishes current road conditions and identifies priority locations for maintenance or upgrades, with an emphasis on preventative maintenance.
	9.1.3: Place speed cameras in school zones around all Petersburg Public Schools to facilitate safety for children, pedestrians, and bicyclists during school hours.
	9.1.4: Complete a parking study/inventory in Old Towne to provide further information about parking surpluses, deficiencies, and maintenance priorities.
	9.1.5: Complete additional road safety audits along Wythe Street, Halifax Street, and Sycamore Street.
	9.1.6: Work with the Virginia Department of Transportation (VDOT) to ensure successful completion of projects included in VTrans and the City's Six-Year Improvement Plan.
	9.1.7: Develop a maintenance plan for City-owned alleyways.
9.2 Continue to invest in and advertise public transportation as a valuable transportation mode.	9.2.1: Update Petersburg Area Transit's (PAT) Transit Strategic Plan to include an emergency evacuation plan.
	9.2.2: Reassess Petersburg Area Transit's (PAT) routes every three years.
	9.2.3: Create a Transit Advisory Board to help inform Petersburg Area Transit's (PAT) strategic planning.
	9.2.4: Develop and maintain a user-friendly Petersburg Area Transit's (PAT) website, independent of the City's official website, and keep PAT social media page updated with accurate information about PAT routes, fares, bus stop locations, and other important information.
	9.2.5: Prioritize safety and accessibility improvements such as lighting and ADA features at all Petersburg Area Transit's (PAT) bus stops.

Objectives	Strategies
9.3 Increase opportunities for active transportation that equitably serves residents in all neighborhoods of the City.	9.3.1: Make an annual funding commitment to support implementation of the Appomattox River Trail and ongoing trail maintenance.
	9.3.2: Complete a study to assess the feasibility of developing complete streets at Washington & Wythe Streets, N. Adams Street, N. Sycamore Street, S. Crater Road, Halifax Street, and Homestead Drive; this study will also serve as a foundation for grant funding.
	9.3.3: Adopt ordinances requiring pedestrian walkways be maintained during any street closures related to construction and requiring new pedestrian connections at all new development.
	9.3.4: In partnership with the Crater Planning District Commission (CPDC) and the Tri-Cities Area Metropolitan Planning Organization (TCAMPO), complete a greenways plan to identify potential locations for future greenways and steps for acquisition and development.
	9.3.5: In partnership with Virginia Department of Transportation (VDOT) and the Petersburg Active Transportation Work Group, obtain funding for Safe Routes to School (SRTS) projects at Pleasants Lane Elementary and Blandford Academy.
	9.3.6: In partnership with local and regional organizations, educate the community on active transportation through holding quarterly community events such as Walk to School Day.
	9.3.7: Ensure that any support of shared e-bike and e-scooter programs is coupled with committed investments in bike lanes, streetlights, and complete streets.
9.4 Coordinate with regional partners in significant transportation investments, especially those that enhance equity or are associated with employment centers.	9.4.1: In collaboration with state and federal agencies, leverage grant funding for other Amtrak station improvements that may become necessary during the timeframe of this Plan.
	9.4.2: Work with Friends of the Lower Appomattox River (FOLAR) and the Virginia Department of Transportation (VDOT) to develop and locate appropriate safety and wayfinding signage along the Appomattox River Trail and banks of the Appomattox River.
	9.4.3: Coordinate with the Virginia Department of Transportation (VDOT) and the Tri-Cities Area Metropolitan Organization (TCAMPO) to evaluate regionally significant corridors, such as U.S. Rt. 460 and U.S. Rt. 1, to identify barriers to emergency evacuation in the event of a disaster and prioritize needed improvements.
	9.4.4: In partnership with state agencies and neighboring localities, support the development and implementation of the Southeast Corridor High Speed Rail project through funding and participation in planning committees and boards.
9.5 Recognize the ways in which transportation infrastructure informs future growth and development patterns in Petersburg.	9.5.1: Map and record the location and quality of all sidewalks in Petersburg to provide a foundation for data-driven, location-based investment over the next twenty years.
	9.5.2: Amend the Zoning Ordinance to reduce parking minimums and require installation of bike racks at parking areas in multi-family residential, commercial, and mixed-use districts.
	9.5.3: Amend the Zoning Ordinance to require EV charging stations at all new multi-family residential, mixed-use, commercial, and industrial development based on the number of parking spaces on site.
	9.5.4: Adopt the draft Petersburg Complete Streets Policy developed in partnership with the National Complete Streets Coalition.

10

LAND USE

Petersburg will support land use and development patterns that are high-quality, environmentally sustainable, and enhance economic opportunity and equity for the community.

"**REMODEL** THE OLD BUILDINGS, BUILD NEW ONES. **MAINTAIN THE ROADS AND CREATE SAFE PLACES** FOR FAMILIES AND KIDS."

- Community Survey Respondent

10

INTRODUCTION

Petersburg is experiencing a rebirth. With renewed interest in advanced manufacturing, tourism, recreation, and residential development, the challenges currently facing Petersburg are how to direct new growth in a way that makes efficient use of land and infrastructure and how to prioritize development that grows the tax base, alleviates blight, preserves the environment, and enhances health and equity for all residents. Not all growth and development is beneficial, and Petersburg finds itself in the position to be selective about the types of development occurring within its borders. This is because the built environment and associated land use patterns serve as a reflection of Petersburg's vision, values, and priorities: by making smart and intentional land use decisions, the City's long-term vision can be physically manifested.

Land use is intertwined with all other elements of PetersburgNEXT, with land use strategies directly tied to other goals, objectives, and strategies. Policies for transportation, economic development, housing and neighborhoods, public safety, and community facilities must be compatible with the overarching land use plan to ensure Petersburg grows and develops as envisioned.

This chapter highlights existing land use patterns, analyzes regional land use considerations and the need for collaborative planning, and establishes a Future Land Use Map and Framework to guide Petersburg as it moves forward into its bright future.

COMMUNITY FEEDBACK: LAND USE

- The most desired future land uses in Petersburg are commercial redevelopment and infill; residential redevelopment and infill; and open and recreational space.
- The least desired future land uses in Petersburg are office parks and new residential development that is not redevelopment/infill.
- The most desirable types of new commercial and industrial development were identified to be local and small businesses, general retail, and entertainment venues.
- Petersburg's architecture and real estate inventory were identified as some of its greatest strengths.
- Assets that Petersburg can leverage to attract and retain future commercial and industrial growth include history, proximity to institutions of higher education, centralized location in Virginia, and general availability of both land and vacant buildings that can be repurposed.

EXISTING LAND USE

Existing land use patterns are not easily changed, and therefore have a large impact on the location and type of future development. Understanding existing land use patterns in Petersburg is essential to planning for and directing future growth.

- **Residential:** Most of Petersburg's land area is residential in nature. Low-density residential uses in the form of single-family detached housing are the most common. Townhomes, duplexes, and apartments are scattered across Petersburg. Petersburg currently has nine residential zoning districts, not including mixed-use or planned development districts.

- **Commercial:** S. Crater Road is Petersburg's primary commercial corridor, with other pockets of commercial uses found in Old Towne and along Wagner Road and Washington Street. Commercial uses in Petersburg are characterized mainly by strip development with a large anchor store and several outparcel stores, or standalone general retail uses such as car washes, restaurants, and gas stations with convenience stores.

- **Industrial:** Petersburg's industrial areas are located along W. Washington Street near Dinwiddie County, along Halifax and Boydton Plank Roads around the Petersburg Interstate Industrial Park and Collier Yard, along Puddledock Road, and on Normandy Drive around the pharmaceutical campus. Other historic industrial sites that may have been adaptively reused for residential or commercial uses are scattered around the city. Petersburg's industrial areas are largely sited along railroad corridors and major transportation routes, reflecting the historic need for proximity to access for freight trucking and rail. It is important to note that much of the land currently zoned for industrial is either undeveloped or has been abandoned. Additionally, much of the industrial zoned land is in or near Petersburg's low-income minority neighborhoods such as Lakemont and Pocahontas Island, creating environmental justice concerns that must be remedied (see Chapter 8). Future industrial properties and uses should therefore be carefully evaluated to minimize adverse impacts on surrounding residential areas.

- **Mixed-Use:** Mixed-use development is characterized by a variety of uses in a single development. It can be horizontal (e.g., a planned development with townhomes and a few small retail stores) or vertical (e.g., a building with office space on the first floor and residential apartments on all subsequent floors). Mixed-use development is uncommon in Petersburg outside of the downtown core, mainly due to historic land use patterns that focus on neighborhood streets in a grid system oriented around a commercial or civic node. Petersburg's zoning classifications have also served to reinforce traditionally single-use areas. However, mixed-use development is a valuable opportunity for Petersburg to meet its goals for high-quality, walkable, and diverse neighborhoods in proximity to employment and educational opportunities.

Poplar Lawn Park

- **Civic:** Civic land uses are comprised of both public and private facilities that serve the community with essential services. These include but are not limited to government offices, schools, places of worship, post offices, and healthcare. Petersburg's civic land uses are scattered throughout the City but can primarily be found in Old Towne and along S. Crater Road, Johnson Road, and Medical Park Boulevard.

- **Agricultural and Conservation:** Conservation areas include land that is protected due to its status as a park, green space, sensitive environmental habitat, or conservation easement. These areas are primarily located along the Appomattox River, Flank Road, and Siege Road. Petersburg National Battlefield comprises a large area in the northwest corner of the City. Agricultural land uses in Petersburg are limited and non-intensive but can be found in the southwest areas of the City along Flank Road and Johnson Road.

Land use and development in Petersburg is regulated by the Zoning Ordinance and the Zoning Map. Zoning controls the types of uses that are permitted on the land, the density of development, and dimensional requirements such as minimum lot size and lot width. Zoning can also address community design standards such as lighting, landscaping, and open space, and can provide additional performance standards for unique uses or uses that may have potentially negative impacts – such as odor and noise – on neighboring properties.

The Zoning Ordinance includes districts designated for agricultural, residential, commercial, and industrial uses. Petersburg has 19 primary zoning districts, with residential districts covering most of the City.

It is important to note that the Zoning Map and the Future Land Use Map in this Plan are not interchangeable. Future land use designations and maps in this Plan have no immediate effect on an individual parcel of land, and are not regulatory in nature, but are used to guide future zoning changes. Future zoning changes should conform with established future land use designations and maps. That said, the two maps must work in tandem. The Zoning Ordinance and Zoning Map should be reviewed and updated as necessary to ensure compliance with the goals of PetersburgNEXT.

INTENTIONAL LAND PLANNING

Land Use and Equity

PolicyLink, a national leader in advancing socioeconomic equity, defines equity as "just and fair inclusion into a society in which all can participate, prosper, and reach their full potential...unlocking the promise of the nation by unleashing the promise in us all." As Petersburg looks ahead to its bright future and plans for growth, it must ensure that all residents – including children, the elderly, renters, racial minorities, and single-parent households – can benefit from that growth.

The American Planning Association (APA) identifies nine best practices for ensuring that equity is provided for the housing, services, health, safety, and livelihood needs of all citizens and groups through a city's land use decisions.

- **Provide a range of housing types:** In addition to the strategies identified in Chapter 4, the Future Land Use Map will facilitate a range of housing types and densities throughout Petersburg.

- **Plan for a jobs-housing balance:** The Future Land Use Map supports a wide range of housing types in proximity to employment opportunities. New development as well as adaptive reuse and infill are all encouraged to both respond to employment growth and grow the housing supply in a sustainable manner.

- **Plan for the physical, environmental, and economic improvement of at-risk, distressed, and disadvantaged neighborhoods:** PetersburgNEXT discusses actionable steps to remedy residential blight, address environmental justice considerations, and support a variety of attainable and stable job opportunities through partnerships and incentives.

- **Plan for improved health and safety for at-risk populations:** Chapter 6 of PetersburgNEXT addresses the need to provide equitable and creative health solutions to serve at-risk populations. Chapter 8 discusses the connection between public safety and community health and wellness and identifies strategies for strengthening this connection during the timeframe of the Plan.

Old Towne Petersburg

- **Provide accessible, quality public services, facilities, and health care to minority and low-income populations:** Petersburg can work with its community partners and state and federal agencies to leverage innovative solutions and provide equitable healthcare to the community. This can be done through mobile clinics, telehealth, educational outreach programs, and school-based health centers.

- **Upgrade infrastructure and facilities in older and substandard areas:** Petersburg has made progress in recent years to upgrade outdated transportation and utility infrastructure, namely around the Poor Creek area. Capital improvements planning should occur annually to further guide infrastructure investments.

- **Plan for workforce diversity and development:** Encouraging entrepreneurship and workforce development programs will be critical to create new job pathways and build community wealth.

- **Protect vulnerable populations from natural hazards:** Development should not be permitted in floodplains to not only preserve Petersburg's natural resources, but to serve as a protective measure against the impacts of severe weather and climate change. This has widespread benefits for the entire community, including vulnerable populations.

- **Promote environmental justice:** Heavy industrial uses with significant external impacts should be sited away from residential areas to the extent possible, especially neighborhoods that are low-income and/or BIPOC (Black, Indigenous, and People of Color) communities. All industrial and commercial uses should seek to integrate principles of low-impact, environmentally friendly design into their structures to provide environmental benefits, in turn positively impacting air and water quality.

Land Use, Health, and Wellness

Intentional land use planning can have profound effects on enhancing community health and wellness. One of the ways in which land use and community health are related is through the concept of "food deserts," which are low-income areas with limited or no access to options for fresh and healthy food. Attracting sustainable sources of healthy food throughout the City is important to help ensure equitable access to healthy food options for all Petersburg residents. This includes traditional grocers and general retail but can also be provided through food sources such as urban gardens, neighborhood markets, specialty food retailers, farm stands, or farmers' markets. These food sources should be sited in traditional commercial areas, but also interspersed through neighborhoods and included in mixed-use development to facilitate equitable access and help create discernible neighborhood centers.

Active transportation opportunities can also promote healthy and active lifestyles. New development should seek to connect existing pedestrian and bike infrastructure, either through the installation of new sidewalks or bike lanes or through upgrading existing infrastructure that is outdated or poorly maintained. Green space should also be integrated into new development, especially higher-density residential and mixed-use development. Environmental justice

is discussed in Chapter 8 and is another important aspect of how land use decisions impact public health.

Land Use, Facilities, and Infrastructure

Planning for future land uses should help prioritize public utility and infrastructure expansions. Balanced growth strategies that encourage efficient service and facility delivery should guide new development to appropriate areas where utilities are either readily available or are able to be expanded to meet projected demand. Future land use should consider realistic and sustainable service goals, expectations, and economic feasibility. Balancing the cost of public services, along with ensuring related mechanisms such as connection fees and permit fees are appropriate, is the backbone of fiscally responsible and sustainable growth. Growth should support a balance of residential and employment uses that will simultaneously bring economic opportunity to Petersburg residents while protecting historic character and preventing displacement of long-term residents.

All new residential, commercial, and industrial development should be prioritized in areas with adequate water and sewer capacity or that are planned for expansion. In areas where water, sewer, or both are unavailable, the developer should be responsible for providing utility connections. Wells and septic systems should be limited as much as possible to prevent adverse environmental impacts.

Land Use and Sustainability

Each land use in Petersburg has benefits and impacts that must be balanced to ensure a sustainable future. Sustainable land use and development practices help mitigate unintended environmental impacts and protect against habitat disruption, resource strain (including potable water and energy consumption), and greenhouse gas emissions. Also of critical importance is the need to locate new development, community facilities, and other key infrastructure resources away from sensitive ecological areas, floodplains, and areas susceptible to sea level rise.

The Chesapeake Bay Preservation Area (CBPA) ordinance protects local water quality by reducing pollution and promoting water resource conservation. The CBPA has two components, Resource Protection Areas (RPAs) and Resource Management Areas (RMAs). The CBPA has enhanced provisions for erosion and sediment control requirements, best management practices, and other tools for reducing pollutants and protecting water quality. Land use considerations for new development and redevelopment should be

Pavilion in Rotary Park

mindful of water quality impacts and proximity to sensitive environmental resources in the RPA and RMA. Additional discussion of environmental stewardship is included in Chapter 8.

Land Use and Mobility

Transportation and land use are inextricably linked. As growth and development occur, investments in the City's transportation network – including repair and maintenance of existing infrastructure – will be necessary to support the rise in user demand. Additionally, a transportation network that provides accessible walking, biking, and public transportation options allows residents who do not have a personal vehicle, or who cannot operate one due to age or physical health considerations, to access job opportunities and services such as grocery stores and parks.

Regional Considerations

Coordination with neighboring communities, regional organizations, and state and federal agencies can facilitate land use policies that expand across borders to better achieve livable communities. Several of the challenges and opportunities discussed in PetersburgNEXT are best considered at a regional level to avoid planning within a vacuum of Petersburg's boundaries. In addition, large-scale planning projects, such as transportation or recreation investments, can reduce cost and time burden when the efforts are shared amongst partners. This can help ensure smoother, more effective, and more comprehensive planning projects across locality borders.

Petersburg values coordination with its neighboring localities, the Crater Planning District Commission (CPDC), and state agencies to ensure that large scale and regional planning efforts are successfully and intentionally executed. The following regional considerations are important to remain mindful of, as they will play a role in shaping future development proposals and patterns throughout the City and region:

- **Demographic:** Petersburg's neighbors to the north and east – Chesterfield and Prince George Counties – are experiencing rapid population growth. Petersburg's neighbors to the west and north – Dinwiddie County and Colonial Heights – are experiencing a stabilizing population. Petersburg's population is also projected to stabilize between 2030 and 2050 (see Chapter 2).

- **Economic:** The region's proximity to ports in Richmond and Norfolk, as well as connectivity to the East Coast through railroads and Interstates 85 and 95, have sparked the rapid expansion

ArtistSpace Lofts

of warehousing and distribution centers, particularly in Petersburg and in Dinwiddie and Chesterfield Counties. Remote work is also growing throughout the region; the completion of universal broadband in Virginia may further accelerate growth. Recent growth in advanced manufacturing throughout the region is also important for spurring increased investment in regional workforce development and talent pipeline programs.

- **Recreation:** The expansion of cross-jurisdictional recreational opportunities such as the Fall Line Trail, Appomattox Riverside Trail, and East Coast Greenway will provide not only expanded opportunities for active and passive recreation but will also be able to be leveraged for eco-tourism. Petersburg and its neighbors should be prepared for an influx of tourists and should support hospitality-oriented land uses around trail entry and exit points. These opportunities will likely have profound economic implications as well. For example, the 150-mile Great Allegheny Passage in Pennsylvania and Maryland generated more than $74 million in direct spending, nearly $22 million in indirect spending, and almost $25 million in induced spending during 2019. The Virginia Capital Trail generated $6.1 million in 2019, with most spending within a 50-mile radius of the trail.

- **Transportation:** An increase in warehousing and distribution centers will lead to an increase in heavy truck traffic. Equity considerations and uneven access to alternative transportation such as public transportation, bicycle infrastructure, and pedestrian infrastructure persist throughout the region. Any investments in public transportation and bicycle and pedestrian infrastructure should ensure safe connection to employment centers and services such as grocery stores and hospitals.

- **Environmental:** All neighboring localities except for Dinwiddie County are subject to the regulations of the Chesapeake Bay Preservation Act (see Chapter 8). As the Chesapeake Bay and Appomattox River are not confined to one locality, so environmental protection and preservation efforts will not be successful without cross-jurisdictional coordination.

FORT GREGG-ADAMS JOINT LAND USE STUDY

The Fort Gregg-Adams (Lee) Joint Land Use Study (JLUS) was developed through coordination with Fort Gregg-Adams, the CPDC, Chesterfield and Prince George Counties, and the Cities of Colonial Heights and Hopewell. **The purpose** of this collaborative planning process was to **identify locations where land use conflicts between the civilian population and military installation are presently occurring or may occur in the future**. The JLUS identifies recommendations for zoning, land use tools, and other development regulations that are **intended to result in more compatible land uses, therefore ensuring the long-term viability of Fort Gregg-Adams.**

Petersburg should **integrate the recommendations of the current JLUS** and **continue to be an active partner** with its neighboring localities, Fort Gregg-Adams, the CPDC, and the U.S. Department of Defense (DOD) in future updates and planning efforts.

Click here to read a summary of the JLUS Findings and Recommendations!

Petersburg National Battlefield
Photo Credit: National Park Service

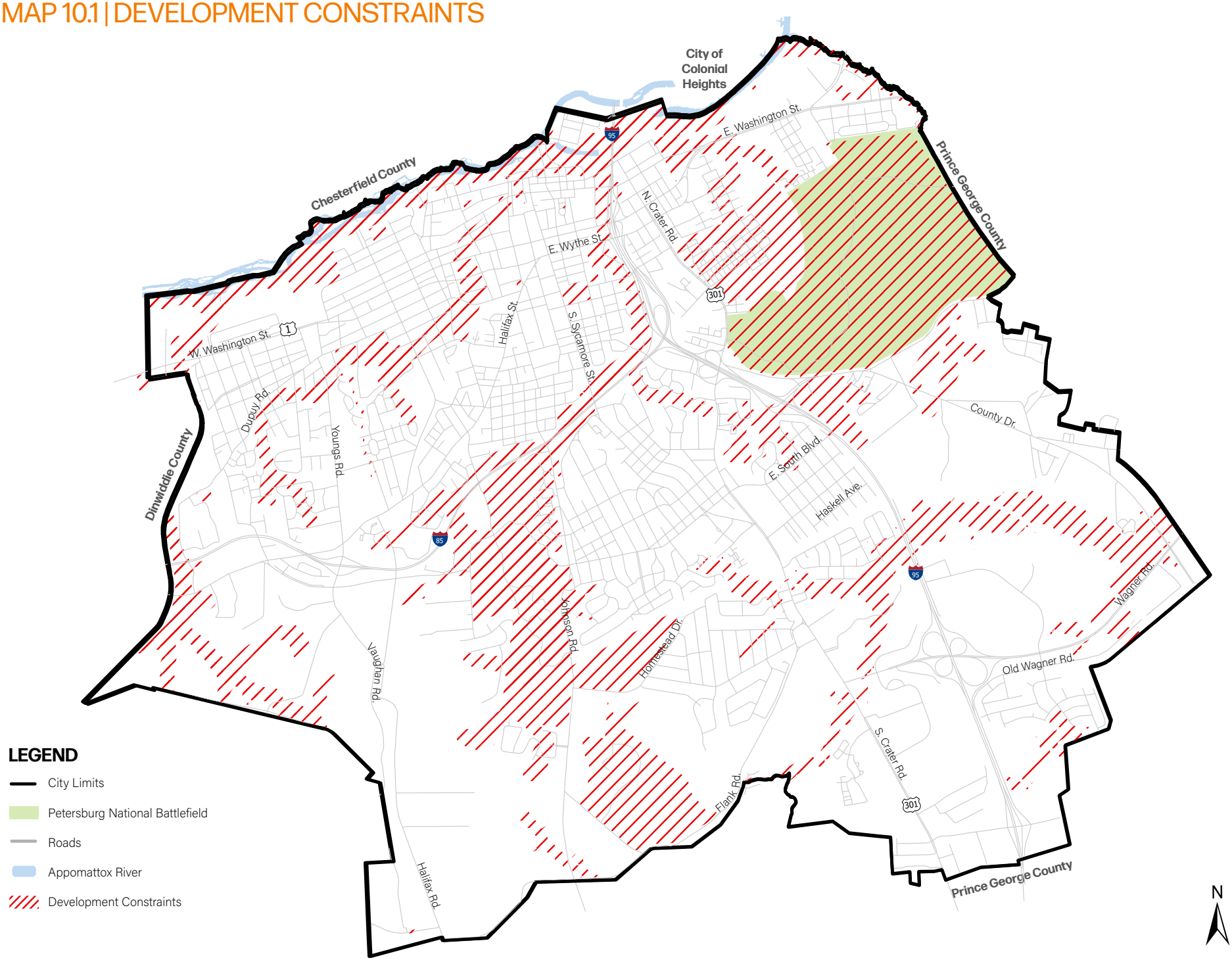
DEVELOPMENT CONSTRAINTS

Development constraints are natural and man-made factors that may either make future development difficult or prevent it entirely. Because much of Petersburg does have sensitive environmental habitats, historic lands, and other development constraints, it will be important to have clear guidelines to guide smart and sustainable growth to developable areas of the City.

- **Natural Features:** Floodplains, wetlands, steep slopes, Resource Management and Resource Protection Areas
- **Conservation Lands:** Parks, conservation easements, and cemeteries
- **Infrastructure:** Areas where water and sewer may not be available or currently lack the capacity to support high rates of future growth and development

Map 10.1 depicts natural development constraints and conservation lands. New development should be discouraged in these areas as much as possible to comply with state environmental regulations and to preserve Petersburg's natural and historic resources for the next generation and beyond.

MAP 10.1 | DEVELOPMENT CONSTRAINTS



WHAT IS TRADITIONAL NEIGHBORHOOD DEVELOPMENT?

All new development in Petersburg should incorporate principles of Traditional Neighborhood Development (TND). TND is a land use approach that provides compact, mixed-use, and pedestrian-oriented development. It can reduce urban sprawl, in turn creating environmental and transportation benefits, and can also promote enhanced equity.

Characteristics of TND include:

- A discernible neighborhood center, such as a park or community space
- Integration of bicycle and pedestrian infrastructure
- A variety of housing types, including accessory dwelling units and apartments
- Ability to walk to employment, education, amenities, services, and places of worship
- A well-connected street grid without cul-de-sacs or dead ends
- Integration of the natural environment and green development

FUTURE LAND USE FRAMEWORK

The Future Land Use Framework and associated Future Land Use Map (FLUM; Map 10.2) establish the recommended pattern and character for future development in Petersburg for the next twenty years. It does not regulate private property but rather is intended to provide guidance to City staff, the Planning Commission, City Council, and the community for evaluating proposed land use changes and development proposals. Together, the Framework and FLUM provide a depiction of how Petersburg should grow to achieve its vision of the future and help guide the direction, design, and outcome of new land uses throughout the City.

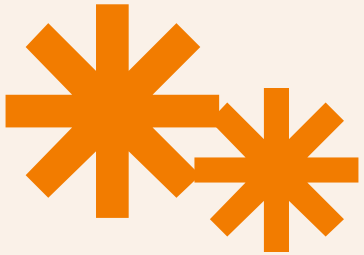
Petersburg's Zoning Ordinance, Zoning Map, and Subdivision Ordinance are the regulatory tools by which the FLUM and Framework are implemented. Petersburg should carefully evaluate its Zoning and Subdivision Ordinances and Zoning Map to identify districts and regulations that are inconsistent with the areas and principles established by the Framework and FLUM and update accordingly to create harmony and ensure successful implementation.

Land use changes will happen gradually over time as development adds residential density, generates employment and tax revenue, or converts one land use to another. In weighing development applications, Petersburg's staff, Planning Commission, and City Council should reference the Future Land Use Map and Framework as well as evaluate the needs of a changing community, the desire for high-quality development, the need to remedy blight, the need to increase multi-modal transportation opportunities, and the economic necessity of improving the City's tax base.

AREA DESIGNATIONS

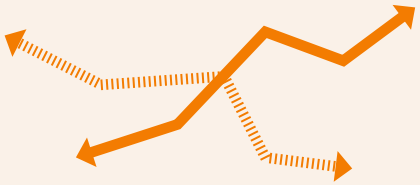
Area Designations represent areas of Petersburg that may share distinct characteristics by virtue of geographic location, built form, character, historic qualities, orientation of the street grid, and/or types of use. As a planning tool, these areas reflect the ideal form, character, and planning principles of future development and redevelopment.

As development applications are evaluated, these pattern areas will serve as a guide for City leaders and staff in evaluating the appropriateness of future developments.



GATEWAYS

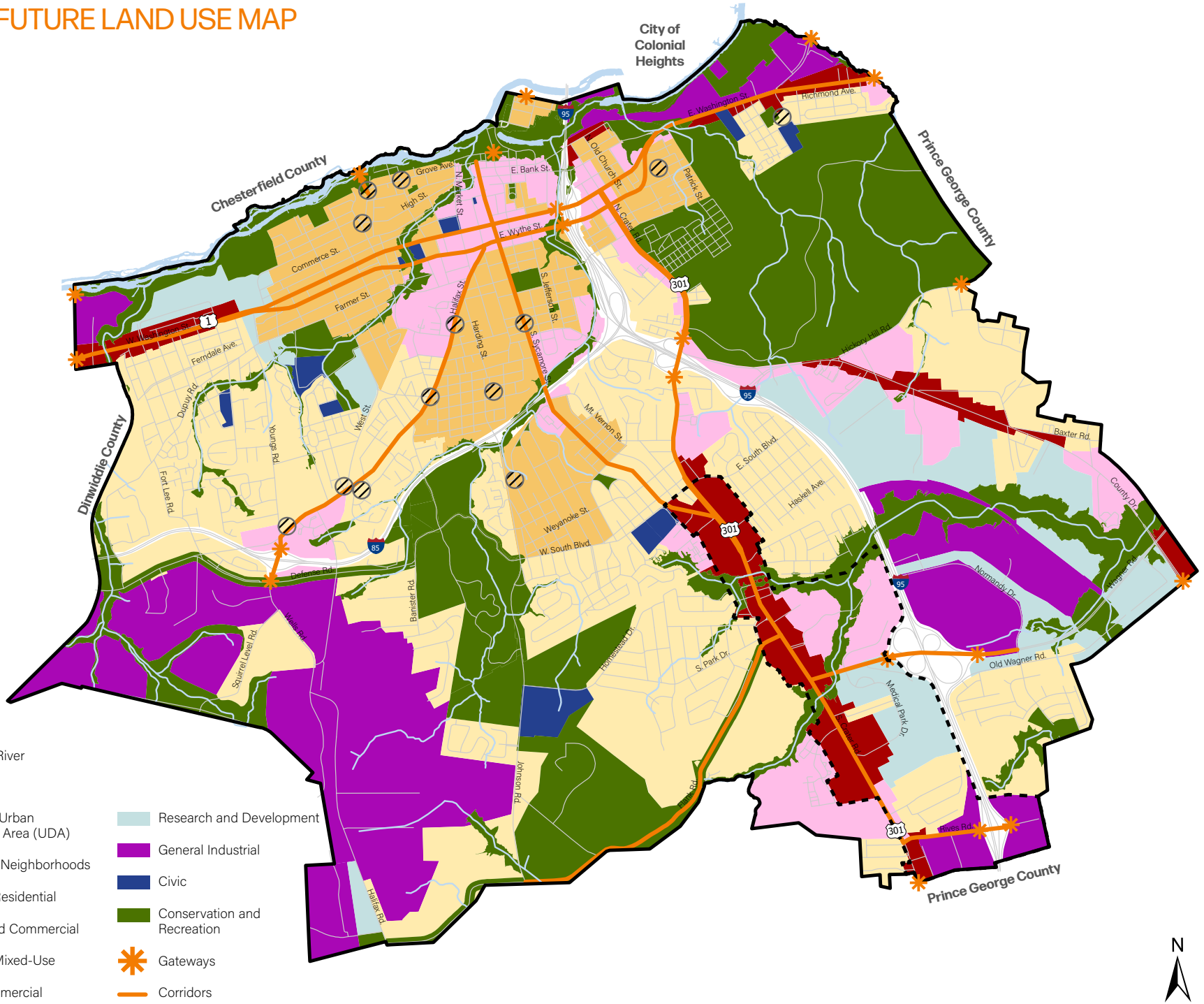
Gateways are key places where the Appomattox River and the regional road, rail, and trail networks enter Petersburg. These gateways are bridges between the transportation network, surrounding development, and neighoring localities. They serve as the community's front door, establishing first impressions and reinforcing perceptions of the City. Planning strategies should prioritize improving the image and attractiveness of these gateways.



CORRIDORS

Corridors are important local and regional travel routes and commercial destinations. These routes strongly influence Petersburg's accessibility, attractiveness, and economic vitality. Corridors can connect local residential areas to centers and commercial areas or can connect Petersburg to the region. Improving the conditions, character, and quality of these corridors is a primary planning focus.

MAP 10.2 | FUTURE LAND USE MAP



LEGEND

- City Limits
- Roads
- Appomattox River
- Waterways
- South Crater Urban Development Area (UDA)
- Historic Core Neighborhoods
- Community Residential
- Neighborhood Commercial
- Community Mixed-Use
- Corridor Commercial
- Research and Development
- General Industrial
- Civic
- Conservation and Recreation
- Gateways
- Corridors

HISTORIC CORE NEIGHBORHOODS

Historic core neighborhoods directly reflect Petersburg's historic development pattern and are generally located in the heart of Petersburg north of Interstate 85 and west of Interstate 95. This development pattern consists of relatively short blocks in a grid orientation, small lots, and residential dwellings in a variety of architectural styles and developed at a moderate density. The overall age, development pattern, and scale make Petersburg's historic core neighborhoods special places worthy of preservation. Revitalization of historic core neighborhoods will serve as a catalyst for revitalization throughout the City.

Development in historic core neighborhoods should continue the existing historic street grid, be sited on compact lots, front on the public right-of-way, and use architecture that is complementary to the historic character of surrounding structures. Single-family attached and detached dwellings, accessory dwelling units, and the adaptive reuse of former single-family structures into triplexes or fourplexes are all appropriate to expand the variety of housing options. Triplexes and fourplexes are appropriate, even if not part of a retrofitted structure, provided they fit the architectural character of the surrounding area. Streetscapes should integrate streetlighting and landscaping, with separated pedestrian and bicycle infrastructure on higher volume streets. Renovation of existing structures, adaptive reuse, and infill are the most appropriate methods of new construction in historic core neighborhoods due to a high number of blighted properties and few large, vacant lots. All renovations and infill within designated Local Historic Districts should conform to the Historic District Design Guidelines and decisions of the Architectural Review Board (ARB).

Primary Land Uses

- Accessory dwelling units
- Multi-family dwellings
- Parks, open space, trails, and recreational facilities
- Places of worship
- Residential adaptive reuse
- Residential infill development
- Schools and daycares
- Senior housing
- Single-family attached dwellings (e.g., rowhouses, duplexes)
- Single-family detached dwellings
- Triplexes and fourplexes

Massie Street | Lexington, VA

Planning + Development Principles

- Continue the existing street grid pattern, with new development providing interconnected streets and pedestrian infrastructure where appropriate.
- Direct the preservation, renovation, reuse, and adaptive use of existing structures.
- Protect and enhance historic structures.
- Ensure that both new and infill development fits the scale, size, proportion, and character of any existing development pattern.
- Include a variety of housing types, including accessory dwelling units, to accommodate varying income levels.
- Incorporate pedestrian and bicycle connections and safety enhancements where possible.
- Orient new buildings towards the street.
- Preserve the existing tree canopy and include native plantings when new landscaping is necessary.

COMMUNITY RESIDENTIAL

Petersburg's community residential neighborhoods were largely developed in the mid- to late- 20th century, tend to be more suburban than urban in character, and can be found on the west side of the City and south of Interstate 85. Lots tend to be larger and more irregular than those found in historic core neighborhoods. Single-family attached and detached dwellings are both present; however, a variety of residential types at a range of densities should be supported to achieve the goal of providing a variety of attainable rental and homeownership options to the community.

Individual infill lots exist throughout community residential areas, with some larger vacant lots available for new development. All new development should complement the scale, form, and existing architectural character of surrounding development. Streetscapes should integrate streetlighting and landscaping, especially street trees. Development on previously undeveloped parcels should seek to provide interconnectivity in the street network and be mindful of sensitive environmental features such as floodplains, the existing mature tree canopy, and steep slopes.

Despite the more suburban character of community residential neighborhoods, providing multi-modal transportation access remains important for ensuring widespread equity and economic opportunity. Pedestrian and bike activity may be compatible with low-volume, slow-speed vehicular traffic on residential streets, but major streets should be redesigned with sidewalks and other pedestrian and bike amenities over the long-term. Connections among neighborhoods and schools, parks, employers, and civic places should be prioritized as conditions permit. Proximity to Neighborhood Commercial centers is also encouraged to build vibrant, walkable neighborhoods where basic needs are easily accessible.

Primary Land Uses

- Accessory dwelling units
- Adaptive reuse
- Infill development
- Manufactured housing
- Multi-family dwellings up to 20 units
- Parks, open space, and recreational facilities
- Planned unit development
- Places of worship
- Schools and daycares
- Senior housing
- Single-family detached dwellings
- Single-family attached dwellings (e.g., rowhouses, duplexes, triplexes)

New Town | Williamsburg, VA

Planning + Development Principles

- Compact development patterns, including cluster and traditional neighborhood development, are encouraged.
- Encourage preservation, renovation, reuse, and adaptive use of existing structures.
- Ensure that both new and infill development fits or enhances the scale, size, proportion, and character of any existing development pattern.
- Include a variety of single-family dwelling types, including accessory dwelling units, to accommodate varying income levels.
- Incorporate pedestrian and bicycle connections and safety enhancements.
- Provide access management through inter-parcel connections.

NEIGHBORHOOD COMMERCIAL

Neighborhood commercial areas serve as discernible neighborhood centers that provide for the daily needs of area residents through uses such as neighborhood grocers, community hubs, laundromats, clinics, neighborhood office uses, and daycares. Neighborhood commercial areas should be centered around an intersection in the heart of a neighborhood and should be directly accessible by car, foot, and bike, as well as by public transportation whenever possible. Development in neighborhood commercial areas should be high-quality, oriented towards the street, provide interconnectivity to existing roads and sidewalks, and integrate community design elements such as landscaping and lighting. Parking should be minimal to encourage the use of alternative transportation, with any parking areas sited to the rear or side of the principal structure. Adaptive reuse of existing vacant commercial or industrial structures is encouraged. While the footprint of neighborhood commercial areas should not expand in a manner that endangers historic core neighborhoods, their use and intensity may expand in ways that are compatible with Petersburg's historic and architectural character. Any investment, however, should ensure the preservation of historic structures and continue the architectural character of the surrounding area. Vertical mixed-use development with residential on the upper floors is appropriate, provided the form and context of the surrounding area are respected through development. Large, auto-oriented commercial uses are not appropriate.

Primary Land Uses

- Adaptive reuse
- Community hubs
- Infill development
- Live-work units
- Medical clinics (e.g., dentists, doctors, therapists)
- Personal services (e.g., hair salons, laundromats, pharmacies)
- Places of worship
- Schools and daycares
- Neighborhood-serving commercial (e.g., specialty food stores, small restaurants)
- Vertical mixed-use with residential on upper floors

Ghent | Norfolk, VA

Planning + Development Principles

- Development should complement the scale, size, proportion, and character of the surrounding neighborhood.
- Implement traffic calming measures.
- Incorporate high quality materials for all buildings.
- Direct parking areas to be screened and located at the rear or side of the property.
- Orient new buildings towards the street.
- Preserve the existing tree canopy and include native plantings in new landscaping as necessary.
- Incorporate alternative transportation methods such as walking, biking, and public transportation.
- Provide access management through inter-parcel connections.

Community mixed-use areas are centers of commerce and amenities for Petersburg residents and visitors alike. These areas are walkable, dense, and interconnected environments of entertainment, shopping, personal services, restaurants, hotels, offices, the arts, and residential uses. While the footprint of community mixed-use areas should not expand in a manner that overwhelms or endangers historic core neighborhoods or conservation areas, their use and intensity may expand in ways that are compatible with Petersburg's historic and architectural character and urban form. Community mixed-use areas are appropriate areas for commercial uses that are pedestrian-oriented, enhance a vibrant street life, and contribute to Petersburg's overall economy. These areas should also integrate pocket parks, street trees, and urban gardens to promote an aesthetically pleasing streetscape and promote air quality and temperature reductions within identified heat islands.

In some community-mixed use areas, such as Old Towne, there may be few opportunities for new development. Therefore, adaptive reuse and infill are most likely to occur and be most appropriate given the historic context of the area. Any investment, however, should ensure the preservation of historic structures and continue the architectural character of the surrounding area. Renovations, infill, and new construction within designated Local Historic Districts should confrom to the Historic District Design Guidelines and decisions of the ARB. Where development and redevelopment occur within a quarter of a mile of a designated historic district, but are not regulated under historic district overlays, adherence to the City's Historic District Design Guidelines should be considered.

Primary Land Uses

- Adaptive reuse
- Infill development
- Community hubs
- Hospitality-oriented uses (e.g., hotels, boutiques, galleries, restaurants)
- Live-work units
- Medical clinics (e.g., dentists, doctors, therapists)
- Multi-family residential dwellings
- Offices
- Parks and recreational spaces
- Personal services (e.g., hair salons, laundromats, pharmacies)
- Places of worship
- Small commercial (e.g., banks, specialty food stores)
- Small-scale manufacturing (e.g., makers' spaces, studios, microbreweries)
- Uses compatible with Fort Gregg-Adams

Downtown Lynchburg | Lynchburg, VA

Planning + Development Principles

- Compact development patterns, including cluster and traditional neighborhood development, are encouraged.
- Connect existing and established new trails, bicycle routes, and other recreational amenities.
- Incorporate use of public art, amenities (i.e., benches, trash cans, street trees), and wayfinding signage to orient visitors and create a sense of place.
- Implement traffic calming measures.
- Incorporate high-quality materials for all buildings.
- Open space should be integrated and provide for community spaces well-defined by streets and adjacent buildings.
- Preservation, renovation, reuse, and adaptive use of existing structures is encouraged.
- Preserve the existing tree canopy wherever possible and include native plantings when new landscaping is necessary.

CORRIDOR COMMERCIAL

Corridor commercial areas provide goods and services for the community, allowing residents to access amenities without leaving and keeping tax dollars within Petersburg. Typical uses include restaurants, indoor entertainment and recreation, and general retail and services.

While corridor commercial uses are often automobile oriented, they should be sited so that the principal façade faces the street and should integrate pedestrian and bicycle infrastructure to create a more walkable, vibrant, and connected "Main Street" development pattern. Increased landscaping and adequate lighting should be encouraged, along with infill development within existing surface parking lots. Façade and signage improvements should be encouraged for existing uses, and the use of trees and native plantings should be incorporated for aesthetic and environmental benefits. New buildings should be oriented towards the street and seek to integrate a mix of uses wherever possible; any automobile parking areas should be minimal and sited to the rear or side of the principal structure. Design and construction should be consistent and use high-quality building materials. Multi-family residential included in vertical mixed-use structures or located behind commercial areas is also appropriate and should be connected to other corridor commercial uses through sidewalks and bike lanes. However, appropriate transitions between corridor commercial and residential areas should be provided through the use of buffering, setbacks, lighting, and signage.

Primary Land Uses

- Adaptive reuse
- Hospitality-oriented uses (e.g., hotels, boutiques, galleries, restaurants)
- Infill development
- Large commercial (e.g., large stores, shopping centers, entertainment, event venues)
- Medical clinics (e.g., dentists, doctors, therapists)
- Multi-family dwellings
- Offices
- Personal services (e.g., hair salons, laundromats, pharmacies)
- Places of worship
- Small commercial (e.g., banks, specialty food stores)
- Small-scale manufacturing (e.g., makers' spaces, studios, microbreweries)
- Uses compatible with Fort Gregg-Adams

Columbia Pike | Arlington, VA

Planning + Development Principles

- Incorporate use of public art, amenities (i.e., benches, trash cans, street trees), and wayfinding signage to direct and orient visitors and create a sense of place.
- Implement traffic calming measures, especially along arterials.
- Incorporate high-quality materials for all buildings.
- Orient new buildings towards the street.
- Preserve the existing tree canopy wherever possible and include native plantings when new landscaping is necessary.
- Incorporate alternative transportation methods such as walking, biking, and public transportation.
- Provide access management through inter-parcel connections, especially between adjacent residential areas to reduce dependency on vehicle trips.

Research and development areas are Petersburg's major employment centers, supplying stable and well-paying jobs in many innovative industries. These areas have a variety of research and development, light industrial, office, medical uses, and supporting service uses that are important regional nodes for research, employment, and trade. Uses are less likely to have adverse impacts such as odor, noise, and waste disposal on surrounding properties than moderate to heavy industrial uses.

Research and development areas should be readily accessible from interstates and principal arterials; providing public transportation to these areas will also be critical for achieving the full extent of economic promise for the community. Institutional uses, such as trade schools and satellite campuses, are also appropriate as a physical means of building a strong talent pipeline.

Development should provide a campus-like setting with adequate landscaping, buffering or screening, lighting, and transportation access. Sustainable development practices, including but not limited to stormwater management and water conservation, should be integrated in facility and site design. Green spaces such as urban gardens, walking paths, pavilions, and groves should be integrated to provide health and environmental benefits. Research and development areas should be cited in designated incentive zones to maximize economic benefit.

Primary Land Uses

- Business and employment uses
- Medical clinics (e.g., dentists, doctors, therapists)
- Hospitals
- Institutional uses
- Logistics and distribution uses (e.g., warehousing, distribution centers)
- Offices
- Research and development (e.g., laboratories, specialized manufacturing, supporting services)
- Small-scale manufacturing (e.g., makers' spaces, studios, microbreweries)

Virginia Tech Corporate Research Center Montgomery County, VA

Planning + Development Principles

- Encourage infill development and adaptive reuse of existing buildings.
- Ensure consistency with economic incentive zones to provide maximum benefits for employers, the City, and the community.
- Incorporate high-quality materials for all buildings.
- Integrate environmentally friendly development practices whenever possible, including low-impact development and energy-efficient building design.
- Integrate green space and opportunities for passive and active recreation into new development.
- Parking lots should be well-landscaped and provide on-site stormwater management.
- Provide access management through inter-parcel connections.
- Provide appropriate setbacks and screening along property lines adjacent to residential development.
- Require dumpsters, loading areas, and other service areas to be screened and located at the rear or side of the property.
- Wherever possible, connect development to public transportation stops.

GENERAL INDUSTRIAL

General Industrial areas should be where all heavy industrial uses are sited. They are readily accessible by road and rail and provide opportunities for wholesale, manufacturing, distribution, and heavy commercial. Because many general industrial uses have significant external impacts, including transportation effects such as noise and traffic, general industrial areas should not be sited adjacent to residential areas unless ample setbacks and buffering are provided. Any development with large amounts of impervious area should plan to include adequate elements for stormwater control. Development should also consider proximity to public transportation routes and stops. Environmental justice considerations should be addressed in all development applications.

Primary Land Uses

- Business and employment uses
- Logistics and distribution uses (e.g., warehousing, distribution centers)
- Moderate and heavy industrial uses (e.g., factories, lumberyards)

Planning + Development Principles

- Incorporate high-quality materials for all buildings.
- Integrate environmentally friendly development practices whenever possible, including low-impact development and energy-efficient building design.
- Parking lots should be well landscaped and provide on-site stormwater management.
- Provide access management through inter-parcel connections.
- Provide appropriate setbacks and screening along property lines adjacent to any residential development.
- Require dumpsters, loading areas, and other service areas to be screened and located at the rear or side of the property.
- Wherever possible, connect development to public transportation stops.

Shamrock Farms | Verona, VA

SOUTH CRATER URBAN DEVELOPMENT AREA

Virginia localities are permitted to designate geographic areas to serve as Urban Development Areas (UDA), which are defined in the Code of Virginia § 15.2-2223.1 as areas that are "...(i) appropriate for higher density development due to its proximity to transportation facilities, the availability of a public or community water and sewer system, or a developed area and (ii) to the extent feasible, to be used for redevelopment or infill development."

The South Crater UDA, designated along portions of S. Crater, Wagner, and Rives Roads, is intended to be an area of Petersburg where land use and transportation efforts are closely coordinated through implementation of traditional neighborhood design and development. Designation of this area as an UDA also opens new opportunities for Petersburg to obtain additional grant funding to support transportation improvements in this area. All transportation improvements in the UDA are required to be consistent with the needs assessment contained in VTrans 2040 (see Chapter 9), and are required for consideration in the SMART SCALE statewide prioritization process for project funding.

Primary Land Uses

- Primary land uses will vary depending on the underlying Area Designations.

Planning + Development Principles

Planning and development principles for the UDA are in addition to those included for each of the Area Designations and are informed by the Code of Virginia.

- Commercial development should have a minimum floor area ratio of 0.4.
- Encourage infill development and adaptive reuse of existing buildings.
- Include a variety of housing types to accommodate varying income levels.
- Incorporate principles of traditional neighborhood design and development.
- Provide access management through inter-parcel connections.
- Residential development should occur at a density of at least four single-family residences, six townhouses, or 12 multi-family units per acre.
- Wherever possible, connect development to public transportation stops.

College Avenue | Blacksburg, VA

CIVIC

Civic areas are areas with a presence of public and private uses that provide direct and essential services to the community, such as daily government services, schools, higher education, and healthcare. Civic uses employ specialized structures to meet specific needs and may maintain master plans of their own to guide future growth and development.

Civic uses should be sited in proximity to existing road networks and public transportation infrastructure and distributed across Petersburg to ensure strengthened connections to existing neighborhoods, in turn growing equitable access to services. Additionally, civic areas should be thoughtfully designed and well-maintained with uniform architecture and the use of high-quality building materials to promote a strong and positive image of Petersburg.

Primary Land Uses

- Community hubs
- Government offices and facilities
- Hospitals
- Institutional uses
- Medical clinics (e.g., dentists, doctors, therapists)
- Parks, open space, trails, and recreational spaces
- Places of worship
- Schools and daycares
- Small civic uses (e.g., post offices, libraries)

Planning + Development Principles

- Incorporate use of public art, amenities (i.e., benches, trash cans, street trees), and wayfinding signage to orient visitors and create a sense of place.
- Incorporate high-quality building materials for all structures.
- Preserve the existing tree canopy wherever possible and include native plantings where new landscaping is necessary.
- Incorporate alternative transportation methods such as walking, biking, and public transportation.
- Provide access management through inter-parcel connections.

CONSERVATION AND RECREATION

Conservation and recreation areas provide recreational, environmental, and educational benefits to the community. These areas consist of sensitive environmental habitats, floodplains and steep slopes, agricultural activities, parks and trails, and historic resources. Therefore, conservation and recreation areas are not appropriate locations for future growth and development, although low-density single-family residential is acceptable in agricultural areas to support ongoing operations. Outdoor event spaces, athletic fields, and sporting courts may also be appropriate, given they are sited and designed to be environmentally friendly and low-impact. Conservation and recreation areas should be preserved to provide opportunities for historic education, to facilitate exercise and healthy activity, to improve environmental benefits, and to enhance Petersburg's community character and quality of life.

Primary Land Uses

- Active and passive recreation facilities (e.g., athletic fields, sporting courts, pavilions)
- Agriculture
- Cemeteries
- Historic sites, markers, and monuments
- Parks and open space

Planning + Development Principles

- Enhance and protect historic resources.
- Ensure the continued viability of agricultural uses.
- Improve and mitigate negative environmental impacts through conservation design, alternative wastewater systems, and low-impact development for filtration or run-off protection.
- Preserve and restore the existing tree canopy and integrate native plantings.
- Provide connections to trails, bicycle routes, parks, and other recreational amenities.
- Use permeable surfaces and recycled materials whenever possible.

South River Preserve | Waynesboro, VA

GATEWAYS AND CORRIDORS

Gateways and Corridors serve to overlay the other Area Designations within this Framework. The appearance and functionality of Gateways and Corridors help integrate and define the distinct Area Designations and create a strong positive perception of Petersburg.

Gateways are locations where regional road, trail, and rail networks - as well as the Appomattox River - enter the Petersburg city limits. These locations should incorporate coordinated signage, public art, ambient lighting, and landscaping to create a strong sense of arrival and establish community character.

Corridors are longer stretches of the street and road network that serve as important local and regional travel routes, providing direct access to businesses, employment, amenities, and recreational opportunities. Identified corridors should be mapped and incorporate a coordinated and consistent streetscape, access management through interparcel connectivity, and multiple travel options. Corridors are not only passageways through Petersburg but are defined places that should be managed to maximize their potential to not only invite visitors in, but welcome them to stay.

Primary Land Uses

- Primary land uses will vary depending on the Area Designations of surrounding areas.

Planning + Development Principles

- Improve the pedestrian experience in corridors through strong urban design principles and provision of ample sidewalks and open space to walk and gather.
- Invest in safety, maintenance, and operational improvements along corridors, particularly near gateways.
- Incorporate signage, wayfinding, public art, landscaping, and lighting at gateways to elevate community appearance and create a sense of arrival.
- Discourage the removal of existing mature trees along corridors, and plant street trees where no landscaping is present.
- Be mindful of existing historic and archeological resources along corridors, taking care to ensure they are properly inventoried and preserved.

Gateway | Pittsylvania County, VA

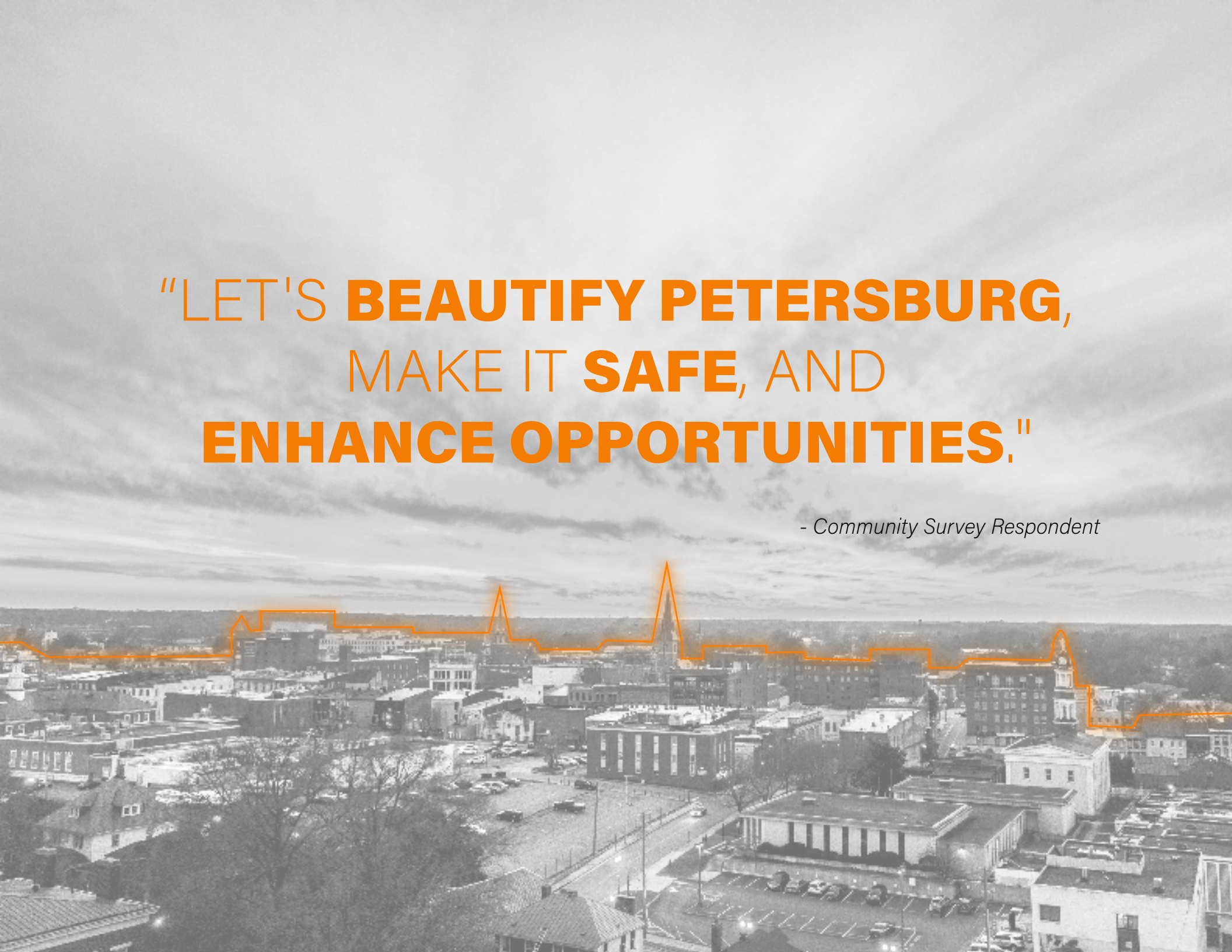
Promoting Smart and Sustainable Growth and Development

Goal Statement: Petersburg will support land use and development patterns that are high-quality, environmentally sustainable, and enhance economic opportunity and equity for the community.	
Objectives	**Strategies**
10.1 Commit to development that builds equity and resiliency through an intentional and multi-faceted approach.	10.1.1: Increase access to stable and well-paying employment opportunities by allowing a variety of job-producing uses along high-frequency Petersburg Area Transit (PAT) routes and along arterials.
	10.1.2: Prioritize capital improvements such as wayfinding, streetscaping, lighting, and pedestrian/bicycle infrastructure along designated Gateways and Corridors.
	10.1.3: Amend the Zoning Ordinance to allow for a greater variety of residential types in residential and mixed-use districts.
	10.1.4: Direct development away from conservation areas to protect and enhance Petersburg's natural, historic, and recreational resources.
	10.1.5: Facilitate active and healthy lifestyles through integrating sidewalks, bike lanes, and green space into new development.
10.2 Support innovative development that complements and enhances Petersburg's historic character.	10.2.1: Direct adaptive reuse or infill development on underdeveloped or vacant properties throughout the City when possible.
	10.2.2: Implement the recommendations of the Downtown Master Plan to create a more attractive, vibrant, and interconnected Old Towne area.
	10.2.3: Evaluate all land use applications and capital improvements against the applicable planning and development guidelines of the Future Land Use Map Area Designation.
	10.2.4: Amend the Zoning Ordinance to ensure compatible development in designated historic districts and throughout Historic Core Neighborhoods.
	10.2.5: Amend the Zoning Ordinance to create an overlay district that more specifically regulates development along designated Gateways and Corridors.

Objectives	Strategies
10.3 Direct future growth and development to areas with adequate transportation and utility infrastructure.	10.3.1: Prioritize new development in areas with adequate water and sewer capacity or that are planned for expansion. Require developers to provide utility connections where utilities are not available.
	10.3.2: Ensure water, sewer, stormwater, public safety, and transportation infrastructure is available to support the required level of service for all new development.
	10.3.3: Evaluate City fees, including impact and connection fees, to ensure they can adequately generate funding for future infrastructure improvements.
	10.3.4: Market the economic potential of interchanges along Interstates 85 and 95 and recommend approval of appropriate development opportunities, such as hospitality-oriented uses and mixed-use development, in those areas.
	10.3.5: Complete a Build-Out Analysis in areas planned for future high-density residential growth to better inform capital improvements planning.
	10.3.6: In accordance with the Code of Virginia, evaluate the feasibility of offering financial incentives for development in the South Crater Urban Development Area.
10.4 Work regularly and openly with neighboring jurisdictions and the Crater Planning District Commission to pursue collaborative and innovative solutions to regional land use challenges.	10.4.1: In review of development applications, ensure alignment with the considerations of the Fort Gregg-Adams Joint Land Use Study.
	10.4.2: Communicate with adjacent jurisdictions regarding development plans that have potential impacts on regional localities and public facilities. Work with them to coordinate plans and to identify and mitigate areas where conflicts may be present.
	10.4.3: Participate actively in joint regional planning efforts and studies.

11

IMPLEMENTATION



"LET'S **BEAUTIFY PETERSBURG**,
MAKE IT **SAFE**, AND
ENHANCE OPPORTUNITIES."

- Community Survey Respondent

11

WHAT IS AN IMPLEMENTATION PLAN?

PetersburgNEXT is a guide for growth and development. It is intended to be a dynamic document that will change and evolve over time to reflect the community's needs. The Implementation element prioritizes, and provides accountability for, each strategy identified in this Plan. It provides specific guidance for decision-making which will define our ongoing progress towards our vision for the future.

Accordingly, to ensure this Comprehensive Plan is properly implemented, Planning Commission and City Council should refer to this document and consider its vision and goals prior to making recommendations and decisions. Petersburg's success depends on effective implementation of the Plan, along with consistent analysis of each land use application and budgetary decision to ensure compatibility with the Plan's long-range vision.

PETERSBURGNEXT VISION STATEMENT

Petersburg is a thriving, culturally diverse community where all residents enjoy safe and attractive neighborhoods, economic opportunity, quality education, and celebration of rich history.

IMPLEMENTATION TOOLS

There are a variety of tools that can and should be used to implement the long-range vision set forth in PetersburgNEXT. The following tools are important to ensure the successful implementation of this Plan.

Annual Budget

The annual budget is arguably the most important tool for implementation of the strategies contained in this Plan. City Council and staff should use the recommendations of the Comprehensive Plan to guide preparation of the annual budget. Allocating funding equalizes priorities, and the budget should work in tandem with PetersburgNEXT to achieve a thriving, stable, and more resilient future.

Petersburg should assess the Plan's effectiveness on a regular basis by annually reviewing and monitoring implementation of the goals and action strategies outlined within this document. When appropriate and necessary, the Plan should be amended, with careful consideration given to whether amendments align with the Plan's overarching vision. Any modifications should be considered with long-term policy implications.

Capital Improvements Plan

An extension of the annual budget, the Capital Improvements Plan (CIP) coordinates the location, timing, and financing of capital improvements over a multi-year period. Capital improvements are major, non-recurring physical expenditures such as land, buildings, public infrastructure, and equipment. The CIP includes a description of proposed capital improvement projects ranked by priority, a year-by-year schedule of expected project funding, and an estimate of project costs and financing sources. The CIP is a working document and should be reviewed and updated annually to reflect changing community needs, priorities, and funding opportunities. The long-range vision of PetersburgNEXT is achieved when funding and the priorities of the CIP, along with ordinance updates and annual budgeting, are all in alignment with the Plan.

Petersburg has adopted CIPs in the past but has not done so in recent years. However, it is imperative to reestablish an annual CIP process to ensure implementation of stated goals. An improved bond rating will allow the City to borrow funds to pay for priorities today, with financing of the future contained within the CIP.

IMPLEMENTATION + CODE OF VIRGINIA

Code of Virginia Section 15.2-2232 states that **the Planning Commission "shall control the general or approximate location, character and extent of each feature shown on the plan."** Therefore, the Planning Commission may continue holding public hearings to address the location, character, and extent of any public utility or facility not already shown in the Comprehensive Plan. Staff should work with the Planning Commission to **develop a CIP in alignment with the priorities of this plan** and present this recommendation to Council **for funding.**

Land Use Regulations

The Zoning and Subdivision Ordinances are the primary implementation tools for PetersburgNEXT. While PetersburgNEXT is a long-term policy guide, Petersburg's Zoning and Subdivision Ordinances are legal documents that regulate the location, form, and character of development throughout the City. Aligning the Ordinances with the goals and strategies of the Comprehensive Plan is therefore critical to its implementation.

Several strategies in this Plan direct revisions to the Zoning Ordinance along with other related considerations for the City's land use regulations. These revisions will work to physically manifest the goals and vision of this Plan over time.

Land Use Actions

PetersburgNEXT should serve as a strong guide for decisions on all rezoning and Special Use Permit applications. Land use applications should be closely reviewed for alignment with the Comprehensive Plan, including related strategies and the Future Land Use Map (FLUM), to ensure consistency. In special circumstances where unforeseen uses or changes in market conditions may warrant deviation from the adopted Plan, Planning Commission and City Council should review and consider amendments to the Plan to address this, ensuring the document remains current, relevant, and responsive to the community's needs.

Intergovernmental Cooperation

Regional cooperation is vital to the success of Virginia localities. Challenges related to the natural environment, transportation, equity, housing, tourism, community facilities, economic and workforce development, and other elements discussed throughout PetersburgNEXT go beyond jurisdictional boundaries and are best solved through cooperation at the regional and state levels. As such, successful implementation of the strategies in this Plan will require continued coordination with neighboring localities, the Crater Planning District Commission (CPDC), and numerous state agencies responsible for various facilities, services, and programs implemented across Virginia.

Active participation in regional boards and alliances is crucial, especially with regards to economic and workforce development. No locality is an island, and many modern problems – and their solutions – are regional in nature. Petersburg should strive to be a leader in identifying regional challenges and developing innovative and effective solutions. Doing so will ensure Petersburg's priorities do not get lost amongst those of neighboring localities and will bring awareness to the needs of the City which drive the region.

Petersburg Public Library

BENCHMARKING

Benchmarking is a critical component of successful Plan implementation and is a process that ensures Petersburg is on track to achieve its objectives and strategies within the assigned timeframes. Benchmarking is beneficial in both setting standards for how work is accomplished and for providing accountability and transparency to the community. It should be completed annually in conjunction with the budgeting process, with an analysis of the progress towards each strategy submitted by department heads whose departments are responsible for carrying them out.

To determine benchmarks, progress towards each strategy must be measured, with full completion within the allotted timeframe serving as the benchmark itself. If the strategy is not completed within the specified timeframe, then analysis should occur to determine why: were resources insufficient, did other priorities arise, or were there issues that were not previously known when the planning process initially occurred? Benchmarking also helps to identify "gaps" when evaluating why a benchmark may not have been met, helping provide information that can improve the process, identify additional resources, or serve to rethink the strategy and amend to best fit current community needs and priorities.

The typical steps in the benchmarking process are as follows:

1. **Determine Strategies:** This step is complete and comprises the Implementation Matrix found in this Chapter.

2. **Assign Strategies:** Strategies are assigned to the appropriate department heads to be completed within the timeframe specified in the Plan. This step is partially complete, as a suggested list of responsible parties is included in the matrix.

3. **Initiate Progress:** Immediately upon adoption of PetersburgNEXT, department heads and their staff should begin work on the strategies that have been assigned to them, as guided by the timeframes set for each strategy in the matrix.

4. **Annual Update:** As part of the annual budgeting process, the City Manager's office should request the matrix to be updated by Department Heads with progress towards accomplishing the strategies. The yearly benchmarking report should then be presented to City Council, with changes made to resources, responsibility, or timelines as needed.

Petersburg National Battlefield
Photo Credit: National Park Service

IMPLEMENTATION MATRIX

The implementation matrix provides specific tools to meet the goals of PetersburgNEXT and serves as our roadmap forward into a bright future. The matrix builds on the strategies in each Plan element by identifying tools, resources, responsible parties, and anticipated timeframes for completion. The implementation matrix should be reviewed annually as part of the City's budgeting process to set priorities as well as measure progress toward PetersburgNEXT's vision.

The key to the Plan's success will be a proactive approach to implementation by City staff, the Planning Commission, City Council, City departments and boards, residents, businesses, and community institutions and organizations.

The matrix includes the following information:

Implementation Category

Categorizes each strategy into a general action type:

- Capital Projects
- Land Use Actions
- Ordinance Updates
- Partnerships
- Plans and Studies
- Programs and Services

Responsible Party

Identifies the department or departments who are primarily responsible for overseeing the implementation of the strategy.

Stakeholders, Partners, and/or Resources

This category identifies examples of community partners, state and federal agencies, and resources that will be necessary to support successful implementation. The identified stakeholders, partners, and resources are meant as a starting point for implementation; others can and should be identified over the timeframe of this Plan.

Some strategies also may reflect an internal policy or function, and therefore may not require external assistance.

Timeframe

Each strategy is assigned an ideal timeframe for completion.

- **Short-Term:** Actions that should be completed within 0-2 years of the Plan's adoption, which is by July 2026
- **Mid-Term:** Actions that should completed within 3-5 years of the Plan's adoption, which is by July 2029
- **Long-Term:** Actions that should be completed within 10+ years of the Plan's adoption, which is by July 2034 and beyond.
- **Ongoing:** Actions that should continue for the life of the Plan. Ongoing actions are likely to be reviewed and implemented annually as part of budgeting or capital improvements planning processes. Some ongoing actions may occur at greater frequencies, such as quarterly or weekly, while others may be occurring as part of routine operations.

Cost

Identifies in general terms whether a strategy is likely to be low-cost, medium-cost, or high-cost to implement. Internal policies and land use reviews are examples of low-cost strategies; capital improvements and staffing expansions are examples of high-cost strategies. Further scoping and analysis will be required to determine specific expenses for implementing each strategy.

The following acronyms are used in the Implementation Matrix:

ARB City of Petersburg Architectural Review Board
ARSWCD Appomattox River Soil and Water Conservation District
ARWA Appomattox River Water Authority
CCWA Community College Workforce Alliance
CDAAA Crater District Area Agency on Aging
CDBG Community Development Block Grant Program
CHD Crater Health District
CPDC Crater Planning District Commission
CRWDB Capital Region Workforce Development Board
CVHS Central Virginia Health Services
DBHS Virginia Department of Behavioral Health and Developmental Services
DEQ Virginia Department of Environmental Quality
DCR Virginia Department of Conservation and Recreation
DHCD Virginia Department of Housing and Community Development
DHR Virginia Department of Historic Resources
DMAS Virginia Department of Medical Assistance Services
DOD U.S. Department of Defense
DOJ U.S. Department of Justice
DOT U.S. Department of Transportation
DRPT Virginia Department of Rail and Public Transportation
EDA City of Petersburg Economic Development Authority
FEMA Federal Emergency Management Agency
FOLAR Friends of the Lower Appomattox River
HUD U.S. Department of Housing and Urban Development
JRA James River Association
LECAP Line Extension Customer Assistance Program
LISC Local Initiatives Support Corporation
MBL Metropolitan Business League
NFWF National Fish and Wildlife Foundation
NPS National Park Service
NRPA National Recreation and Park Association
OIPI Virginia Office of Intermodal Planning and Investment
PAAL Petersburg Area Art League
PAT Petersburg Area Transit
PCPS Petersburg City Public Schools
PHARVA Partnership for Housing Affordability
PHOPs Petersburg Healthy Options Partnerships
PRHA Petersburg Redevelopment and Housing Authority
SCDHC Southside Community Development and Housing Corporation
SCWA South Central Wastewater Authority
SOVA Southern Virginia Regional Chamber
TCAMPO Tri-Cities Area Metropolitan Planning Organization
USACE U.S. Army Corps of Engineers
VAMSA Virginia Municipal Stormwater Association
VATI Virginia Telecommunication Initiative
VCU Virginia Commonwealth University
VDEM Virginia Department of Emergency Management
VDH Virginia Department of Health
VDOE Virginia Department of Education
VDOT Virginia Department of Transportation
VDSS Virginia Department of Social Services
VEC Virginia Employment Commission
VEDP Virginia Economic Development Partnership
VGR Virginia's Gateway Region
VHA Virginia Housing Alliance
VIMS Virginia Institute of Marine Science
VLGMA Virginia Local Government Management Association
VMRC Virginia Marine Resources Commission
VPRA Virginia Passenger Rail Authority
VSCLT Virginia Statewide Community Land Trust
VSU Virginia State University
VATC Virginia Tourism Corporation
YMCA Petersburg Family YMCA

CATALYST STRATEGIES

The below strategies are considered "catalyst strategies". These strategies were identified to be catalysts as they will pave the way for other related progress, ultimately proving transformational for the City of Petersburg.

3.2.2 Develop a comprehensive Economic Development Strategic Plan to build on existing initiatives and direct future investment.

3.4.4 Develop a strategic plan for the Poor Creek area to identify the highest and best use of land as it related to potential economic drivers and future employers.

4.1.9 Develop a robust code enforcement strategy to allow the City to be more proactive in preventing properties from reaching Red Tag status.

4.2.1 Amend the Zoning Ordinance to support "missing middle" housing. Create incentives within the Zoning Ordinance for these types of structures to promote their development.

5.1.2 Ensure that the City's major anchor parks, such as Patton Park, Legends Park, and the Petersburg Sports Complex, have routine grounds and trail maintenance to provide a safe and inviting recreational atmosphere. Install or repair safety fencing, emergency lighting, street lighting, and security cameras in parking areas and along trails where needed for increased nighttime safety.

6.1.3 Enhance interdepartmental communication across City government as well as between the various public boards and City Council.

6.2.1 Develop a Capital Improvements Plan (CIP) as recommended by Code of Virginia Section 15.2-2239; review annually to monitor progress and update with emerging needs.

7.1.6 Implement the findings of the City-wide salary study upon its completion to improve attraction and retention of additional first responders and law enforcement personnel.

7.2.2 Through partnerships with Bon Secours Southside Medical Center, Central Virginia Health Services (CVHS), and others, develop a Community Paramedicine program to specifically address drug abuse and mental health crises.

8.4.1 Formally participate in the Federal Emergency Management Agency's (FEMA) Community Rating System to implement flood protection policies beyond minimum requirements and earn community discounts on flood insurance premiums.

8.5.1 Reduce the heat island effect by proactively installing new native trees throughout the city, with priority areas determined by heat island temperatures using heat mapping data from Virginia State University (VSU) and the Heat Watch project; consider pursuing Tree City USA designation to help implement this strategy.

9.1.1 Include ongoing repairs of bridges and culverts as routine maintenance in addition to other roadway improvement projects. Prioritize repairs to bridges and culverts in poor condition to prevent further degradation and the need for weight limit reductions.

9.1.2 Complete a repaving schedule for Public Works that establishes current road conditions and identifies priority locations for maintenance or upgrades, with an emphasis on preventative maintenance.

10.1.3 Amend the Zoning Ordinance to allow for a greater variety of residential types in residential and mixed-use districts.

10.3.3 Evaluate City fees, including impact and connection fees, to ensure they can adequately generate funding for future infrastructure improvements.

Strategy	Implementation Type	Responsible Department	Timeframe	Stakeholders, Partners, and/or Resources	Cost
Objective 3.1 Expand Petersburg's existing clusters in Health Care and Manufacturing.					
3.1.1: Identify and target associated businesses, such as suppliers, to support the pharmaceutical campus.	Partnerships, Programs and Services	Communications, Marketing, Tourism & Government Relations; Economic Development	2026	EDA, GO Virginia, VEDP	$
3.1.2: Work with state economic development agencies, local economic development organizations, and local business partners to market Petersburg to Health Care businesses and manufacturers that would complement the existing businesses in these clusters.	Partnerships, Programs and Services	Communications, Marketing, Tourism & Government Relations; Economic Development	Ongoing (Routine Operations)	Bon Secours, EDA, GO Virginia, VEDP	$
3.1.3: Hold a biannual "roundtable" meeting of regional Health Care and Pharmaceutical executives, institutions of higher education, and City Economic Development professionals to serve as a catalyst for ongoing collaboration and strategic investment.	Partnerships, Programs and Services	Economic Development	Ongoing (Biannually)	Aetna, Anthem, Bon Secours, Brightpoint Community College, CCWA, CRWDB, LISC, MBL, Molina Healthcare, Optima Health, CPDC, Richard Bland College, United Healthcare, VCU, VEC, Virginia Premier, VSU	$
3.1.4: Develop Collier Yard and continued expansion in the Petersburg Interstate Industrial Park for advanced manufacturing and energy production.	Capital Projects, Partnerships	Economic Development	2034	Capital Improvements Plan, CPDC, EDA, VEDP, VDOT	$$$

Strategy	Implementation Type	Responsible Department	Timeframe	Stakeholders, Partners, and/or Resources	Cost
Objective 3.2 Diversify Petersburg's economy.					
3.2.1: Expand the existing clusters in the Manufacturing, Retail, and Accommodation sectors by identifying potential locations for new development and ensuring the proper entitlements and infrastructure are in place to support easy startup.	Programs and Services	Economic Development	Ongoing (Routine Operations)	EDA, VEDP	$
3.2.2: Develop a comprehensive Economic Development Strategic Plan to build on existing initiatives and direct future investment.	Plans and Studies	Economic Development	2026	EDA, MBL, SOVA, VEDP, VCU, VSU	$
3.2.3: Focus recruitment efforts on gaps identified in the Economic Development Strategic Plan by identifying and targeting prospective businesses to fill them.	Partnerships, Plans and Studies	Economic Development	Ongoing (Routine Operations)	EDA, VEDP, VCU, VSU	$
3.2.4: Site new warehousing and distribution centers; promote new associated job opportunities to Petersburg residents through social media, the quarterly newsletter, and other local job boards.	Land Use Actions	Communications, Marketing, Tourism & Government Relations; Economic Development; Planning & Community Development	2029	EDA, GO Virginia, VEDP	$$
3.2.5: Direct community-oriented, environmentally sustainable, and well-designed development at the historic Petersburg Harbor.	Land Use Actions, Partnerships	Economic Development; Planning & Community Development	2034	DEQ, EDA, FOLAR, VEDP	$$
Objective 3.3 Build entrepreneurship and workforce development programs to create new job pathways and build community wealth.					
3.3.1: Hold quarterly meetings with educational partners to remain updated on vocational and technical training programs, especially for expanding industries such as hospitality, technology, and manufacturing. Collaborate on opportunities to expand existing programs or create new ones.	Partnerships, Programs and Services	Economic Development	Ongoing (Quarterly)	Activation Capital, Brightpoint Community College, CRWDB, PCPS, Richard Bland College, VEC, VSU	$
3.3.2: Provide annual funding for the existing training options for residents in the Pharmaceutical and Health Care related sectors.	Partnerships, Programs and Services	Economic Development	Ongoing (Annually)	Brightpoint Community College, CCWA, CRWDB, PCPS, Richard Bland College, VEC, VSU	$

Strategy	Implementation Type	Responsible Department	Timeframe	Stakeholders, Partners, and/or Resources	Cost
3.3.3: In partnership with local economic development organizations, offer two small business forums a year that provide educational opportunities on city processes, support opportunities, and new development in Petersburg.	Partnerships, Programs and Services	Economic Development	Ongoing (Biannually)	Brightpoint Community College, CRWDB, EDA, LISC, PCPS, Richard Bland College, SOVA,VEC, VGR,VCU, VSU	$
3.3.4: Maintain a viable Revolving Loan Fund to assist in microlending to entrepreneurs.	Partnerships, Programs and Services	Economic Development	Ongoing (Routine Operations)	Activation Capital, CPDC, DHCD, EDA, LISC, Local Banks, MBL	$$
3.3.5: Hold discussions with Brightpoint Community College about creating a local branch within City limits, and identify at least two potential locations.	Partnerships	Economic Development	2026	Brightpoint Community College, Richard Bland College, VEC, VSU	$$
3.3.6: Facilitate the development of a coworking space in Old Towne as a pilot program for entrepreneurs and remote workers.	Programs and Services	Economic Development	2029	DHCD, GO Virginia, Virginia Housing	$$
Objective 3.4 Create additional opportunities for redevelopment of vacant commercial land and structures.					
3.4.1: Use the land bank program for commercial and industrial property in Petersburg.	Capital Projects, Programs	Economic Development; Planning & Community Development	Ongoing (Routine Operations)	EDA	$$
3.4.2: Certify all Economic Development Authority (EDA) owned sites through the Virginia Economic Development Partnership (VEDP).	Partnerships, Programs and Services	Economic Development	2026	EDA, VEDP	$
3.4.3: Direct franchise development in vacant commercial properties, using incentives as necessary.	Programs and Services	Economic Development	Ongoing (Routine Operations)	DHCD, EDA, MBL, SOVA, VEDP	$$
3.4.4: Develop a strategic plan for the Poor Creek area to identify the highest and best use of land as it related to potential economic drivers and future employers.	Plans and Studies	Economic Development; Planning & Community Development; Public Works	2029	Internal Function	$

Strategy	Implementation Type	Responsible Department	Timeframe	Stakeholders, Partners, and/or Resources	Cost
Objective 3.5 Promote tourism and strengthen economic development marketing and branding efforts.					
3.5.1: Direct the development of new lodging and dining options around Old Towne and near the Interstate 85 and 95 entrance corridors through incentives and Tourism Zone financing opportunities.	Ordinance Updates, Land Use Actions	Economic Development	Ongoing (Routine Operations)	MBL, PARTC, SOVA, VGR, VATC	$$
3.5.2: Require short term rentals to pay lodging taxes to generate additional revenue.	Ordinance Updates	Commissioner of the Revenue; Finance	2029	Internal Function	$
3.5.3: Update City websites and other real estate websites on a quarterly basis to include accurate information about available properties for economic development.	Programs and Services	Economic Development; Communications, Marketing, Tourism & Government Relations	Ongoing (Quarterly)	PARTC, VDEP	$
3.5.4: Update the City's social media and tourism website weekly to include information about upcoming events, things to do, and options for lodging, dining, and retail.	Programs and Services	Communications, Marketing, Tourism & Government Relations	Ongoing (Weekly)	PARTC	$
3.5.5: Evaluate locations for additional Tourism Zones with different strategic goals to support widespread, tourism-focused uses.	Capital Projects	Economic Development; Planning Commission	2026	VATC	$
3.5.6: In partnership with the Virginia Department of Transportation (VDOT), install branded wayfinding signage to Old Towne Petersburg, Petersburg National Battlefield, the Appomattox River Trail and waterfront, and historic sites from the American Civil Rights Movement.	Capital Projects	Planning & Community Development; Public Works	2029	DEQ, DHR, FOLAR, NPS, TCAMPO, VDOT	$$
3.5.7: Create a visitor center in the old South Side Depot to serve as a centralized hub for tourism and information.	Capital Projects	Economic Development; Communications, Marketing, Tourism & Government Relations; Public Works	2029	CPDC, DCR, DHCD, NPS, PARTC, TCAMPO	$$$
Objective 3.6 Streamline business licensing and permitting requirements.					
3.6.1: Automate all permitting and licensing processes through an online platform, and create a one-stop webpage for permitting and licensing information.	Programs and Services	Commissioner of the Revenue; Information Technology; Treasurer	2026	Internal Function	$$

Strategy	Implementation Type	Responsible Department	Timeframe	Stakeholders, Partners, and/or Resources	Cost
Objective 4.1 Systematically identify and eradicate residential blight across Petersburg.					
4.1.1: Create a stand-alone, comprehensive residential blight abatement strategy.	Plans and Studies, Programs and Services	Code Enforcement; Planning & Community Development	2026	CPCD, DHCD, DHR	$
4.1.2: Adopt a drug blight ordinance in accordance with the Code of Virginia as an additional mechanism to eliminate blight associated with confirmed criminal activity.	Ordinance Updates	Code Enforcement; Bureau of Police	2026	Code of Virginia	$
4.1.3: Ensure that penalties for blight violations are clearly stated in the City's Ordinances and set to the maximum allowable by state code.	Ordinance Updates	Code Enforcement; Planning & Community Development	2026	Code of Virginia	$
4.1.4: Avoid demolition of properties in identified historic districts, pursuing rehabilitation, adaptive reuse, or creative reuse.	Land Use Actions	Planning & Community Development	Ongoing (Routine Operations)	ARB, DHR, Historic Petersburg Foundation	$
4.1.5: Allow demolition as needed in non-historic districts to allow infill with compatible residential development.	Land Use Actions, Programs and Services	Planning & Community Development	Ongoing (Routine Operations)	Internal Function	$
4.1.6: Create an online code enforcement database to allocate City resources more efficiently, track progress, and guide Ordinance updates and capital improvements planning.	Programs and Services	Code Enforcement; Information Technology; Planning & Community Development	2026	Internal Function	$$
4.1.7: Partner with the Virginia National Guard to eradicate blighted structures.	Partnerships	Bureau of Police; Code Enforcement	Ongoing (Annually)	Virginia National Guard	$
4.1.8: Prioritize the expansion of the Department of Neighborhood Services, aiming to double the number of staff responsible for code enforcement within the next five years.	Programs and Services	Code Enforcement	2029	Annual Budget, Capital Improvements Plan	$$
4.1.9: Develop a robust code enforcement strategy to allow the City to be more proactive in preventing properties from reaching Red Tag status.	Land Use Actions	Code Enforcement; Planning & Community Development	2026	Internal Function	$

Strategy	Implementation Type	Responsible Department	Timeframe	Stakeholders, Partners, and/or Resources	Cost
Objective 4.2 Facilitate the provision of a diverse, safe, attainable, and high-quality housing stock in all neighborhoods.					
4.2.1: Amend the Zoning Ordinance to support "missing middle" housing. Create incentives within the Zoning Ordinance for these types of structures to promote their development.	Ordinance Updates	Planning & Community Development	2026	Code of Virginia	$
4.2.2: Amend the Zoning Ordinance to facilitate the provision of safe and attractive manufactured housing development in appropriate areas.	Land Use Actions, Ordinance Updates	Planning & Community Development	2026	Code of Virginia	$
4.2.3: Provide financial support to the Petersburg Redevelopment and Housing Authority (PRHA) in their work to maintain housing developments, ensuring that they are attractive and safe communities.	Partnerships	Planning & Community Development	Ongoing (Annually)	Annual Budget, Cameron Foundation, CPCD, DHCD, PRHA	$$
4.2.4: Recommend approval of mixed-income, market-rate, and workforce housing developments, especially when located in areas of opportunity.	Partnerships, Programs and Services, Land Use Actions	Planning & Community Development	Ongoing (Routine Operations)	Internal Policy	$
4.2.5: Amend the Zoning Ordinance to allow for adaptive reuse, creative reuse, and opportunities for new housing in non-traditional areas (e.g., former shopping centers, former churches and schools, etc.).	Land Use Actions, Ordinance Updates	Planning & Community Development	2026	Internal Policy	$
Objective 4.3 Expand pathways to homeownership through partnerships, education, and eliminating regulatory barriers.					
4.3.1: Prioritize annual Community Development Block Grant (CDBG) funding for job training, skills development, and economic development to better position residents for homeownership.	Partnerships, Programs and Services	Planning & Community Development	Ongoing (Annually)	DHCD, HUD, VEC	$$
4.3.2: Develop a formal Fair Housing Q&A flyer for frontline City staff to ensure a consistent and high-quality process of referring residents to HOME and Legal Aid. Include this in a Fair Housing clearinghouse on a highly visible section of the City's website.	Programs and Services	Planning & Community Development; Communications, Marketing, Tourism & Government Relations	2026	CDAAA. Habitat for Humanity, project:HOMES, Pathways, PHARVA, PRHA, SCDHC, United Way, Cameron Foundation, VHA	$

Strategy	Implementation Type	Responsible Department	Timeframe	Stakeholders, Partners, and/or Resources	Cost
4.3.3: Establish defined boundaries for two rental inspection districts.	Ordinance Updates, Programs and Services	Code Enforcement; Planning & Community Development	2026	Code of Virginia	$
4.3.4: Evaluate the feasibility of creating a Housing department to streamline the provision of housing services such as education, assistance, and benefits to the community.	Programs and Services	City Manager's Office	2029	Internal Function	$
4.3.5: Create and promote a Community Land Trust program in collaboration with local non-profits and lenders.	Partnerships, Programs and Services	Planning & Community Development	2034	VHA, PHARVA, Cameron Foundation, Habitat for Humanity, project:HOMES, Pathways, SCDHC, VSCLT	$
Objective 4.4 Support neighborhood vitality through community partnerships, regulatory action, and strategic investments.					
4.4.1: Update small area plans for Pocahontas Island, Halifax Triangle, and University Boulevard to further detail broad-based, inclusive visioning and planning for revitalization in these neighborhoods.	Plans and Studies	Planning & Community Development	2029	CPDC	$
4.4.2: Collaborate with community groups and partner organizations in tactical urbanism efforts to beautify neighborhoods in the short-term. Evaluate the creation of a Private Property Mural Program as a first step.	Land Use Actions, Partnerships, Programs and Services	Planning & Community Development; Public Works	2026	Better Housing Coalition, PHOPs, VDOT	$
4.4.3: Apply for grant funding related to infrastructure improvements as a means of supporting quality neighborhoods and economic development.	Capital Projects, Programs and Services	Economic Development; Planning & Community Development; Public Works	Ongoing (Routine Operations)	Better Housing Coalition, Cameron Foundation, DHCD, HUD, Pathways, project:HOMES, Virginia Housing	$$

Strategy	Implementation Type	Responsible Department	Timeframe	Stakeholders, Partners, and/or Resources	Cost
4.4.4: Amend the City Code of Ordinances to designate two housing rehabilitation zones in accordance with the Code of Virginia.	Ordinance Updates	Code Enforcement; Planning & Community Development	2026	Code of Virginia, DHCD	$
4.4.5: Establish a Dollar Lot Program through collaboration with regional partner organizations.	Capital Projects, Partnerships, Programs and Services	Code Enforcement; Planning & Community Development	2034	Cameron Foundation, Pathways, DHCD, Habitat for Humanity, HUD, project:HOMES, SCDHC, United Way, Virginia Housing	$$
Objective 4.5 Be mindful of community character when evaluating new residential development to ensure that investment is complementary to existing character and history and does not displace long-term residents.					
4.5.1: Direct mixed-income residential development in appropriate areas throughout the City, as guided by the Future Land Use Framework and Map.	Land Use Actions	Planning & Community Development	Ongoing (Routine Operations)	Internal Policy	-
4.5.2: Ensure that adaptive reuse and infill development in designated historic districts and Old Towne is complementary to the scale and architectural character of the surrounding area.	Land Use Actions, Ordinance Updates	Planning & Community Development	Ongoing (Routine Operations)	DHR, Historic Petersburg Foundation	$

Strategy	Implementation Type	Responsible Department	Timeframe	Stakeholders, Partners, and/or Resources	Cost
Objective 5.1 Provide parks and recreational spaces that are safe and accessible to all.					
5.1.1: Annually assess the current conditions of park facilities to identify and prioritize safety improvements, ADA accessibility, and repair/replacement of broken or aging equipment.	Capital Projects, Plans and Studies	Public Works; Recreation, Special Events & Volunteerism	Ongoing (Annually)	Capital Improvements Plan, CPDC, FOLAR	$$
5.1.2: Ensure that the City's major anchor parks, such as Patton Park, Legends Park, and the Petersburg Sports Complex, have routine grounds and trail maintenance to provide a safe and inviting recreational atmosphere. Install or repair safety fencing, emergency lighting, street lighting, and security cameras in parking areas and along trails where needed for increased nighttime safety.	Capital Projects, Programs and Services	Public Works; Recreation, Special Events & Volunteerism	2029	Annual Budget, Capital Improvements Plan, DCR, NRPA, FOLAR	$$
5.1.3: Coordinate with local non-profit organizations and volunteer groups to assist with grounds maintenance and cleanup programs, particularly in neighborhood parks.	Partnerships	Recreation, Special Events & Volunteerism	Ongoing (Routine Operations)	CDAAA, Petersburg Boys & Girls Club, Petersburg Wellness Consortium, PHOPS, Progressive Outreach, YMCA, FOLAR	$
5.1.4: Apply for grants and other creative funding sources to install new playground equipment in parks that currently lack facilities.	Capital Projects	Recreation, Special Events & Volunteerism	Ongoing (Routine Operations)	KABOOM!, NRPA	$
5.1.5: Renovate A.P. Hill Community Center, Harding Street Community Center, and Peabody Middle School for use as community centers.	Capital Projects	Public Works; Recreation, Special Events & Volunteerism	2034	Capital Improvements Plan	$$$
5.1.6: Utilize available resources from the National Recreation and Park Association (NRPA) to evaluate and enhance existing park assets, safety considerations, and public wellness opportunities.	Partnerships, Programs and Services	Recreation, Special Events & Volunteerism	Ongoing (Routine Operations)	NRPA	$

Strategy	Implementation Type	Responsible Department	Timeframe	Stakeholders, Partners, and/or Resources	Cost
5.1.7: Integrate community hubs with community centers and design them to advance wellness across the seven interconnected dimensions of well-being.	Programs and Services	Recreation, Special Events & Volunteerism	2034	CDAAA. Capital Improvements Plan, Cameron Foundation, FOLAR, PHOPs, NRPA	$$$
5.1.8: Develop new parks throughout Petersburg so 70% of all residents are within a 10-minute walk of a park.	Capital Projects, Plans and Studies	Recreation, Special Events & Volunteerism	2034	Capital Improvements Plan, Cameron Foundation, FOLAR, PHOPS, NRPA	$$$
Objective 5.2 Capitalize on existing assets to increase revenue streams and invest in staffing resources.					
5.2.1: Identify underutilized City-owned properties for reinvestment as multifunctional facility spaces for rentals and events.	Capital Projects, Programs and Services	Recreation, Special Events & Volunteerism; Public Works	2034	Internal Function	$
5.2.2: Invest in dedicated staff resources to provide quality recreational programming more efficiently.	Programs and Services	Recreation, Special Events & Volunteerism	2029	Annual Budget	$$
5.2.3: Identify and evaluate opportunities for increased sponsorship opportunities at major events and parks.	Partnerships, Programs and Services	Recreation, Special Events & Volunteerism	2029	Internal Function	$
5.2.4: Leverage creative marketing and branding to generate interest in recreational programming, assets, and events and drive participation rates.	Programs and Services	Communications, Marketing, Tourism & Government Relations; Recreation, Special Events & Volunteerism	2026	VATC, PARTC	$
Objective 5.3 Create a parks and recreation master plan to best utilize existing parks and recreational assets for the community and generate revenue for facility and program improvements.					
5.3.1: Incorporate facility space needs assessments and fiscal analyses to balance improvement costs with new revenue streams.	Capital Projects, Programs and Services	Public Works; Recreation, Special Events & Volunteerism	2034	Internal Function	$
5.3.2: Coordinate new investment with regional plans for the Appomattox River Trail, Fall Line Trail, Petersburg National Battlefield, and other regional amenities to ensure cohesive visioning and efficient use of resources.	Capital Projects, Partnerships, Programs and Services	Recreation, Special Events & Volunteerism	Ongoing (Routine Operations)	CPDC, DHR, NPS, FOLAR, TCAMPO, VDOT	$

Strategy	Implementation Type	Responsible Department	Timeframe	Stakeholders, Partners, and/or Resources	Cost
5.3.3: Establish landscape design standards and maintenance plans for sites within City-maintained right of way to formally create additional opportunities for neighborhood park access.	Capital Projects, Ordinance Updates	Planning & Community Development; Public Works; Recreation, Special Events, & Volunteerism	2026	Internal Function	$
Objective 5.4 Continue to develop and enhance recreational opportunities along the Appomattox River.					
5.4.1: In collaboration with regional stakeholders, invest in park upgrades and facilities at Patton Park, Rotary Park at Pocahontas Island, and Appomattox Riverside/Ferndale Park.	Capital Projects, Partnerships	Recreation, Special Events, & Volunteerism	2029	Annual Budget, Capital Improvements Plan, Cameron Foundation, FOLAR, Rotary Club, VDOT, DCR	$$
5.4.2: Identify opportunities to create additional riverfront park space with piers and docks for water access.	Capital Projects, Plans and Studies	Recreation, Special Events, & Volunteerism	2034	DCR, DEQ, FOLAR	$$
5.4.3: As river access increases, install additional wayfinding and safety signage along the riverbank for both land navigation and water access.	Capital Projects	Public Works; Recreation, Special Events, & Volunteerism	2034	Annual Budget, Capital Improvements Plan, CPDC, FOLAR, TCAMPO, VDOT	$$
5.4.4: Require that all recreational enhancements along the Appomattox River waterfront incorporate shoreline and water quality protection measures in accordance with the latest state guidelines and regulations.	Ordinance Updates	Planning & Community Development; Public Works	2029	DCR, DEQ, USACE	$
Objective 5.5 Support a strong local arts and culture economy.					
5.5.1: Develop a public art master plan and/or incorporate public art considerations into related City strategic and master plans to help revitalize, define, and enhance the character of Petersburg and its neighborhoods.	Plans and Studies	Communications, Marketing, Tourism & Government Relations; Public Works; Recreation, Special Events & Volunteerism	2034	CultureWorks, PAAL	$
5.5.2: Actively market Arts and Culture District incentives to entrepreneurs and arts organizations; evaluate the feasibility of new incentives to direct investment in vacant, underutilized spaces.	Partnerships, Programs and ServicesC95	Economic Development	2026	EDA, VEDP	$$

Strategy	Implementation Type	Responsible Department	Timeframe	Stakeholders, Partners, and/or Resources	Cost
5.5.3: In collaboration with local stakeholders, organize festivals and events to increase tourism and establish Petersburg as a regional event center.	Partnerships, Programs and Services	Economic Development	Ongoing (Routine Operations)	PAAL, PARTC, VATC	$$
5.5.4: Identify and pursue creative marketing strategies to promote arts and cultural opportunities in Petersburg.	Programs and Services	Economic Development; Communications, Marketing, Tourism & Government Relations	2026	CultureWorks, PAAL, PARTC	$
Objective 5.6 Leverage historic preservation as a means of enhancing quality of life for Petersburg's residents.					
5.6.1: In collaboration with local partners and the Virginia Department of Historic Resources (DHR), identify creative ways to further educate the community on Petersburg's diverse history.	Partnerships	Planning & Community Development	Ongoing (Routine Operations)	DHR, Historic Petersburg Foundation, NPS, FOLAR	$
5.6.2: Build inclusive preservation efforts by identifying and preserving sites/districts associated with historically Black and disinvested neighborhoods.	Partnerships, Programs and Services	Planning & Community Development	2034	DHR, Historic Petersburg Foundation, NPS	$
5.6.3: Direct the rehabilitation and adaptive reuse of historic Old Towne properties as a means of increasing downtown population and economic vibrancy.	Land Use Actions, Ordinance Updates	Planning & Community Development	Ongoing (Routine Operations)	DHR, Historic Petersburg Foundation, NPS	$
5.6.4: Utilize key design elements from the City's historic districts to inform new development, especially along major commercial corridors and within transition areas between historic districts and non-historic peripheral areas.	Land Use Actions, Plans and Studies	Planning & Community Development	Ongoing (Routine Operations)	DHR	$$
5.6.5: Provide support, including technical assistance and documentation, for owners of newly eligible properties for potential inclusion on the Virginia Landmarks Register and National Register of Historic Places. Collaborate with partners as needed.	Partnerships, Programs and Services	Planning & Community Development	Ongoing (Routine Operations)	DHR, Historic Petersburg Foundation, NPS	$

Strategy	Implementation Type	Responsible Department	Timeframe	Stakeholders, Partners, and/or Resources	Cost
5.6.6: Leverage historic preservation and heritage tourism as key elements for a strong and resilient local economy.	Programs and Services	Communications, Marketing, Tourism & Government Relations; Economic Development; Planning & Community Development	Ongoing (Routine Operations)	FOLAR, Historic Petersburg Foundation, NPS, PARTC	$
5.6.7: Maintain Certified Local Government status and enforce local historic preservation ordinances as tools in promoting community-wide preservation.	Land Use Actions, Programs and Services	Planning & Community Development	Ongoing (Routine Operations)	DHR	$$
5.6.8: Provide support, including funding as needed, to ensure the continued operations of Petersburg's museums, such as Blandford Church, Siege Museum, and Center Hill Museum, as tourism drivers and sources of City history and identity.	Capital Projects, Partnerships, Programs and Services	Economic Development; Recreation, Special Events & Volunteerism	Ongoing (Annually)	Annual Budget, Battersea Foundation, Historic Petersburg Foundation, NPS, PARTC	$$
5.6.9: In partnership with Crater Planning District Commission (CPDC) and other regional partners, develop a comprehensive Geographic Information System (GIS) database and map for historic resources and green space in Petersburg, including but not limited to earthworks, markers, parks, and monuments.	Partnerships, Programs and Services	Planning & Community Development; Public Works	2026	CPDC, DHR, FOLAR, NPS	$
5.6.10: Collaborate with private individuals, businesses, and non-profit groups to identify, preserve, and maintain Petersburg's historic and archaeological resources and to identify historic landmarks for visitors.	Partnerships, Programs and Services	Planning & Community Development	Ongoing (Routine Operations)	Battersea Foundation, DHR, Historic Petersburg Foundation, NPS	$

Strategy	Implementation Type	Responsible Department	Timeframe	Stakeholders, Partners, and/or Resources	Cost
Objective 6.1: Demonstrate commitment to transparency, efficiency, and accountability in governance.					
6.1.1: Expand and improve external government communications through maintaining a robust social media presence and revamping the City website to maintain regular updates on important announcements.	Programs and Services	Communications, Marketing, Tourism & Government Relations	Ongoing (Routine Operations)	Internal Function	$
6.1.2: Create a phone-based civic alert system or a reverse 911 notification system to provide important updates and emergency alerts to residents without internet access.	Programs and Services	Emergency Communications; Communications, Marketing, Tourism & Government Relations; Information Technology	2029	Internal Function	$$
6.1.3: Enhance interdepartmental communication across City government as well as between the various public boards and City Council.	Programs and Services	City Manager's Office	2026	VLGMA	$
6.1.4: Explore the feasibility of creating a centralized government complex.	Capital Projects, Plans and Studies	City Manager's Office	2034	Internal Function	$$$
6.1.5: Seek community input on service needs and priorities to ensure equitable investment in infrastructure and facilities.	Plans and Studies	Communications, Marketing, Tourism & Government Relations; Planning & Community Development; Public Works	Ongoing (Annually)	Internal Function	$
Objective 6.2 Offer City facilities that are efficient, effective, and meet the needs of residents and businesses.					
6.2.1: Develop a Capital Improvements Plan (CIP) as recommended by Code of Virginia Section 15.2-2239; review annually to monitor progress and update with emerging needs.	Capital Projects, Plans and Studies	All Departments	2026	Code of Virginia, Annual Budget	$
6.2.2: Perform a Space Needs Assessment to determine and prioritize the needs of City departments and facilities.	Capital Projects, Plans and Studies	City Manager's Office; Public Works	2029	Internal Function	$$
6.2.3: Inventory and assess unused City-owned land and parcels to determine optimal uses for City services and/or redevelopment opportunities.	Plans and Studies	City Manager's Office; Public Works	Ongoing (Routine Operations)	Internal Function	$$

Strategy	Implementation Type	Responsible Department	Timeframe	Stakeholders, Partners, and/or Resources	Cost
Objective 6.3 Maintain functional water, sewer, and stormwater infrastructure to support residential and business development.					
6.3.1: Develop comprehensive water, sewer, and stormwater improvement strategic plans to determine the highest priority needs for investment.	Capital Projects, Plans and Studies	City Manager; Public Works	2029	ARWA, DEQ, JRA, SCWA	$$
6.3.2: In partnership with Crater Planning District Commission (CPDC), develop a comprehensive Geographic Information System (GIS) database and map for water, sewer, and stormwater systems.	Partnerships, Programs and Services	Public Works; Planning & Community Development	2026	CPDC, JRA	$$
6.3.3: Upgrade stormwater infrastructure in dense residential neighborhoods with histories of spot flooding and ponding issues.	Capital Projects	Public Works	Ongoing (Routine Operations)	Annual Budget, Capital Improvements Plan, DEQ, FEMA, JRA, VAMSA	$$$
6.3.4: Assess utility needs in areas targeted for future commercial and industrial development, such as industrial parks.	Plans and Studies	Economic Development; Planning & Community Development; Public Works	2029	Dominion Energy	$$
6.3.5: Apply for state and federal grant programs to help address vital water, sewer, and stormwater improvements.	Partnerships, Programs and Services	Public Works	Ongoing (Routine Operations)	DEQ, FEMA, JRA, VAMSA	$
Objective 6.4 Expand educational opportunities for residents through support of modern technology, Petersburg City Public School facilities, and community spaces.					
6.4.1: Provide financial support to the Petersburg Public Library to maintain and grow the space as a valued center of community and learning.	Capital Projects, Programs and Services	Petersburg Public Library	Ongoing (Annually)	Annual Budget	$$
6.4.2: Pursue grant funding to support upgrades to existing broadband and cell service and expansion of broadband in unserved areas to ensure universal access.	Partnerships, Programs and Services	City Manager's Office; Economic Development; Public Works	Ongoing (Routine Operations)	Commonwealth Connect, DHCD, LECAP, VATI	$
6.4.3: Provide financial support to Petersburg City Public Schools (PCPS) as they work to maintain accreditation for all schools, and complete capital improvements which assist in developing high-quality learning environments.	Capital Projects	City Manager's Office; PCPS	Ongoing (Annually)	Annual Budget, VDOE, Urban League	$$$

Strategy	Implementation Type	Responsible Department	Timeframe	Stakeholders, Partners, and/or Resources	Cost
6.4.4: Permit the use of Petersburg City Public Schools (PCPS) facilities after-hours to provide safe, neighborhood-oriented space for education, recreation, and socialization.	Partnerships, Programs and Services	PCPS; Recreation, Special Events & Volunteerism Staff	2026	Boys & Girls Clubs, CIS, YMCA, Rotary Club, Urban League	$
6.4.5: Monitor Petersburg City Public Schools (PCPS) student enrollment as a means of determining the short-term and long-term needs of school facilities.	Plans and Studies	Public Works; PCPS	Ongoing (Annually)	VDOE	$
Objective 6.5 Recognize the relationship between high-quality community facilities and infrastructure and overall health, wellness, and quality of life.					
6.5.1: Improve collaboration between the Department of Social Services (DSS) and regional organizations to alleviate caseload and provide more specialized assistance for residents.	Partnerships	Community Corrections; Social Services	2026	Aetna, Anthem, Bon Secours, CDAAA, CVHS, DMAS, VDSS	$$
6.5.2: Create a comprehensive informational clearinghouse available both online and as a paper copy that provides a comprehensive list of available health and human services resources in the Tri-Cities region; review and update annually.	Programs and Services	Communications, Marketing, Tourism & Government Relations; Social Services	Ongoing (Annually)	Internal Function	$
6.5.3: Advertise, and encourage community involvement in, the Adopt-a-Spot, Adopt-a-Street, and Don't Trash Petersburg programs.	Partnerships, Programs and Services	Communications, Marketing, Tourism & Government Relations; Public Works; Recreation, Special Events & Volunteerism	Ongoing (Routine Operations)	Internal Function	$
6.5.4: In partnership with regional stakeholders, initiate educational campaigns and marketing efforts to reduce solid waste flow and encourage household recycling and sustainability.	Programs and Services	Communications, Marketing, Tourism & Government Relations; Public Works	2029	DEQ	$
6.5.5: Allocate funding for the placement of additional waste receptables around Old Towne.	Capital Projects	Public Works	2026	Annual Budget, Capital Improvements Plan, DHCD, Virginia Main Street	$$

Strategy	Implementation Type	Responsible Department	Timeframe	Stakeholders, Partners, and/or Resources	Cost
6.5.6: Promote urban gardens and small-scale agriculture by allowing unused City-owned property to be used for community gardens.	Land Use Actions, Programs and Services	Public Works	2026	Boy/Girl Scouts of America, Cameron Foundation, Civic Clubs, PHOPs, Local Religious Institutions	$
6.5.7: In partnership with regional stakeholders, identify potential locations throughout Petersburg that could support new pop-up Farmers' Markets.	Partnerships	Public Works; Recreation, Special Events & Volunteerism	2026	Main Street Petersburg, PHOPs, River Street Market	$
6.5.8: Recommend approval of rezoning and development proposals for primary, urgent, and emergency medical care land uses in and around the Old Towne, South Crater Road, and Blandford areas.	Land Use Actions	Planning & Community Development	Ongoing (Routine Operations)	Internal Policy	$
6.5.9: Strengthen existing partnerships with Virginia Department of Health (VDH), Central Virginia Health Services (CVHS), and other regional organizations to identify community health needs and provide equitable and reliable medical care.	Partnerships	Social Services	Ongoing (Routine Operations)	Aetna, Anthem, Bon Secours, Cameron Foundation, CDAAA, CPCD, CVHS, Molina, Optima, PCPS, PHOPS, United Healthcare, VDH	$
6.5.10: Evaluate the potential for additional mobile markets during the summer months in partnership with PCPS, local non-profits, and regional organizations.	Partnerships	PCPS; Recreation, Special Events & Volunteerism	2026	CVHS, Main Street Petersburg, PCPS, River Street Market	$

Strategy	Implementation Type	Responsible Department	Timeframe	Stakeholders, Partners, and/or Resources	Cost
Objective 7.1 Identify and meet the personnel, equipment, and facility needs of the City's public safety departments.					
7.1.1: Map crime data through Geographic Information Systems (GIS) and make available to the public, both to increase transparency and to oversee data-driven, location-based solutions for future crime prevention.	Plans and Studies, Programs and Partnerships	Bureau of Police; Sheriff's Office	Ongoing (Routine Operations)	CPDC	$
7.1.2: Annually monitor personnel and equipment needs of the City's public safety departments to ensure that an optimum level of public safety and protection is maintained for Petersburg's residents, homes, properties, and businesses.	Plans and Studies	City Manager's Office; Community Corrections; Bureau of Police; Emergency Communications; Fire-Rescue; Sheriff's Office	Ongoing (Annually)	Annual Budget, Capital Improvements Plan	$$
7.1.3: Provide regular and visible patrols throughout Petersburg through joint efforts with Virginia State Police.	Partnerships	Bureau of Police	Ongoing (Routine Operations)	Virginia State Police	$$
7.1.4: Implement the recommendations of the Department of Fire, Rescue, and Emergency Services Strategic Plan upon its completion. Review and update the Strategic Plan every five years to monitor progress and update target goals as needed.	Plans and Studies	Fire-Rescue	Ongoing (5-Year Cycle)	Annual Budget, Capital Improvements Plan	$$$
7.1.5: Complete a Strategic Plan for the Bureau of Police. Review and update the Strategic Plan every five years to monitor progress and update target goals as needed.	Plans and Studies	Bureau of Police	2029	Annual Budget, Capital Improvements Plan	$$$
7.1.6: Implement the findings of the City-wide salary study upon its completion to improve attraction and retention of additional first responders and law enforcement personnel.	Plans and Studies	City Manager's Office; Human Resources	2026	Internal Function	$$$
7.1.7. Develop an intensive recruiting and retention program for the Bureau of Police that focuses on equity and recruiting underrepresented demographics.	Programs and Services	Bureau of Police; Human Resources	2029	Internal Function	$$$

Strategy	Implementation Type	Responsible Department	Timeframe	Stakeholders, Partners, and/or Resources	Cost
Objective 7.2 Facilitate the provision of rapid, effective, and equitable service delivery.					
7.2.1: Develop an opioid abatement strategy as a critical first step in helping combat high drug overdose rates.	Plans and Studies	Bureau of Police; Community Corrections; Fire-Rescue; Social Services	2026	Opioid Abatement Authority	$
7.2.2: Through partnerships with Bon Secours Southside Medical Center, Central Virginia Health Services (CVHS), and others, develop a Community Paramedicine program to specifically address drug abuse and mental health crises.	Partnerships, Programs and Services	Bureau of Police; Community Corrections; Fire-Rescue; Social Services; Sheriff's Office	2029	Bon Secours, CVHS, DOJ, VDH, VSU	$$
7.2.3: Maintain the Petersburg Bureau of Police's accreditation status.	Programs and Services	Bureau of Police	Ongoing (Annually)	Virginia Law Enforcement Professional Standards Commission	$
7.2.4: Bring all areas of Petersburg within a four-minute response time for Fire-Rescue responses through construction of an additional facility in the southeast area of the City.	Capital Projects	Fire-Rescue	2034	Annual Budget, Capital Improvements Plan	$$$
7.2.5: Conduct regular training exercises, including scenario training, for law enforcement and first responders to ensure Petersburg is prepared for increased frequencies of climate disasters that could significantly impact the community.	Programs and Services	Bureau of Police; Fire-Rescue	Ongoing (Routine Operations)	FEMA, VDEM	$$
7.2.6: Include mental health and social assistance professionals in post-disaster recovery and collaboration efforts.	Partnerships, Programs and Services	Bureau of Police; Community Corrections; Fire-Rescue; Social Services	2029	Aetna, Anthem, Bon Secours, CVHS, Optima Health, Pathways, United Healthcare, Unite Virginia, Virginia Premier, VSU	$
7.2.7: Review and update the City's Emergency Preparedness and Response Procedure.	Plans and Studies	Fire-Rescue; Public Works	2026	FEMA, VDEM	$
7.2.8: Maintain a permanent location to serve as an Emergency Operations Center during Citywide disasters and designate two potential back-up facilities.	Capital Projects	Bureau of Police; Fire-Rescue	2029	FEMA, VDEM	$$$

Strategy	Implementation Type	Responsible Department	Timeframe	Stakeholders, Partners, and/or Resources	Cost
7.2.9: In response to changing demographics, integrate multilingual public safety staff and services into daily operations.	Programs and Services	Bureau of Police; Fire-Rescue; Social Services	2034	Internal Function	$$
Objective 7.3 Regularly engage the community in public safety efforts to grow a culture of mutual respect and responsibility.					
7.3.1: Develop a widespread volunteer "Neighborhood Watch" program for neighborhoods, parks, trails, public areas, and along the pedestrian network leading to and from destinations, and engage existing "Neighborhood Watch" programs to coordinate efforts.	Partnerships, Programs and Services	Bureau of Police	Ongoing (Routine Operations)	Civic Organizations, Existing Neighborhood Watches, Neighborhood Associations, Religious Institutions	$
7.3.2: In partnership with local non-profits and community groups, expand efforts to provide the community with trauma-informed care.	Partnerships, Programs and Services	Bureau of Police; Community Corrections; Fire-Rescue; Social Services	Ongoing (Routine Operations)	Aetna, Anthem, Bon Secours, CVHS, Optima Health, Pathways, United Healthcare, Unite Virginia, Virginia Premier, VSU	$
7.3.3: Staff one full-time School Resource Officer (SRO) in every Petersburg City Public School. Apply for grant funding to help fund positions and consider joint funding between PCPS and the City.	Programs and Services	Bureau of Police	2026	DOJ COPS Program, PCPS	$$
7.3.4: Install metal detectors at all entrances to Petersburg High School and Vernon Johns Middle School.	Capital Projects	PCPS	2026	Annual Budget	$$
7.3.5: In partnership with local and regional organizations, provide quarterly community training on identifying and responding to drug overdoses.	Partnerships, Programs and Services	Bureau of Police; Fire-Rescue; Social Services	2026	DBHS REVIVE, VDH	$
7.3.6: Expand social programming between law enforcement and the community through participation in regular programs such as Coffee with a Cop and Gun Buy-Back Days.	Programs and Services	Bureau of Police	Ongoing (Weekly)	Internal Function	$$

Strategy	Implementation Type	Responsible Department	Timeframe	Stakeholders, Partners, and/or Resources	Cost
Objective 7.4 Recognize the impact of land planning on public safety and community wellness.					
7.4.1: Amend the Zoning Ordinance to adopt community design standards that incorporate principles of Crime Prevention through Environmental Design (CPTED) – including but not limited to requirements for lighting and landscaping maintenance – in both residential and commercial areas.	Ordinance Updates	Planning & Community Development	2026	Internal Function	$
7.4.2: Prioritize violent crime reduction efforts around schools and in neighborhoods with large populations of children.	Programs and Services	Bureau of Police	Ongoing (Routine Operations)	Internal Policy	$
7.4.3: Require public safety officials to provide comment on all site plan and subdivision submittals as one means of ensuring that future growth aligns with the location of facilities and target response time areas.	Land Use Actions	Bureau of Police; Fire-Rescue; Planning & Community Development	2026	Internal Function	$
7.4.4: Include neighborhood-specific strategies for crime prevention and eradication as a component of future Small Area Plans.	Land Use Actions, Plans and Studies	Bureau of Police; Planning & Community Development	2034	Internal Function	$

Strategy	Implementation Type	Responsible Department	Timeframe	Stakeholders, Partners, and/or Resources	Cost
Objective 8.1 Protect local water quality and the Chesapeake Bay through enforcement of the Chesapeake Bay Preservation Area (CBPA) ordinance.					
8.1.1 Annually review the CBPA ordinance to incorporate new best practices and state code requirements.	Ordinance Update	Planning & Community Development	Ongoing (Annually)	Code of Virginia, DEQ	$
8.1.2 Review and implement Total Maximum Daily Load (TMDL) Action Plans to address water quality improvements for local impaired waterbodies. Update Action Plans as needed to meet ongoing TMDL requirements.	Plans and Studies	Public Works	Ongoing (Annually)	Code of Virginia, DEQ	$
8.1.3 Track progress and implementation of all projects described in the Water Quality Master Plan, and any revisions thereof.	Plans and Studies	Public Works	Ongoing (Routine Operations)	DEQ, NFWF	$
8.1.4 Address water quality concerns by continuing to require Water Quality Impact Assessments (WQIAs) for any proposed land disturbance, development, or redevelopment location within Resource Protection Areas (RPA), or within Resource Management Areas that will impact the RPA.	Ordinance Update	Public Works	Ongoing (Routine Operations)	DEQ, NFWF, Code of Virginia	$
Objective 8.2 Proactively protect waterways, groundwater, and sensitive environments through best practices and site design.					
8.2.1 Amend the Zoning Ordinance to bolster requirements and incentives to incorporate low impact development and environmental site design into development applications.	Ordinance Updates	Planning & Community Development; Public Works	2026	Internal Function	$
8.2.2 Work with the Virginia Department of Environmental Quality (DEQ), Department of Conservation and Recreation (DCR), and Virginia Department of Health (VDH) to identify existing or potential sources of surface and groundwater pollution and take action to prevent or control the effect of the sources.	Partnerships, Plans and Studies, Programs and Services	Public Works	2029	DCR, DEQ, NFWF,VDH	$$
8.2.3 Through coordination with the Virginia Department of Health (VDH), protect water resources from onsite sewage disposal system failure through permitting and regulatory tools, including requiring VDH approval for plats showing onsite systems and requiring septic tanks to be pumped every five years.	Programs and Services	Public Works	Ongoing (Routine Operations)	DEQ, VDH	$

Strategy	Implementation Type	Responsible Department	Timeframe	Stakeholders, Partners, and/or Resources	Cost
8.2.4 Actively pursue removal or sealing of abandoned underground storage tanks.	Programs and Services	Planning & Community Development; Public Works	Ongoing (Routine Operations)	DEQ, VDH	$
8.2.5 Require submission of environmental inventories in order to protect environmentally sensitive lands; to save or most efficiently use permeable soils; and to limit impervious cover.	Plans and Studies	Planning & Community Development; Public Works	Ongoing (Routine Operations)	DCR, DEQ, VDH	$
8.2.6 Ensure that water dependent facilities such as docks and piers are located and constructed in an environmentally sensitive manner and include adequate marine sanitation facilities in accordance with federal and state regulations, including but not limited to the Virginia Marine Resources Commission (MRC), the Army Corps of Engineers (USACE), and Virginia Department of Environmental Quality (DEQ).	Land Use Actions	Planning & Community Development; Public Works	Ongoing (Routine Operations)	DEQ, MRC, USACE	$
Objective 8.3 Refer to the guidance presented in Petersburg's Comprehensive Coastal Resource Management Portal (CCRMP) prepared by VIMS to guide regulation and policy decisions regarding coastal resource management and shoreline erosion control.					
8.3.1 Utilize VIMS Decision Trees for onsite review and subsequent selection of appropriate erosion control/ shoreline best management practices: http://ccrm.vims.edu/ decisiontree/index.html.	Programs and Services	Planning & Community Development; Public Works	Ongoing (Routine Operations)	VIMS	$
8.3.2 Utilize VIMS' CCRMP Shoreline Best Management Practices for management recommendation for all tidal shorelines in the jurisdiction.	Programs and Services	Planning & Community Development; Public Works	Ongoing (Routine Operations)	VIMS	$
8.3.3 Require biennual staff training on decision making tools developed by the Center for Coastal Resources Management at VIMS.	Partnerships	Planning & Community Development; Public Works	Ongoing (Biennual)	VIMS	$
8.3.4 Identify creative public outreach opportunities to educate citizens and stakeholders on new shoreline management strategies, including Living Shorelines.	Partnerships, Programs and Services	Planning & Community Development; Public Works	Ongoing (Routine Operations)	FOLAR, JRA, VIMS	$
8.3.5 Follow the development of integrated shoreline guidance under development by VMRC, and implement any recommended strategies.	Programs and Services	Planning & Community Development; Public Works	Ongoing (Routine Operations)	FOLAR, JRA, VMRC	$
8.3.6 Evaluate the use of a locality-wide regulatory structure to encourage a more integrated approach to shoreline management.	Plans and Studies, Programs and Services	Planning & Community Development; Public Works	2034	DCR, DEQ, VMRC	$

Strategy	Implementation Type	Responsible Department	Timeframe	Stakeholders, Partners, and/or Resources	Cost
8.3.7 Evaluate the feasibility of cost share opportunities for construction of living shorelines.	Programs and Services	Planning & Community Development; Public Works	2026	DCR, DEQ, VMRC	$$
8.3.8 Preserve available open spaces adjacent to marsh and wetlands to allow for natural protection of water quality, flood mitigation, and the protection of biodiversity and habitat.	Programs and Services	Planning & Community Development; Public Works	Ongoing (Routine Operations)	DCR, DEQ, FOLAR, VMRC	$$
8.3.9 Implement a policy where VIMS' Shoreline Best Management Practices and living shorelines are the recommended adaptation strategies for erosion control in accordance with Code of Virginia § 28.2-104.1. Departures from these recommendations by an applicant wishing to alter the shoreline should use the best available science to show that a living shoreline approach is not suitable.	Land Use Actions	Planning & Community Development; Public Works	2026	DEQ, VIMS	$
8.3.10: In collaboration with the Virginia Department of Environmental Quality (DEQ), implement shoreline erosion mitigation measures at Petersburg's identified shoreline erosion sites.	Land Use Actions, Programs and Services	Planning & Community Development; Public Works	2029	DEQ, FOLAR, VIMS	$$
Objective 8.4 Proactively reduce flooding risks to residents and property owners.					
8.4.1 Formally participate in the Federal Emergency Management Agency's (FEMA) Community Rating System to implement flood protection policies beyond minimum requirements and earn community discounts on flood insurance premiums.	Plans and Studies	Planning & Community Development; Public Works	2026	FEMA	$$$
8.4.2 Locate new development and critical facilities and infrastructure outside of current flood zones and areas projected to be impacted by sea level rise in the future.	Capital Projects, Land Use Actions, Ordinance Updates, Programs and Services	Planning & Community Development; Public Works	Ongoing (Routine Operations)	DEQ, FEMA, VMRC	$$
8.4.3 Annually review the Floodplain Management ordinance to incorporate new best practices and Code of Virginia requirements.	Ordinance Updates	Planning & Community Development; Public Works	Ongoing (Annually)	FEMA, Code of Virginia	$

Strategy	Implementation Type	Responsible Department	Timeframe	Stakeholders, Partners, and/or Resources	Cost
8.4.4 Provide education and outreach materials on hazard preparedness, flood management, sea level rise, and recommended mitigation steps to homeowners and private businesses.	Programs and Services	Planning & Community Development; Communications, Marketing, Tourism & Government Relations; Public Works	2026	DEQ, FEMA, VMRC	$
8.4.5 Implement recommendations from the Wilcox Lake Dam study to protect the area within the dam break inundation zone.	Capital Projects	Planning & Community Development; Public Works	2034	FEMA, DEQ	$$$
Objective 8.5 Improve environmental resilience and sustainability efforts to protect residents and property owners from the long-term effects of climate change.					
8.5.1 Reduce the heat island effect by proactively installing new native trees throughout the city, with priority areas determined by heat island temperatures using heat mapping data from Virginia State University (VSU) and the Heat Watch project; consider pursuing Tree City USA designation to help implement this strategy.	Programs and Services	Public Works	2029	FOLAR, Forestry Service, Tree City USA, VCU, VSU	$$
8.5.2 Require the use of native plantings in all public landscaping and amend the Zoning Ordinance to provide more specific requirements for landscaping, including prioritizing native species and prohibiting invasive species.	Ordinance Updates	Planning & Community Development; Public Works	2026	Code of Virginia	$
8.5.3 Amend the Zoning Ordinance to require preservation of the existing mature tree canopy to the extent possible, especially in residential neighborhoods.	Ordinance Updates	Planning & Community Development	2026	Code of Virginia	$
8.5.4 Collaborate with regional partners to proactively implement strategies from Hazard Mitigation Plan, Petersburg Resilience Plan, and Richmond-Petersburg Ozone Advance Action Plan.	Partnerships, Programs and Services	Planning & Community Development; Communications, Marketing, Tourism & Government Relations; Public Works	Ongoing (Routine Operations)	CPDC, DEQ	$$

Strategy	Implementation Type	Responsible Department	Timeframe	Stakeholders, Partners, and/or Resources	Cost
8.5.5 In collaboration with the Crater Planning District Commission, implement regulations to help meet Coastal Zone Management resilience and water resource protection goals.	Ordinance Updates, Partnerships, Programs and Services	Planning & Community Development; Communications, Marketing, Tourism & Government Relations; Public Works	Ongoing (Routine Operations)	CPDC, FEMA, VMRC	$
8.5.6 Amend the Zoning Ordinance and related policies to encourage siting of solar facilities on rooftops, brownfields, and areas of existing unused impervious surface. Meet SolSmart Bronze goals through the Standard Criteria pathway to help implement this strategy.	Ordinance Updates	Planning & Community Development	2029	SolSmart	$
8.5.8 Implement recommendations from the Resilience Adaptation Feasibility Tool (RAFT) Scorecard to improve local resiliency and increase RAFT score.	Capital Projects	City Manager's Office; Planning & Community Development	Ongoing (Routine Operations)	Internal Function	$$$
Objective 8.6 Promote public knowledge of and involvement in the City's environmental programs and initiatives.					
8.6.1 Create an easily accessible, user-friendly information clearinghouse in both physical and digital formats for environmental regulations and resources, including but not limited to permitting requirements, submittal checklists, frequently asked questions, and grant/program resources.	Programs and Services	Planning & Community Development; Communications, Marketing, Tourism & Government Relations; Public Works	2026	FEMA, FOLAR, DEQ, JRA, VCU, VSU, Extension Office	$
8.6.2 Work with Appomattox River Soil and Water Conservation District to annually promote urban/suburban and agricultural cost-share programs available for funding best management practices (BMPs) to improve site-specific water quality/quantity issues.	Partnerships, Programs and Services	Planning & Community Development; Communications, Marketing, Tourism & Government Relations; Public Works	Ongoing (Annually)	ARSWCD, Extension Office	$
8.6.3 Conduct annual public outreach and provide resources for water quality and efficiency best practices, green infrastructure, the responsible use of fertilizer, proper disposal of animal waste, and other actions that conserve water and improve water quality.	Programs and Services	Planning & Community Development; Public Works	Ongoing (Annually)	ARSWCD, DEQ, Extension Office, FOLAR	$

Strategy	Implementation Type	Responsible Department	Timeframe	Stakeholders, Partners, and/or Resources	Cost
Objective 9.1: Ensure the existing transportation network remains safe, reliable, and efficient.					
9.1.1: Include ongoing repairs of bridges and culverts as routine maintenance in addition to other roadway improvement projects. Prioritize repairs to bridges and culverts in poor condition to prevent further degradation and the need for weight limit reductions.	Capital Projects	Public Works	Ongoing (Routine Operations)	VDOT	$$$
9.1.2: Complete a repaving schedule for Public Works that establishes current road conditions and identifies priority locations for maintenance or upgrades, with an emphasis on preventative maintenance.	Capital Projects, Programs and Services	Public Works	2026	VDOT	$
9.1.3: Place speed cameras in school zones around all Petersburg Public Schools to facilitate safety for children, pedestrians, and bicyclists during school hours.	Capital Projects, Programs and Services	Bureau of Police; Public Works	2026	Code of Virginia, VDOT	$$
9.1.4: Complete a parking study/inventory in Old Towne to provide further information about parking surpluses, deficiencies, and maintenance priorities.	Plans and Studies	Planning & Community Development; Public Works	2029	CPDC, PHOPs	$$
9.1.5: Complete additional road safety audits along Wythe Street, Halifax Street, and Sycamore Street.	Plans and Studies	PAT; Planning & Community Development; Public Works	2034	Cameron Foundation, CHD, FOLAR, PHOPs, VDOT	$$
9.1.6: Work with the Virginia Department of Transportation (VDOT) to ensure successful completion of projects included in VTrans and the City's Six-Year Improvement Plan.	Capital Projects, Partnerships	Planning & Community Development; Public Works	Ongoing (Annually)	OIPI, TCAMPO, VDOT	$
9.1.7: Develop a maintenance plan for City-owned alleyways.	Plans and Studies	Public Works	2034	TCAMPO	$$
Objective 9.2 Continue to invest in and advertise public transportation as a valuable transportation mode.					
9.2.1: Update Petersburg Area Transit's (PAT) Transit Strategic Plan to include an emergency evacuation plan.	Plans and Studies	PAT	2026	DRPT, VDEM	$
9.2.2: Reassess Petersburg Area Transit's (PAT) routes every three years.	Programs and Services	PAT	Ongoing (Triennually)	DRPT, TCAMPO	$
9.2.3: Create a Transit Advisory Board to help inform Petersburg Area Transit's (PAT) strategic planning.	Partnerships	PAT	2026	PAT, TCAMPO	$

Strategy	Implementation Type	Responsible Department	Timeframe	Stakeholders, Partners, and/or Resources	Cost
9.2.4: Develop and maintain a user-friendly Petersburg Area Transit's (PAT) website, independent of the City's official website, and keep PAT social media page updated with accurate information about PAT routes, fares, bus stop locations, and other important information.	Programs and Services	Information Technology; PAT; Communications, Marketing, Tourism & Government Relations	2026	PAT	$$
9.2.5: Prioritize safety and accessibility improvements such as lighting and ADA features at all Petersburg Area Transit's (PAT) bus stops.	Capital Projects	PAT; Public Works	2026	PAT, TCAMPO, VDOT	$$
Objective 9.3: Increase opportunities for active transportation that equitably serves residents in all neighborhoods of the City.					
9.3.1: Make an annual funding commitment to support implementation of the Appomattox River Trail and ongoing trail maintenance.	Capital Projects	Recreation, Special Events & Volunteerism; Planning & Community Development	Ongoing (Annually)	FOLAR, VDOT	$$$
9.3.2: Complete a study to assess the feasibility of developing complete streets at Washington & Wythe Streets, N. Adams Street, N. Sycamore Street, S. Crater Road, Halifax Street, and Homestead Drive; this study will also serve as a foundation for grant funding.	Plans and Studies	Planning & Community Development; Public Works	2034	CHD, PHOPs, TCAMPO, VDOT	$$
9.3.3: Adopt ordinances requiring pedestrian walkways be maintained during any street closures related to construction and requiring new pedestrian connections at all new development.	Ordinance Updates	Planning & Community Development; Public Works	2026	Internal Function	$
9.3.4: In partnership with the Crater Planning District Commission (CPDC) and the Tri-Cities Area Metropolitan Planning Organization (TCAMPO), complete a greenways plan to identify potential locations for future greenways and steps for acquisition and development.	Partnerships, Plans and Studies	Planning & Community Development	2034	CPDC, DCR, FOLAR, TCAMPO	$$
9.3.5: In partnership with Virginia Department of Transportation (VDOT) and the Petersburg Active Transportation Work Group, obtain funding for Safe Routes to School (SRTS) projects at Pleasants Lane Elementary and Blandford Academy.	Programs and Services	Planning & Community Development; Public Works	2034	PCPS, PHOPs, TCAMPO, VDOT	$

Strategy	Implementation Type	Responsible Department	Timeframe	Stakeholders, Partners, and/or Resources	Cost
9.3.6: In partnership with local and regional organizations, educate the community on active transportation through holding quarterly community events such as Walk to School Day.	Programs and Services	Planning & Community Development	Ongoing (Quarterly)	Aetna, Anthem, Bon Secours, Crater Health District, FOLAR, PHOPs, VDOT, Rotary, Urban League	$
9.3.7: Ensure that any support of shared e-bike and e-scooter programs is coupled with committed investments in bike lanes, streetlights, and complete streets.	Capital Projects	Planning & Community Development; Public Works	2034	Capital Improvements Plan, PHOPs, TCAMPO, VDOT	$$$
Objective 9.4 Coordinate with regional partners in significant transportation investments, especially those that enhance equity or are associated with employment centers.					
9.4.1: In collaboration with state and federal agencies, leverage grant funding for other Amtrak station improvements that may become necessary during the timeframe of this Plan.	Partnerships	Planning & Community Development	2034	Amtrak, Chesterfield County, DRPT, OIPI, DOT, VDOT, VPRA	$
9.4.2: Work with Friends of the Lower Appomattox River (FOLAR) and the Virginia Department of Transportation (VDOT) to develop and locate appropriate safety and wayfinding signage along the Appomattox River Trail and banks of the Appomattox River.	Capital Projects, Partnerships	Public Works Staff; Recreation, Special Events & Volunteerism	2029	FOLAR, VDOT	$
9.4.3: Coordinate with the Virginia Department of Transportation (VDOT) and the Tri-Cities Area Metropolitan Organization (TCAMPO) to evaluate regionally significant corridors, such as U.S. Rt. 460 and U.S. Rt. 1, to identify barriers to emergency evacuation in the event of a disaster and prioritize needed improvements.	Plans and Studies, Partnerships	Bureau of Police; Fire-Rescue; Planning & Community Development; Public Works	2034	FEMA, TCAMPO, VDEM, VDOT	$$
9.4.4: In partnership with state agencies and neighboring localities, support the development and implementation of the Southeast Corridor High Speed Rail project through funding and participation in planning committees and boards.	Plans and Studies, Partnerships	Planning & Community Development	2034	CPDC, DRPT, OIPI, Southeast Corridor Commission, TCAMPO, VDOT	$$$

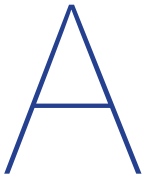
Strategy	Implementation Type	Responsible Department	Timeframe	Stakeholders, Partners, and/or Resources	Cost
Objective 9.5 Recognize the ways in which transportation infrastructure informs future growth and development patterns in Petersburg.					
9.5.1: Map and record the location and quality of all sidewalks in Petersburg to provide a foundation for data-driven, location-based investment over the next twenty years.	Plans and Studies	Planning & Community Development; Public Works	2026	CPDC, FOLAR, PHOPs, TCAMPO, VDOT	$
9.5.2: Amend the Zoning Ordinance to reduce parking minimums and require installation of bike racks at parking areas in multi-family residential, commercial, and mixed-use districts.	Ordinance Updates	Planning & Community Development	2026	Internal Function	$
9.5.3: Amend the Zoning Ordinance to require EV charging stations at all new multi-family residential, mixed-use, commercial, and industrial development based on the number of parking spaces on site.	Ordinance Updates	Planning & Community Development	2026	Internal Function	$
9.5.4: Adopt the draft Petersburg Complete Streets Policy developed in partnership with the National Complete Streets Coalition.	Ordinance Updates	Planning & Community Development; Public Works	2026	CPDC, FOLAR, National Complete Streets Coalition, PHOPs, TCAMPO, VDOT	$

Strategy	Implementation Type	Responsible Department	Timeframe	Stakeholders, Partners, and/or Resources	Cost
Objective 10.1: Commit to development that builds equity and resiliency through an intentional and multi-faceted approach.					
10.1.1: Increase access to stable and well-paying employment opportunities by allowing a variety of job-producing uses along high-frequency Petersburg Area Transit (PAT) routes and along arterials.	Land Use Actions	PAT; Planning & Community Development	Ongoing (Routine Operations)	Internal Policy	-
10.1.2: Prioritize capital improvements such as wayfinding, streetscaping, lighting, and pedestrian/bicycle infrastructure along designated Gateways and Corridors.	Capital Projects	Planning & Community Development; Public Works	Ongoing (Routine Operations)	Capital Improvements Plan, VDOT	$
10.1.3: Amend the Zoning Ordinance to allow for a greater variety of residential types in residential and mixed-use districts.	Ordinance Updates	Planning & Community Development	2026	Internal Function	$
10.1.4: Direct development away from conservation areas to protect and enhance Petersburg's natural, historic, and recreational resources.	Land Use Actions	Planning & Community Development	Ongoing (Routine Operations)	Internal Policy	-
10.1.5: Facilitate active and healthy lifestyles through integrating sidewalks, bike lanes, and green space into new development.	Land Use Actions, Ordinance Updates	Planning & Community Development	2034	Internal Policy	$
Objective 10.2: Support innovative development that complements and enhances Petersburg's historic character.					
10.2.1: Direct adaptive reuse or infill development on underdeveloped or vacant properties throughout the City when possible.	Land Use Actions	Planning & Community Development	Ongoing (Routine Operations)	Internal Policy	-
10.2.2: Implement the recommendations of the Downtown Master Plan to create a more attractive, vibrant, and interconnected Old Towne area.	Capital Projects, Land Use Actions, Plans and Studies	Planning & Community Development	2029	Internal Function	$$$
10.2.3: Evaluate all land use applications and capital improvements against the applicable planning and development guidelines of the Future Land Use Map Area Designation.	Land Use Actions	Planning & Community Development	Ongoing (Routine Operations)	Internal Policy	-
10.2.4: Amend the Zoning Ordinance to ensure compatible development in designated historic districts and throughout Historic Core Neighborhoods.	Ordinance Updates	Planning & Community Development	2026	Internal Function	$

Strategy	Implementation Type	Responsible Department	Timeframe	Stakeholders, Partners, and/or Resources	Cost
10.2.5: Amend the Zoning Ordinance to create an overlay district that more specifically regulates development along designated Gateways and Corridors.	Ordinance Updates	Planning & Community Development	2026	Internal Function	$
Objective 10.3: Direct future growth and development to areas with adequate transportation and utility infrastructure.					
10.3.1: Prioritize new development in areas with adequate water and sewer capacity or that are planned for expansion. Require developers to provide utility connections where utilities are not available.	Land Use Actions, Ordinance Updates	Planning & Community Development; Public Works	Ongoing (Routine Operations)	Internal Policy	-
10.3.2: Ensure water, sewer, stormwater, public safety, and transportation infrastructure is available to support the required level of service for all new development.	Land Use Actions, Programs and Services	Planning & Community Development; Public Works	Ongoing (Routine Operations)	Internal Policy	$
10.3.3: Evaluate City fees, including impact and connection fees, to ensure they can adequately generate funding for future infrastructure improvements.	Plans and Studies	City Manager's Office; Economic Development	2026	Internal Function	$
10.3.4: Market the economic potential of interchanges along Interstates 85 and 95 and recommend approval of appropriate development opportunities, such as hospitality-oriented uses and mixed-use development, in those areas.	Land Use Actions, Ordinance Updates	Economic Development; Planning & Community Development; Public Works	Ongoing (Routine Operations)	EDA, GO Virginia, VEDP	$$
10.3.5: Complete a Build-Out Analysis in areas planned for future high-density residential growth to better inform capital improvements planning.	Plans and Studies	Planning & Community Development; Public Works	2029	Internal Function	$$
10.3.6: In accordance with the Code of Virginia, evaluate the feasibility of offering financial incentives for development in the South Crater Urban Development Area.	Land Use Actions, Ordinance Updates	Economic Development; Planning & Community Development; Public Works	2026	Code of Virginia, TCAMPO, VTrans	$

Strategy	Implementation Type	Responsible Department	Timeframe	Stakeholders, Partners, and/or Resources	Cost
Objective 10.4: Work regularly and openly with neighboring jurisdictions and the Crater Planning District Commission to pursue collaborative and innovative solutions to regional land use challenges.					
10.4.1: In review of development applications, ensure alignment with the considerations of the Fort Gregg-Adams Joint Land Use Study.	Land Use Actions	Planning & Community Development	Ongoing (Routine Operations)	CPDC, Fort Gregg-Adams, DOD	-
10.4.2: Communicate with adjacent jurisdictions regarding development plans that have potential impacts on regional localities and public facilities. Work with them to coordinate plans and to identify and mitigate areas where conflicts may be present.	Partnerships	Planning & Community Development	Ongoing (Routine Operations)	CPDC	$
10.4.3: Participate actively in joint regional planning efforts and studies.	Partnerships, Plans and Studies	Planning & Community Development	Ongoing (Routine Operations)	CPDC, FOLAR, VDOT, Fort Gregg-Adams, TCAMPO	$

APPENDIX



GLOSSARY

Access Management: Systematic control of the location, spacing, design, and operation of driveways, median openings, interchanges, and street connections to a roadway.

Accessory Dwelling Unit (ADU): Additional living quarters located on single-family lots that are independent of the primary building; can be either detached or attached structures.

Active Recreation: Refers to a structured individual or team activity that requires the use of special facilities, courses, fields, or equipment. Examples include swimming pools, tennis courts, and football fields.

Adaptive Reuse: A new use for a structure or landscape other than the historic use, normally entailing some modification of the structure or landscape.

Affordable Housing: According to the U.S. Department of Housing and Urban Development (HUD), affordable housing is any housing in which the occupant is paying no more than 30% of their gross household income on housing costs, including utilities.

Aging in Place: The ability to live in one's own home and community safely, independently, and comfortably, regardless of age, income, or ability level.

American Community Survey (ACS): An ongoing survey, conducted by the U.S. Census Bureau, that provides demographic information on a yearly basis.

Americans with Disabilities Act (ADA): A civil rights law that prohibits discrimination based on disability.

Area Median Income (AMI): The household income for the median household in a defined geographical area. The AMI is determined and published annually by the Department of Housing and Urban Development (HUD). The local AMI is used to determine individuals' and families' qualifications for various federal and state assistance programs, including affordable housing programs.

Average Annual Daily Traffic (AADT): The total volume of traffic on a highway segment for one year, divided by the number of days in the year.

Best Management Practices (BMP): Structural, vegetative, or managerial practices (e.g., schedules of activities, prohibitions of practices, maintenance procedures, and other management practices) to prevent or reduce the pollution of surface waters and groundwater systems from the impacts of land-disturbing activities.

Blight: A state of structural deterioration which poses a threat to the community's general health, safety, and welfare due to dilapidation or a violation of minimum health and safety standards.

Blight Abatement: The removal of property blight through revitalization or removal of the structures.

Blueway: A route on a waterway designated for recreational use especially by nonmotorized watercraft (e.g., canoes and kayaks) and often used for environmental protection.

Buffer: A natural area of land established to separate land uses or designed to intercept pollutants and manage other environmental concerns or provide for open space.

Capital Improvements Plan (CIP): A community planning and fiscal management tool used to coordinate the location, timing, and financing of capital improvements over a multi-year period.

Certified Local Government (CLG): A program administered by the National Park Service (NPS) and the State Historic Preservation Offices (SHPOs) to link federal, state, and local government in the identification, evaluation, and protection of historic properties.

City Code of Ordinances: The collection of laws passed by a local governing body.

City Budget: Establishes the plan of revenue and expense activities for the fiscal year and provides a coordinated financial program to attain the City's goals and objectives, including those identified in the Comprehensive Plan.

Community Advisory Committee: A structured community organization group through which individual citizens share their opinions and perspectives, study issues, and develop recommendations in a focused, small-group structure.

Community Development Block Grant (CDBG): A program which provides annual grants on a formula basis to invest in housing and expand economic opportunities primarily for low- and moderate-income persons.

Community Land Trust: A community-based organization that acquires land to provide affordable owner-occupied housing on behalf of a specific community.

Cost-Burdened: Paying more than 30% of the gross household income on a rent or mortgage and utilities, according to the U.S. Department of Housing and Urban Development (HUD).

Cultural Resources: Physical evidence or place of past human activity: site, object, landscape, structure or a site, structure, landscape, object or natural feature of significance to a group of people traditionally associated with it.

Density: The average number of dwelling units per gross acre of land on a development site, including all land within the boundaries of the site for which the density is calculated.

Development: Any man-made changes to existing or proposed land use. Development activities can include land divisions, lot line adjustments, construction or alteration of structures, construction of roads and any other accessway, establishing utilities or other associated facilities, etc.

Displacement: The involuntary relocation of current residents or businesses resulting from gentrification.

Dollar Lot Program: A program through which local governments sell vacant parcels for $1 – or a similarly low rate – to community members who live on the same block or other individuals or institutions with a vested interest in the neighborhood.

Easement: A preservation tool which allows property owners to voluntarily protect the historical, architectural, and archaeological integrity of their property by donating the easement to the Virginia Department of Historic Resources (DHR), other government agency, or nonprofit organization. Its intention is to prevent demolition or other adverse changes, generally in perpetuity.

Ecosystem: A biological community of interacting organisms and their physical environment.

Enterprise Zone: A partnership between state and local government that encourages job creation and private investment by way of two grant-based incentives — the Job Creation Grant (JCG) and the Real Property Investment Grant — to qualified investors and job creators within certified Virginia Enterprise Zones.

Floodplain: A relatively flat or low land area adjoining a river, stream, or watercourse which is subject to partial or complete inundation.

Flood Zones: Flood Zone designations are determined by the Federal Emergency Management Agency (FEMA), and designated on a Flood Insurance Rate Map (FIRM). Flood Zone designations and their descriptions are as follows:

Zone X: Area of minimal flood hazard, usually depicted on a FIRM as above the 500-year floodplain. Zone X is the area determined to be outside the 500-year floodplain or protected by levee.

500-Year Floodplain: Areas where there is a 0.2% annual chance of flooding.

Zone A: Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas, no depths or base flood elevations are shown within these zones.

Zone AE: The base floodplain where base flood elevations are provided.

Garden-Style Apartments: Apartments typically no more than four stories high, with multiple apartments per story, and landscaped grounds surrounding them.

Gentrification: A process by which wealthy, often college-educated individuals begin to move into lower-income communities.

Geographic Information Systems (GIS): A means of producing, analyzing, and storing map data.

Gig Economy: Refers to a labor market that is administered through digital platforms and typically filled by part-time and independent contractors.

Green Infrastructure: Natural and nature-based assets including sites (parks, sports fields, playgrounds, nature reserves, forests, community gardens, cemeteries), linkages between sites (sidewalks, bike lanes, and trails), and waterways (streams, rivers, and wetlands). Constructed green infrastructure features blend in with natural assets in a synergistic manner to survive and rebound from the impacts of natural and human-induced hazards.

Guerilla Landscaping: An informal gardening movement that empowers communities to use unauthorized interventions to improve public spaces. Examples of this include vacant lot gardening and planting in medians.

Hazard Mitigation: Action and plans taken to reduce or eliminate long- term risk to people and property from hazards and their effects.

Heat Island: Urbanized areas that experience higher temperatures than outlying areas.

Historic Resources: A district, site, building, structure or object that is significant in the history, architecture, engineering, archaeology or culture of a locality, state, or nation.

Housing Choice Voucher (HCV): The federal government's major program for assisting very low-income families, the elderly, and the disabled to afford decent, safe, and sanitary housing in the private market. A housing subsidy is paid to the landlord directly by the local public housing authority on behalf of the participating family.

Housing Diversity: Refers to diversity in the types of housing units available in a geographic area, in terms of size, cost, and unit type.

Housing Rehabilitation Zone: Local housing rehabilitation zones permitted by the Code of Virginia that provide incentives and regulatory flexibility for housing revitalization financing for a variety of incomes to be eligible for housing revitalization financing.

HUD Section 202: A federal program which finances the construction, rehabilitation or acquisition of structures to serve as supportive housing for very low-income elderly persons, including the frail elderly, and provides rent subsidies for the projects to help make them affordable.

Impervious Surface: Any hard-surfaced, man-made area that does not readily absorb or retain water, including but not limited to building roofs, parking and driveway areas, graveled areas, sidewalks, and paved recreation areas.

Infrastructure: The basic physical and organizational structures and facilities that are needed for the operation of a community, such as roads, powerlines, wastewater treatment plants, etc.

Infill: The development of housing or other uses on vacant parcels or sites within already built-up areas.

Labor Force Participation (LFP) Rate: The percentage of the population that is either working or actively looking for work.

Land Use: The occupation or use of land or water area for any human activity or any purpose defined in a Comprehensive Plan.

Level of Service (LOS): LOS is a quality measure used to analyze roadways and intersections by categorizing traffic flow and assigning quality levels of traffic based on performance measure like vehicle speed, travel time, freedom to maneuver, traffic interruptions, comfort and convenience, etc.

Livable Communities: A community that has affordable and appropriate housing, supportive community features and services, and adequate mobility options, which together facilitate personal independence and the engagement of residents in civic and social life.

Low Impact Development (LID): Systems and practices that use or mimic natural processes that result in the infiltration, evapotranspiration, or use of stormwater to protect water quality and associated aquatic habitat. Often utilizes green infrastructure to preserve, restore, and create green space using soils, vegetation, and rainwater harvest techniques that work with nature to manage stormwater as close to its source as possible.

Low-Income Housing Tax Credit (LIHTC): A state administered tax credit which subsidizes the acquisition, construction, and rehabilitation of affordable rental housing for low-and moderate-income tenants.

Manufactured Home: A structure subject to federal regulatory standards which is transportable in one or more sections; is built on a permanent chassis; is designed to be used as a single-family dwelling, with or without a permanent foundation, when connected to the required utilities; and includes the plumbing, heating, air conditioning and electrical systems contained in the structure.

Median Gross Rent: Refers to the total monthly home payment, including monthly rent and any payments made for electricity, gas, water, and sewer.

Microlending: Small-dollar loans for business owners which mainstream banks do not always offer.

Missing Middle Housing: A term typically used to refer to multi-family structures containing between 2 and 5 units, including townhomes and duplexes.

Mixed-Use: A building, development, or area that incorporates two or more uses such as, but not limited to, residential, retail, public, or entertainment. Vertical mixed-use developments incorporate a mix of uses within the same building, typically with uses on different floors. Horizontal mixed-use developments incorporate a mix of uses within adjacent buildings.

National Register of Historic Places: An official, federally administered list of America's historic and archeological resources which have been identified and documented for their historic significance.

Non-Tidal Wetlands: Freshwater wetlands that are found in inland areas and are not affected by tidal influences. They are fed by rain, snow, or groundwater and experience changing water levels throughout the year.

Open Space: An area or portion of land, either landscaped or essentially unimproved, used to

provide opportunities for human recreation or protect sensitive environmental areas.

Opportunity Zone: A federal economic development tax benefit available to investors with capital gains designed to encourage long-term private investment in low-income, suburban, and rural census tracts.

Parklet: A sidewalk extension that provides additional seating areas for pedestrians through the transfiguration of curbside parking spaces.

Passive Recreation: Refers to non-consumptive recreation uses such as wildlife observation, walking, biking, and canoeing.

Placemaking: A community-driven, hands-on approach for improving a neighborhood by reimagining and reinventing community public spaces.

Predatory Lending: Any lending practice that uses misleading or unethical tactics to persuade borrowers to take out loans that aren't in their best interest, often with extraordinarily high fees and ambiguous terms.

Recreation: Participating in physical, social, intellectual, and/or creative pursuits that enhance individual and community wellbeing.

Redevelopment: The process of reconstruction in an area that is not making effective and efficient use of the land or is in substandard condition.

Redlining: A discriminatory practice in which lenders would systematically deny loans, mortgages, and other financial services to residents of certain areas based on the prevailing race or ethnic group in the area.

Resource Management Area (RMA): Lands contiguous to the inland boundary of the RPA which have a potential for degrading water quality or diminishing the functional value of the RPA, if not properly managed.

Resource Protection Area (RPA): All tidal wetlands; tidal waters; non-tidal wetlands connected by surface flow and contiguous to tidal wetlands or water bodies with perennial flow; shorelines; and a one hundred (100) foot vegetated buffer around each such feature and around all water bodies with perennial flow. In their natural condition, these lands provide for the removal, reduction or assimilation of sediments, nutrients and potentially harmful or toxic substances in runoff entering the bay and its tributaries and minimize the adverse effects of human activities on state waters and aquatic resources.

Septic System: Underground wastewater treatment structures, commonly used in rural areas without centralized sewer systems. They use a combination of nature and technology to treat wastewater from household plumbing produced by bathrooms, kitchen drains, and laundry.

Six-Year Improvement Program (SYIP): A state document that outlines planned spending for transportation projects proposed for development or study over the next six years.

Short-Term Rental: A living space, typically furnished, that is available for short periods of time, from a few days to weeks.

Small Area Planning: A planning process which is focused on a particular area of the City and results in a specific set of planning strategies for that area.

SMART SCALE: The method used by the Virginia Department of Transportation (VDOT) to score planned projects included in VTrans that are funded by House Bill 1887. Transportation projects are scored based on an objective, outcome-based process that is transparent to the public and strives for the best use of limited tax dollars.

Special Use Permits (SUP): A permit that allows a use not allowed by-right in a particular zone on a parcel of land or property.

Streetscape: Elements of a corridor or street including the road, sidewalk conditions and materials, landscaping, street furniture (utility poles, benches, garbage cans, etc.), and signage.

Subdivision: The division of a parcel of land into three or more lots or parcels for the purpose of transfer of ownership or building development, or, if a new street is involved in such a division, any division of a parcel of land.

Sustainable: Community use of resources in a way that does not jeopardize the ability of future generations to live and prosper.

Tactical Urbanism: A term referring to rapid, low-cost, short-term, and scalable interventions intended to create long-term change in neighborhoods.

Talent Pipeline: A process for a company or organization to identify and develop relationships with individuals and institutions which have the potential to work for or otherwise benefit the organization in the future.

Technology Zone: Local established zones encouraging the development of commercial and industrial businesses engaged in technological research, design, and manufacturing.

Tidal Wetlands: Commonly referred to as marshes, they occur along the shoreline where oceans, bays, rivers, and streams meet the land. They can range from freshwater to saltwater and have water pushed in and out daily by tidal cycles.

Total Maximum Daily Load (TMDL): A regulatory term that identifies the maximum amount of a pollutant that a body of water can receive while still meeting water quality standards for that particular pollutant.

Tourism Zone: A program which allows businesses to take advantage of local tax incentives and deductions not available to businesses outside localities with Tourism Zones. Tourism Zones are passed by local ordinance and may contain both requirements and benefits for existing and new or expanded tourism businesses, including lodging, dining, retail, meeting and sports facilities, outdoor recreation areas, theme parks and event venues.

Traditional Neighborhood Development: Also known as 'new urbanism,' 'neo-traditional,' or 'village-style' development, this type of development typically includes principles such as pedestrian-friendly road design, interconnection of new local streets with existing local streets and roads, connectivity of road and pedestrian networks, preservation of natural areas, satisfaction of requirements for stormwater management, mixed-use neighborhoods, including mixed housing types, reduction of front and side yard building setbacks.

Transitional Housing: Housing units which serve the purpose of temporary residence, typically for up to 24 months.

Urban Core: An area in a metropolitan area with high population density and high transit, walking, and cycling work trip shares.

Vacant: Land or buildings that are not currently used for any purpose.

Virginia Landmarks Register: The Commonwealth of Virginia's official list of places of historic, architectural, archaeological and/or cultural significance. The Virginia Landmarks Register has the same criteria and nomination process as the National Register of Historic Places.

VTrans: A long-range, statewide multimodal plan that lays out overarching vision and goals for transportation in Virginia. It identifies transportation investment priorities and provides direction to transportation agencies on strategies and programs to be incorporated into their plans and programs.

Watershed: An area of land from which all water drains, running downhill, to a shared destination, such as a river, pond, stream, lake, or estuary.

Wayfinding: A system of gateway signs, vehicular and/or pedestrian sign systems, or area-specific identification signs that help orient residents and visitors while promoting civic pride and enhancing community character.

Wetlands: Areas that are flooded by water either permanently or seasonally, and that under normal circumstances can support a prevalence of vegetation typically adapted for life in saturated soil conditions.

Workforce: Total number of people in an area age 16 and older who are physically able and available to work.

Zoning Ordinance/Zoning Map: A Zoning Ordinance, along with a Zoning Map, controls land use by providing regulations and standards relating to the nature and extent of uses of land and structures. The Zoning Ordinances should be consistent with the Comprehensive Plan. The City's Zoning Ordinance divides Petersburg into districts and specifies allowed uses and dimensional requirements for each district.

B

CITY OF PETERSBURG SIX-YEAR IMPROVEMENT PLAN (SYIP)

UPC	Description	Route	Road System	Estimate	Previous	FY24	FY25-29	Balance
				Values in Thousands of Dollars				
104036	CITY OF PETERSBURG, SOUTHSIDE DEPOT RESTORATION	EN12	Enhancement	$713	$919	$0	$0	($206)
120439	#OTHERINT - I-85 - SIGNS AND MARKINGS US 1	85	Interstate	$250	$83	$42	$125	$0
113386	#SGR19VB - BR DECK REPLACMENT SB I-95 OVER RT 301 & EB 460	95	Interstate	$5,077	$5,246	$0	$0	($170)
T28390	RIDEFINDERS - CARPOOL AND VANPOOL ENCOURAGEMENT PROGRAM	-	Miscellaneous	$250	$250	$0	$0	$0
109308	#HB2.FY17 PETERSBURG STATION - PARK AND RIDE PARKING DECK	9002	Miscellaneous	$8,000	$8,000	$0	$0	$0
120666	#FLT - RIGHT OF WAY PETERSBURG	U000	Miscellaneous	$200	$200	$0	$0	$0
T204	TRI-CITIES MPO RIDEFINDERS PROGRAM	MRAQ	Public Transportation	$505	$575	$35	$175	($280)
113390	#SGR19VB - REPLACE SUPERSTRUCTURE FORT LEE ROAD OVER I-85	0	Urban	$6,952	$2,108	$1,892	$2,952	$0
111735	#SGR19LBÂ - UNIVERSITY BLVD/APPOMATTOX RIVER CANAL	36	Urban	$2,283	$2,387	$0	$0	($104)
113442	ROUTE 36 RESURFACING, CITY OF PETERSBURG	36	Urban	$175	$175	$0	$0	$0
113443	ROUTE 36 RESURFACING, CITY OF PETERSBURG	36	Urban	$115	$115	$0	$0	$0

118478	#SGR21LP - CITY OF PETERSBURG EAST WASHINGTON STREET	36	Urban	$404	$404	$0	$0	$0
118886	#SGR22LP - 1114 E WASHINGTON STREET	36	Urban	$97	$97	$0	$0	$0
118949	APPOMATTOX RIVER TRAIL (ART) - WESTERN EXTENSION	36	Urban	$682	$0	$141	$649	($107)
117838	US ARMY PROJ FT PICKETT/DSCR/FT LEE -- RICHMOND	109	Urban	$127	$127	$0	$0	$0
T27925	#SGR24LP - SOUTH SYCAMORE STREET	301	Urban	$175	$0	$172	$0	$3
101039	SOUTH CRATER ROAD AREA - SIGNAL COORDINATION	301	Urban	$2,029	$2,029	$0	$0	$0
113481	#SGR19LBÂ - SYCAMORE ST OVER LIEUTENANT RUN - RE-HAB CULVERT	301	Urban	$728	$611	$117	$0	$0
118479	#SGR21LP - CITY OF PETERSBURG S CRATER RD	301	Urban	$439	$439	$0	$0	$0
118480	#SGR21LP - CITY OF PETERSBURG S CRATER RD	301	Urban	$423	$423	$0	$0	$0
121279	#SGR23LP - S CRATER RD	301	Urban	$434	$434	$0	$0	$0
121280	#SGR23LP - S SYCAMORE ST	301	Urban	$105	$105	$0	$0	$0
123271	#PIPELINE23 RTE301 (06)	301	Urban	$100	$100	$0	$0	$0
118888	#SGR22LP - 1153 E. WYTHE ST	460	Urban	$439	$439	$0	$0	$0
121278	#SGR23LP - US ROUTE 460 BUSINESS (WINFIELD ROAD)	460	Urban	$276	$276	$0	$0	$0
121281	#SGR23LP - W WASHINGTON STREET	460	Urban	$508	$508	$0	$0	$0
T27845	#SMART24 - ART RT1 TO COLONIAL HEIGHTS AND I-95	U000	Urban	$3,923	$0	$0	$3,923	$0
123580	#SMART24 - ART OLD TOWNE PETERSBURG (GROVE AVE TO RIVER RD)	U000	Urban	$1,701	$0	$0	$1,701	$0
123581	#SMART24 - FLT/ART TRAILHEAD/PARKING LOT	U000	Urban	$3,964	$0	$423	$3,541	$0
Total Line Item Estimate: $41,072 (K)								

C

IDENTIFIED PRIORITY INFRASTRUCTURE NEEDS

Poor Creek Water / Wastewater Area / Southeastern Area Infrastructure Upgrades

Major economic development projects in the Poor Creek service area, Phlow Corp., AMPAC Fine Chemicals, and Civica are dependent on the upgrades, and future success of the Petersburg Pharmaceutical Campus and related supply chain companies. The Poor Creek Service area (Southeastern area of Petersburg) includes 31% of Petersburg's land mass. Nearly 2,000 acres of undeveloped land are in this area of the city.

With the support of a $29.5M budget amendment from the General Assembly in 2022 and other grants, Petersburg has secured approximately $38M for the Poor Creek upgrades. This does not include funding for inflation, additional repairs, and upgrades required for water and wastewater feeder pump stations and piping connected to Poor Creek and the needs of neighboring localities.

The need exists to upgrade from a 24-inch force main to a 30-inch force main. A recent Poor Creek Pump Station Capacity Study indicated that a 24-inch diameter force main would allow for pumping a 2-year, 24-hour storm only. A 30-inch diameter force main will allow for pumping a 10-year, 24-hour storm. The 30-inch force main allows for more flow growth with a 56.4% higher max pumping rate and the capability to pump during a significant storm. This upsizing will also provide needed services to neighboring localities.

Additional water/wastewater upgrades in the vicinity of Poor Creek include:

- Replace Distribution Mains
- Wagner Road Water Line
- Walnut Hill Water Tank Rehabilitation
- Abandoning Wastewater Line in Petersburg National Battlefield
- S. Crater Road Interceptor Upgrade
- Blackwater Swamp/Creek Wastewater Main

Mount Vernon Project Description

The Mount Vernon water pumping station, an integral part of Petersburg's water infrastructure, is in immediate need of significant upgrades. These improvements include the replacement of pumps and pipes, electrical controls, and carrying out essential maintenance tasks.

Over the past 15 years, there have been consistent pump, motor, and equipment failures that limit the pumping capacity to one pump with no backup. This facility is not meeting Class 1 reliability requirements as required by the Virginia Department of Health (VDH) per the existing waterworks operating permit.

The pump station is part of a complex containing a 5,900,000-gallon water storage tank, which is continually replenished by the Appomattox River Water Authority. This water supply serves several core areas of the city. It supplies the downtown area situated north of the station that includes the new Sycamore Grove site and planned Old Towne developments. Mount Vernon also replenishes the Jamestown and Walnut Hill elevated water storage tanks located east of the station that provide water to the Poor Creek service area.

Downtown / Old Towne / Adams North / Sycamore Grove Infrastructure Upgrades

The Main Pump Station, constructed in the 1950s, is a comprehensive undertaking that involves the replacement of several key components as many repair parts are no longer available. These include pumps, motors, motor control centers, variable-speed drives, pipes, and valves. As part of the project, the wet well will be drained and cleaned, after which it will be lined with a protective coating to prevent the concrete from deteriorating.

The installation of a diesel generator is needed to ensure the facility has a backup power source during any power outages, securing uninterrupted service. The upgrade of this Pump Station is a critical need for Petersburg's development and future growth.

Flooding is a recurring issue at the Bank Street Wastewater Pumping Station, creating a pressing need for significant upgrades to prevent complete failure. The flooding is primarily caused by Poor Creek, which poses a threat to the station's operation. Water/wastewater from over 200 acres of the city drains into pipes on Bank Street.

To address this issue, the station must be rebuilt with new infrastructure that includes three new pumps, electrical systems, ventilation, a generator, and associated equipment. These components will be placed on a higher platform to prevent water damage.

Rebuilding the Bank Street Wastewater Pumping Station with new, elevated infrastructure is critical to prevent future flooding and ensure the station's efficient operation.

Lock's Booster Station & Water Main

The Lock's Booster Station and Water Main, Petersburg's sole source of treated drinking water, draws its supply from the Lake Chesdin reservoir. This water supply is managed by the Appomattox River Regional Water Authority, of which the City of Petersburg is a member.

Constructed in 1960, the Lock's Booster Station was designed to house three pumps for sufficient water supply. However, only two pumps were installed, and these are now operating beyond their capacity due to the age and supply required.

The station's generator is currently non-functional and too outdated to be repaired. Moreover, the electrical system is antiquated and poses safety risks.

Lock's Water Main is composed of asbestos piping that has been in place for over 70 years. In 2022, Petersburg received a $3,581,531 HUD grant through Community Project Congressional funding. This grant is intended for Phase 1 of the replacement of half the asbestos piping, extending from the Booster Station to Commerce Street. All city residents and businesses receive their water supply from Lock's Water Main.

Additional Critical Water/Wastewater Upgrades

- **Large Water/Wastewater Meter Replacement:** The need to replace larger meters, many of which are over 40 years old, is pressing due to a substantial decrease in their accuracy. This decrease in efficiency has led to the loss of revenue, making meter replacement a critical task for operation.
- **Infiltration & Reduction Projects:** The reduction of infiltration and inflow remains a significant concern throughout Petersburg, particularly in the Downtown/Old Towne/Sycamore Grove area. Infiltration and inflow refer to extraneous water from stormwater and groundwater that enters the sanitary sewer system, often exacerbated during heavy rain events. Each year, Petersburg faces considerable expenses treating millions of gallons of ground and rainwater that infiltrate the sewer system. This infiltration not only strains the city's resources but also contributes to sewer overflows and flooding, posing environmental and health risks. Addressing infiltration and

inflow is critical for efficient wastewater management and sustainable infrastructure development in Petersburg. It will not only lead to cost savings, but also contribute to a healthier and safer environment for City residents.

- **Water Tank Rehabilitation:** All ground storage and elevated water storage tanks in Petersburg are currently in immediate need of both repairs and repainting. These steel water storage tanks necessitate a protective coating system to ward off rust, prevent deterioration, and avoid loss of steel thickness caused by excessive rusting. Typically, the cycle for painting such tanks ranges from 10 to 15 years, contingent upon service conditions. However, most of the tanks in Petersburg have not undergone repairs for over 15 years. Neglecting to adequately maintain and repair the protective coating on these tanks can lead to leaks, and, ultimately, failure of the steel structure.
- **Manhole Inserts:** Water and wastewater manhole inserts, often made of high-density polyethylene, are devices installed under manhole covers to reduce or prevent surface water inflow into the collection system. These inserts play a critical role in managing inflow, particularly during rainfall events, where clean water can enter the sanitary sewer collection system. Petersburg has not had the funding for an insert program that is much needed. Manhole inserts help maintain the efficiency and longevity of the wastewater infrastructure.
- **Generators:** There is only one generator that is operational at any of Petersburg's water/wastewater pump stations. Generators are critical to prevent loss of service during power outages.
- **Rohoic Creek Pump Station:** This station serves western Petersburg. New pumps and electrical upgrades are required.

Appomattox River Trail

The completion of the Appomattox River Trail in Petersburg plays a crucial role in promoting community health, tourism, and economic development. Petersburg has partnered with The Friends of the Lower Appomattox River (FOLAR) in envisioning a pristine river and a world-class trail that enhances river access and conservation. The new Fall Line Trail will begin/end on the Appomattox River Trail in Petersburg, bringing thousands of new visitors into the city each year and offering citizens a connection to outdoor activities in the region. This vision aligns with the objective of fostering a culture of active outdoor recreation, which is instrumental in improving the overall health of the community.

The trail provides ample space for outdoor activities such as hiking, biking, jogging, and birdwatching. These activities promote physical well-being and contribute to mental health benefits associated with spending time in nature.

The Appomattox River Trail is more than just a recreational path; it's a journey through history in Petersburg. The trail will wind along the banks of the Appomattox River, a designated Virginia State Scenic River, and pass through historical Old Towne and Pocahontas Island. This area also offers an inviting backdrop for shopping and dining experiences.

Economically, the Appomattox River Trail will stimulate growth and job creation. As more tourists visit the trail, local businesses, including restaurants, hotels, B&B's and shops, will grow and more people will be employed.

In conclusion, the Appomattox River Trail is a vital asset for Petersburg, contributing significantly to community health, tourism, and economic development.

Appomattox River Harbor Dredging Study

Since the 1970s, the Appomattox River Dredging Project has remained a top priority for Petersburg. The aim is to make the river navigable for various types of water transport, including recreational purposes. This

ambitious endeavor holds immense potential for Petersburg's growth and local businesses.

Over the decades, the Army Corps of Engineers has sought funding for the project. However, unforeseen circumstances such as hurricanes and natural disasters have redirected funding away from the Petersburg project. Despite these challenges, dredging efforts commenced two decades ago in the former Petersburg Harbor area near Pocahontas Island. The discovery of contaminants halted progress.

With the introduction of new floodplain maps in 2023, and discussions with the Virginia Department of Conservation and Recreation, it is believed that dredging the former Petersburg Harbor could help mitigate flooding on historic Pocahontas Island, the oldest free Black community in the United States, as well as in Old Towne Petersburg. To assess the potential mitigation of flooding, a comprehensive study is required. If it is determined that dredging will alleviate flooding, Petersburg could apply for grants from FEMA to support the project.

The Appomattox River Dredging Project signifies not only an opportunity for economic growth but also a means to protect historically significant areas from potential flood damage.

Sycamore Grove Roadway Upgrades

The proposed Sycamore Grove development on the former hospital site located on Sycamore Street in Petersburg is a major project spearheaded by the Virginia Development Consortium (VDC) in collaboration with the City of Petersburg and the Commonwealth of Virginia. With an estimated budget of over $200 million, this comprehensive development aims to create a vibrant city within a city.

The Sycamore Grove development will offer a range of amenities and facilities, including a national grocery store, retail shops, restaurants, a travel service station, upscale housing comprising approximately 150 units, recreational spaces, and office buildings. This ambitious project seeks to revitalize the area, boost the local economy, and provide residents with a diverse range of services and opportunities.

To accommodate the increased traffic and ensure smooth accessibility to the development, both short-term and long-term roadway improvements are necessary. Immediate upgrades will need to be made to Sycamore Street and Graham Road, including the installation of traffic signals, turn lanes, and additional travel lanes. Furthermore, enhancements to the I-95 Crater Road exit should be implemented, allowing for improved traffic flow in multiple directions. Additional turn lanes may also be required on Washington and Wythe Streets to facilitate access to and from Sycamore Street.

Long-term roadway plans include the construction of new exits and the reconfiguration of existing ones on I-85 and I-95. These infrastructure enhancements will ensure efficient transportation and contribute to the overall success of the Sycamore Grove development and Petersburg.

Rives Road Improvements

Rives Road is an existing two-lane, undivided, west/east roadway with narrow roadside shoulders between the intersection with South Crater Road (US 301) and the I-95 interchange. The road is an extremely important transportation corridor, serving as a connection between I-95 and South Crater Road and between South Crater Road and US Route 460. This project will widen Rives Road from the intersection with South Crater Road (US 301) to the southbound I-95 off-ramp. This connection will serve to increase capacity along Rives Road from the interchange to both existing and emerging developments along South Crater Road (US 301). RIGHT-OF-WAY Improvements will require the acquisition of land for right-of-way and easement purposes. As a result of this project, some property relocations will be required.

Stormwater management to minimize potential impacts on water quality and comply with current regulations is required. Upgraded water/wastewater lines will be needed for upcoming development on Rives Road and the Industrial Park located off Rives Road.

Normandy Drive / Wagner Road Improvements

The Pharmaceutical Cluster and other manufacturing businesses are situated on Normandy Drive, relying on Wagner Road as a crucial access point to I-95 and Crater Road (Rt. 301). Due to the growing volume of truck and vehicular traffic in the area, there is a pressing need to upgrade the intersection at Normandy and Wagner.

Street Paving

Petersburg has 396.2 lane miles of roadway and 62% of those need restoration. These roadways have not been completely repaved or reconstructed in over 25 years. An increase in VDOT funding for street paving for Petersburg is needed. Petersburg receives $5.9 million dollars each year for all street operations and maintenance. One million dollars is dedicated each year to paving, which covers only one mile of roadway. The remaining funding is used for street repairs, pavement markings, road signs, sidewalks, and other repairs.

Oakhill Bridge Replacement

The closure of the bridge has caused safety issues and inconvenience for residents and commuters in Petersburg. This vital transportation route connects Rt. 301 (Crater Road) to the Battlefield Park neighborhood, as well as providing access to Vernon Johns Middle School and Petersburg High School. The failure of the corrugated metal pipe culverts, which serve as support and drainage components for the bridge, has necessitated its closure for more than two years. This has disrupted daily routines, increased travel times, and impacted the overall accessibility of the area.

Lafayette Street Bridge Repair

The closure of this historic masonry arch-style bridge has been in effect for over a year. The bridge's deteriorated condition, including issues such as age, scouring of abutments, loss of stone and brick structural components, and increased flash flooding, has rendered it unsafe for use. This closure has significantly impacted the route between High Street and Washington Street/Route 1, which is heavily traveled.

Public Safety - Police and Fire/Rescue

Petersburg is continually at the top of the rankings for the most homicides per capita and over 1,000 calls for service regarding shots fired and over 100 shootings. Petersburg has consistently ranked above the state average for homicide per 100,000 with the lowest in the 21st century occurring in 2004 when the rate was only twice that of the Virginia state average; it was 12 times the Virginia state average in 2021 and there has been a consistent increase in homicides per 100,000 since 2012 except outliers in 2015 and 2020. Gun violence impacts the entire city and traumatizes children and adults.

Petersburg has one of the highest poverty rates and one of the highest single-parent household rates (60%) in the Commonwealth. These are contributors to high crime.

Although the Code of Virginia sets out a distribution formula for calculating the amounts for eligible localities, in recent years the General Assembly has instead specified in the Appropriations Act that localities' allocations in a given fiscal year are to be based on a standard, across-the-board percentage increase or decrease from the previous fiscal year's allocations. The distribution formula has, in effect, been superseded during those years by the instructions in the Appropriations Act.

There is a need for a revised formula for the distribution of 599 funding. Until the General Assembly adopts a new formula, Petersburg has an immediate need for additional funding to offset the high rate of crime.


WELCOME TO
PETERSBURG
HIGH SCHOOL
32

D

ENVIRONMENTAL STEWARDSHIP SUPPLEMENT

The information included in this Appendix is intended to supplement Chapter 8, Environmental Stewardship.

PROTECTING THE POTABLE WATER SUPPLY

As the principal water supplier of the region, the Appomattox River Water Authority (ARWA) issues recommendations regarding how localities can protect and preserve the potable water supply. In the Regional Water Supply Plan, ARWA recommends that the City avoid development of conservation lands such as the Petersburg National Battlefield Park as well as designated wetlands in order to avoid environmental harm and damage to cultural and historic resources. The plan also recommends avoiding development in flood hazard areas, as doing so could lead to increased erosion and the scouring of embankments located in vulnerable floodplains, increasing the susceptibility of the region to elevated water levels during flooding. The Regional Water Supply Plan also lists over-irrigation of lawns or crops and withdrawal of water by other users without proper permits as additional threats to Petersburg's water supply.

While there are no public groundwater wells supplementing the potable water supply, there are approximately 50 known private wells accessing local groundwater. Protection of the groundwater supply is vital for all those who use local aquifers for their drinking water, both in the City of Petersburg and regional neighbors who are tapping into the same groundwater sources. Pollutants to groundwater come in a variety of forms, but the predominate sources of pollution include septic system failure; boating pollution, including fuel leaks and sewage spills; industrial and sewage treatment plant pollution; and agricultural pollution from animal waste, sediment, nutrients, pathogens, pesticides, metals, and salts. The groundwater supply is also susceptible to threats from leaking underground storage tanks (USTs), septic tanks, and abandoned wells; abandoned wells can provide a direct channel for pollutants and salt water to enter the groundwater. Proper closure or removal of unused USTs and remediation of impacted soils is crucial to protecting the water supply.

What Is A Water Supply Plan?

The Local and Regional Water Supply Planning regulation (9VAC25-780) requires all localities in Virginia to submit a Water Supply Plan, either individually or as part of a regional planning unit. This regulation was enacted following widespread drought in 2001-2002, during which some water utilities and localities were unable to meeting water supply demands.

Water Supply Plans include key information on the water sources a locality uses and how much water they currently use. Petersburg is covered under the Appomattox River Water Authority's Regional Water Supply Plan. Plans include projections for when future water will be needed and how much will be needed for a variety of categories of water uses. Localities must also evaluate the adequacy of their current water supplies and identify where they can find more water where current supplies may be inadequate in the future. Drought Response and Contingency Plans with ways to reduce overall water use during drought must also be included. DEQ compiles the information included in each plan, as well as the reported water withdrawals collected through the Annual Withdrawal Reporting and the Water Withdrawal Permitting Programs, to create a model that is used to evaluate the sustainability of Virginia's water resources. The

Click here to learn more about the State Water Resources Plan!

results of this collective analysis are published in the State Water Resources Plan.

What is the State Water Resources Plan?

The State Water Resources Plan (State Plan) is published at five-year intervals and compiles information provided to DEQ by localities through Local and Regional Water Supply Plans, Annual Water Withdrawal Reporting, and Surface and Groundwater permitting into a central document. DEQ analyzes this information by completing Cumulative Impact Analysis (CIA) modeling of surface water and groundwater resources.

The first State Plan was published in 2015. The 2020 State Plan, published in 2022, includes current water demands and projections of future use through 2040. Advances in CIA modeling include new flow metrics and the addition of several new modeling scenarios that evaluate the potential impacts of climate change. The 2020 State Plan also includes 20 distinct regional analyses conducted at river basin scale which allow the evaluation of results beyond the statewide trends.

EXISTING SHORELINE CONDITIONS

The 2017 Shoreline Inventory Report by VIMS states that two miles of surveyed shoreline along the Appomattox River is primarily natural with no defensive structures such as bulkheads or riprap. Land uses and cover near the shorelines include commercial, paved, industrial, forested, and residential areas. There are approximately 0.5 miles of tidal marsh shoreline and 5 acres of tidal marsh area located east of Pocahontas Island. Future inventories of Petersburg's shorelines should more thoroughly assess all four miles of shoreline within the City's boundaries to better understand the existing conditions and identify additional areas that could benefit from remediation.

The map on the following page depicts land use cover and tidal marsh locations basd on the 2017 Shoreline Inventory Report.

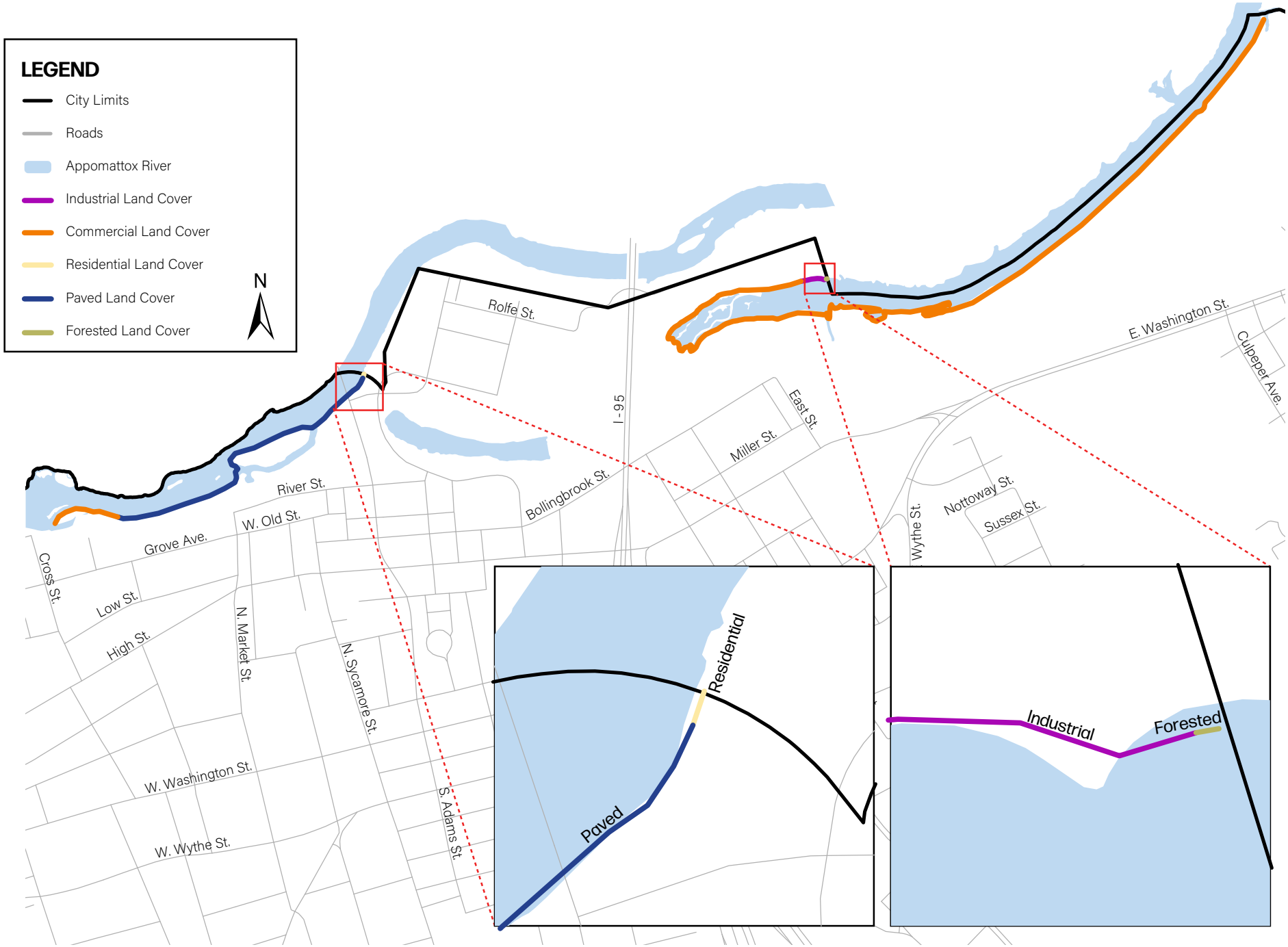
SHORELINE AND STREAMBANK EROSION

Natural shorelines and streambanks perform a vast array of functions by way of shoreline and streambank stabilization, improved water quality, and provision of habitat. Tidal wetland areas and marshes absorb wave energy and buffer erosion of upland areas. Nontidal wetland areas are important for flood control purposes. In addition, many of these features have aesthetic and recreational value. Knowing where natural shoreline features exist and their relative size, health, and role in water quality protection is important to development effective management strategies to protect them as part of the planning process.

The health of the City's shorelines and streambanks can be gauged by examining their specific conditions, including vegetative conditions and areas of erosion. Shoreline and streambank erosion can be exacerbated by the destruction of vegetation on riverbanks and the removal of sand and gravel from the stream bed, which generally occurs by clearing, overgrazing, cultivation, vehicular traffic near banks, or fire events. Erosion can be further accelerated by lowering the stream bed or increasing the level of its bottom (often through increased runoff of soil), the redirection and acceleration of flow around infrastructure, obstructions or debris, and soil characteristics such as poor drainage or seams or readily erodible material within the bank profile.

Two of the most reliable ways to mitigate water erosion is to maximize the amount of vegetative cover along shorelines and streambanks and increase the amount of permeable cover throughout the City. Cover

SHORELINE LAND COVER



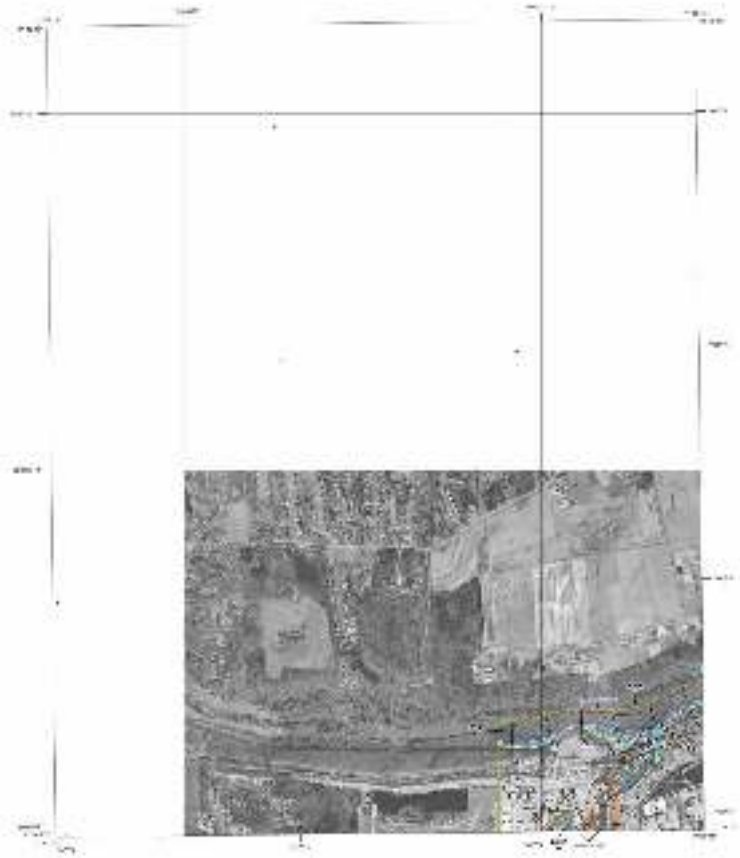
SOURCE: Virginia Institute of Marine Science, 2017 Shoreline Inventory Report

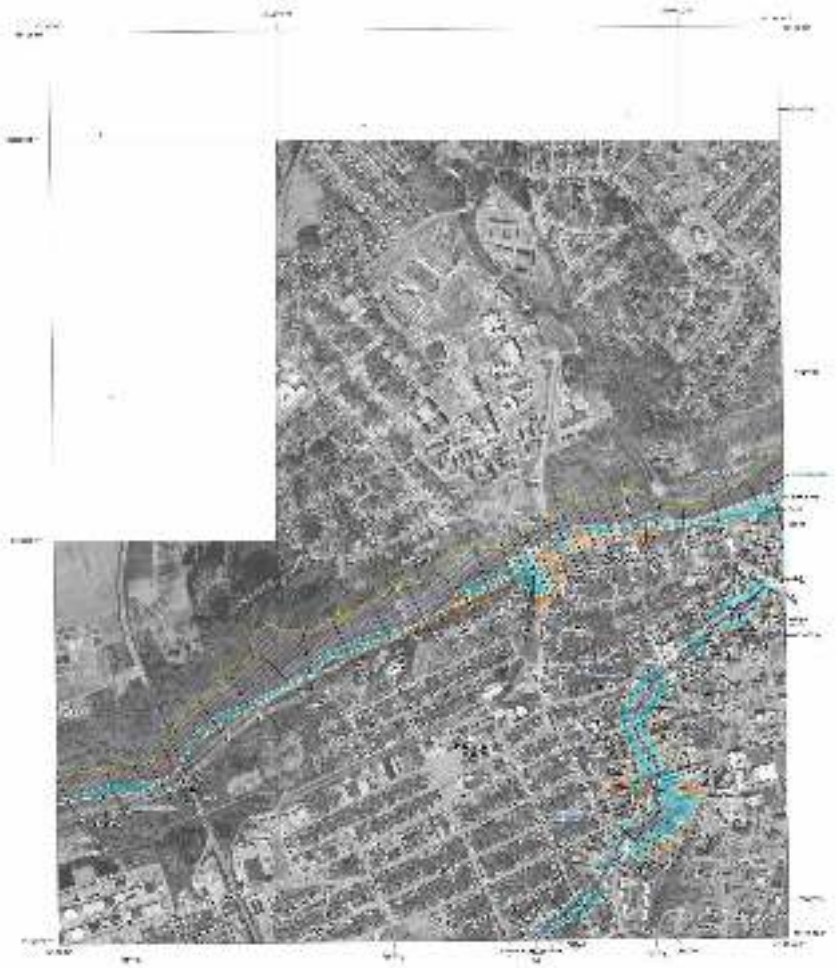
which is permeable can absorb excess water runoff and therefore helps reduce erosion, while impermeable cover such as parking lots or concrete infrastructure can increase runoff since excess rainfall can't be absorbed into the ground. Trees are very helpful in preventing erosion, particularly on-stream banks, though if the soil is bare under a tree's canopy then erosion will still occur.

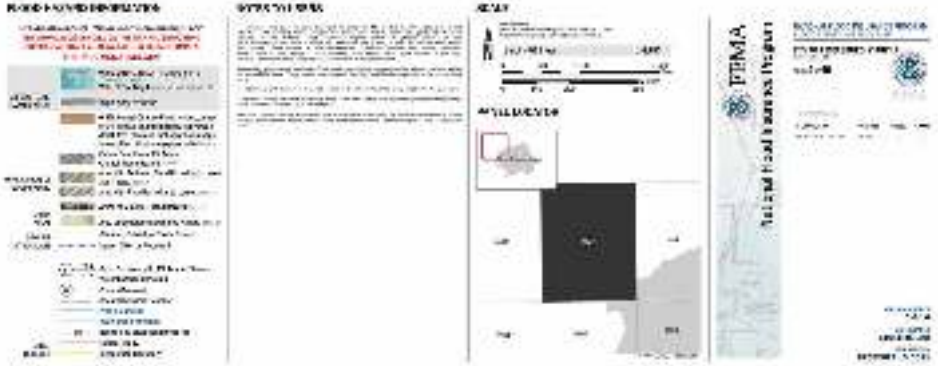
Erosion can be mitigated during development through such means as diverting upslope stormwater around any construction sites or other disturbed areas. Construction sites often displace large quantities of the area's soil, and if there are no provisions for diverting upslope stormwater then one good night's rainfall displacing tons of loose soil into the local waterways is a likely possibility. Another best practice is to install sediment barriers or turf buffer strips downslope of building sites to filter coarse sediments, and restricting vehicle access on the site to one (preferably graveled) access point. Finally, construction crews and developers can connect a temporary or permanent downpipe to a stormwater system before laying the roof, and landscape all bare areas as soon as possible after construction is completed as a further means of reducing erosion during the point when the landscape is most vulnerable to such impacts.

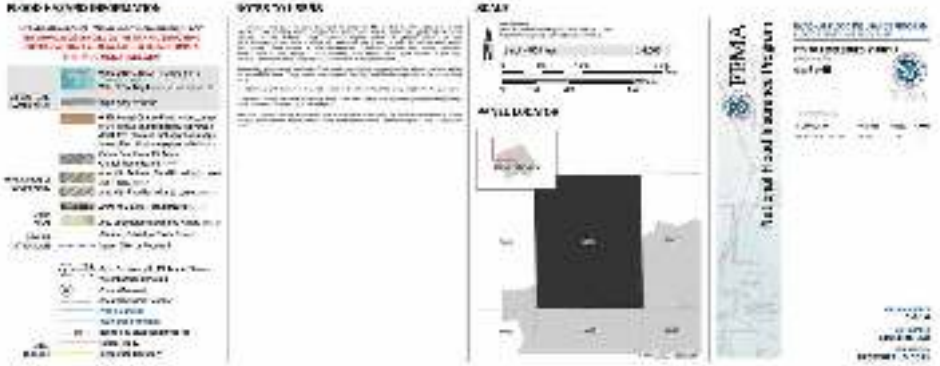
FLOODING

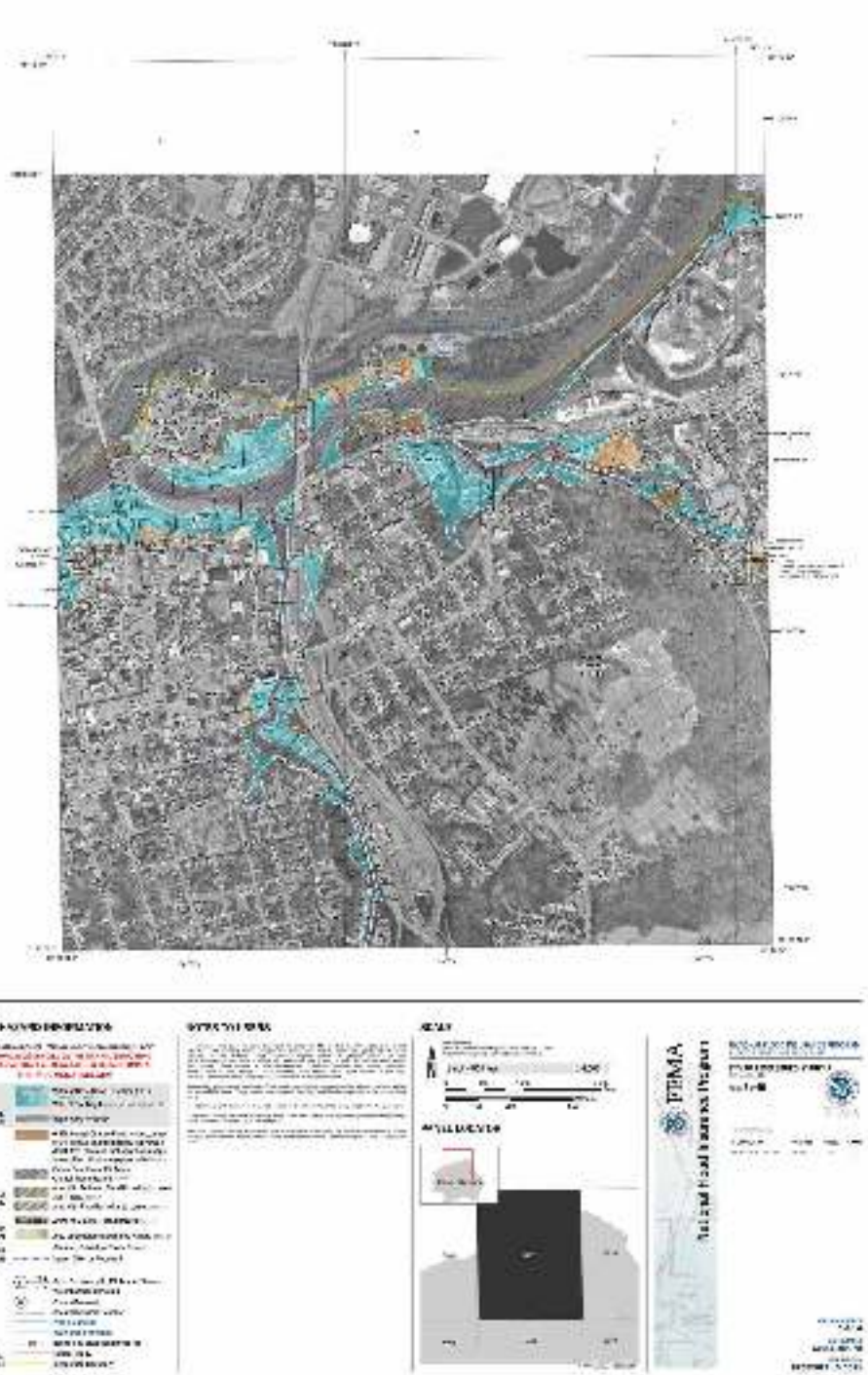
Flood Insurance Rate Map (FIRM) panels for the City of Petersburg are shown on the following pages. These maps are an important tool for the City to understand which areas are susceptible to flooding. FIRM maps are updated around every five years to ensure that the latest topographic information, improved hydrological modeling, and changes to the resultant floodplains and hazard areas are incorporated.

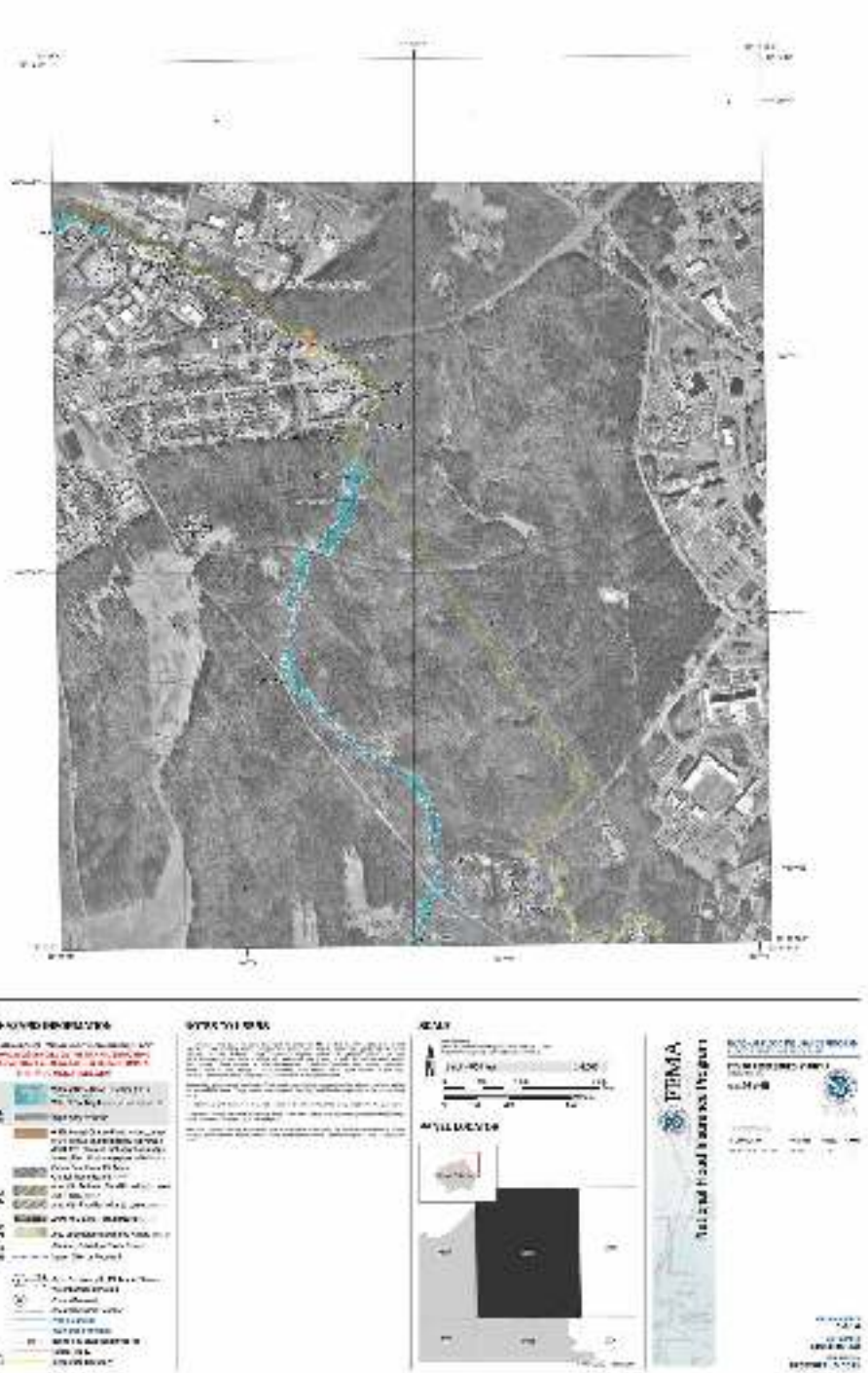


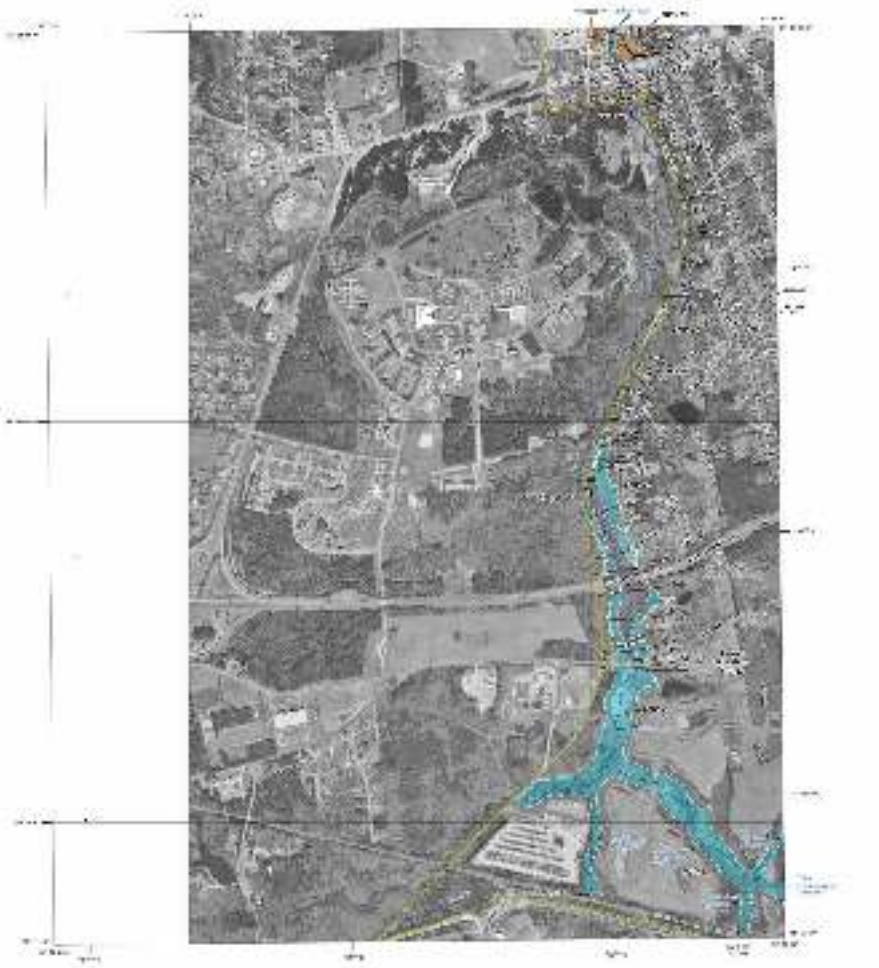


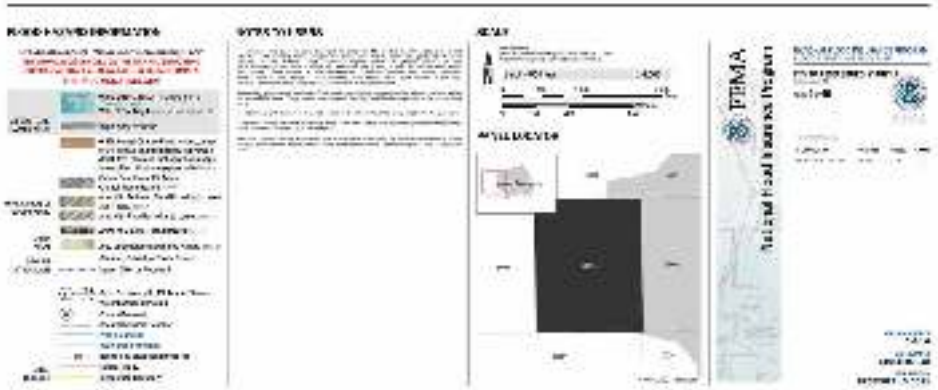


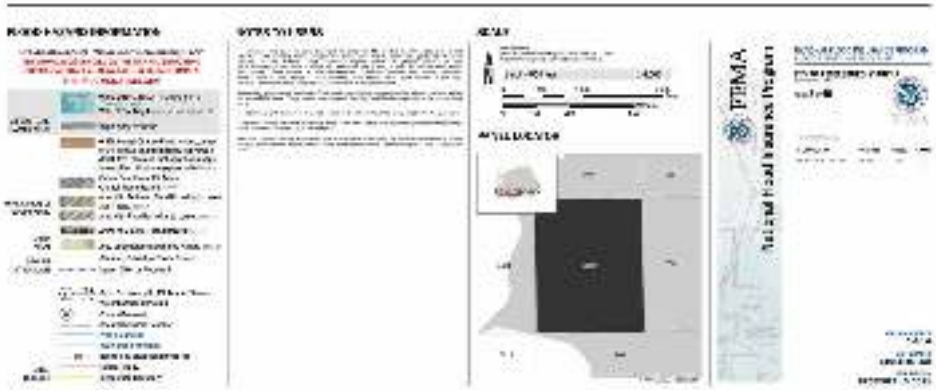


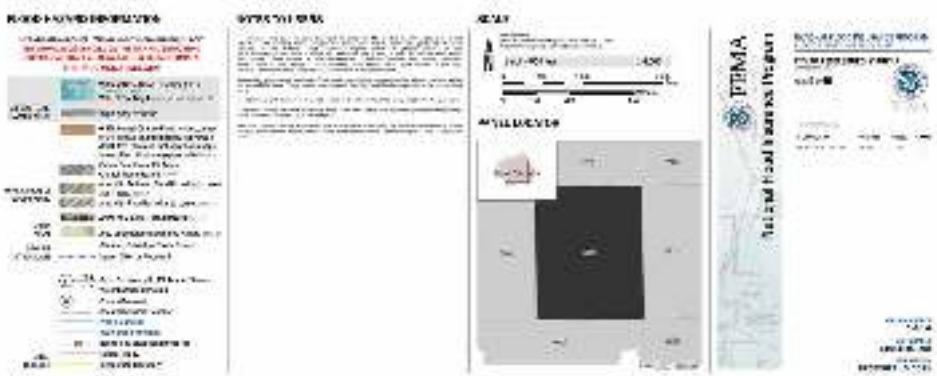


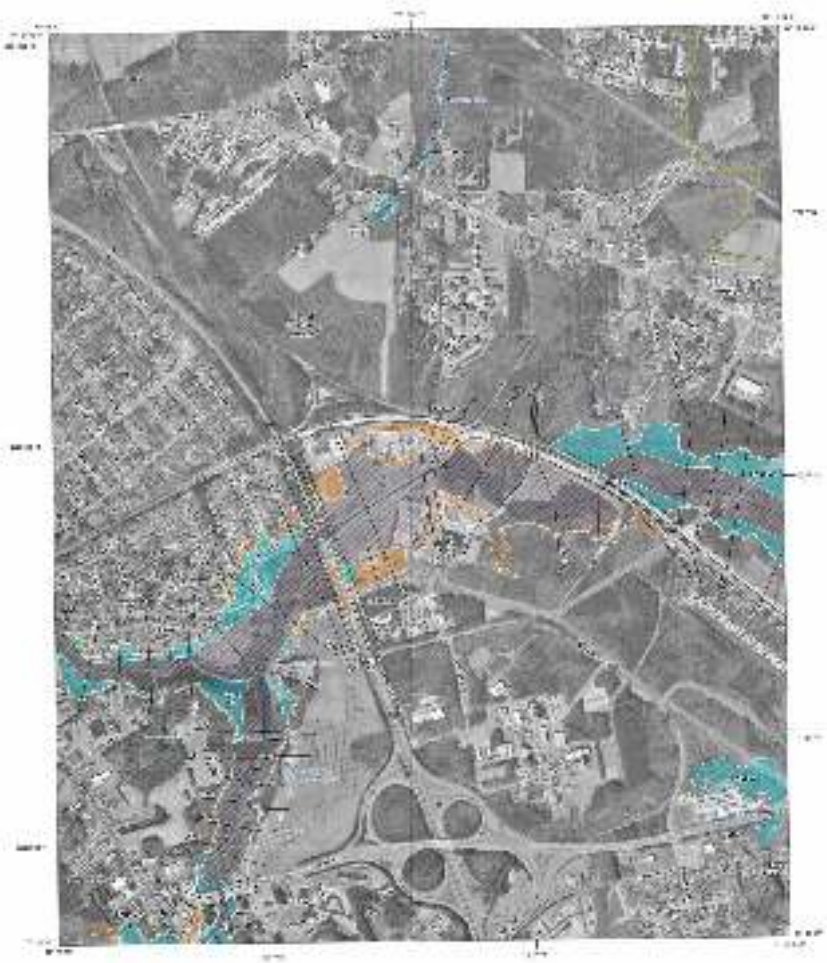


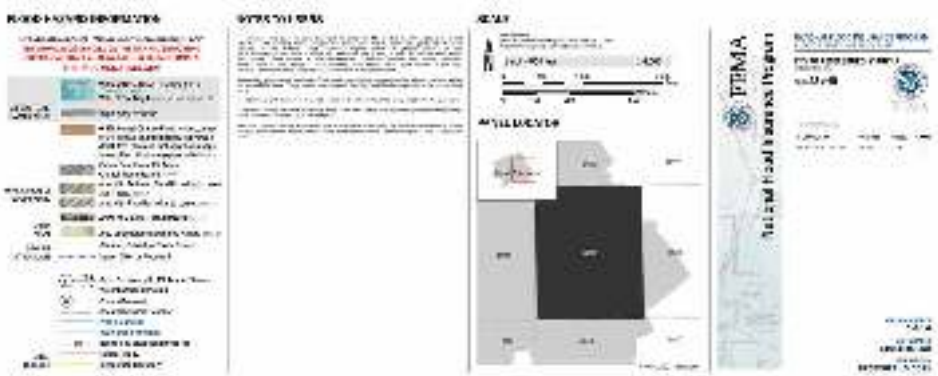


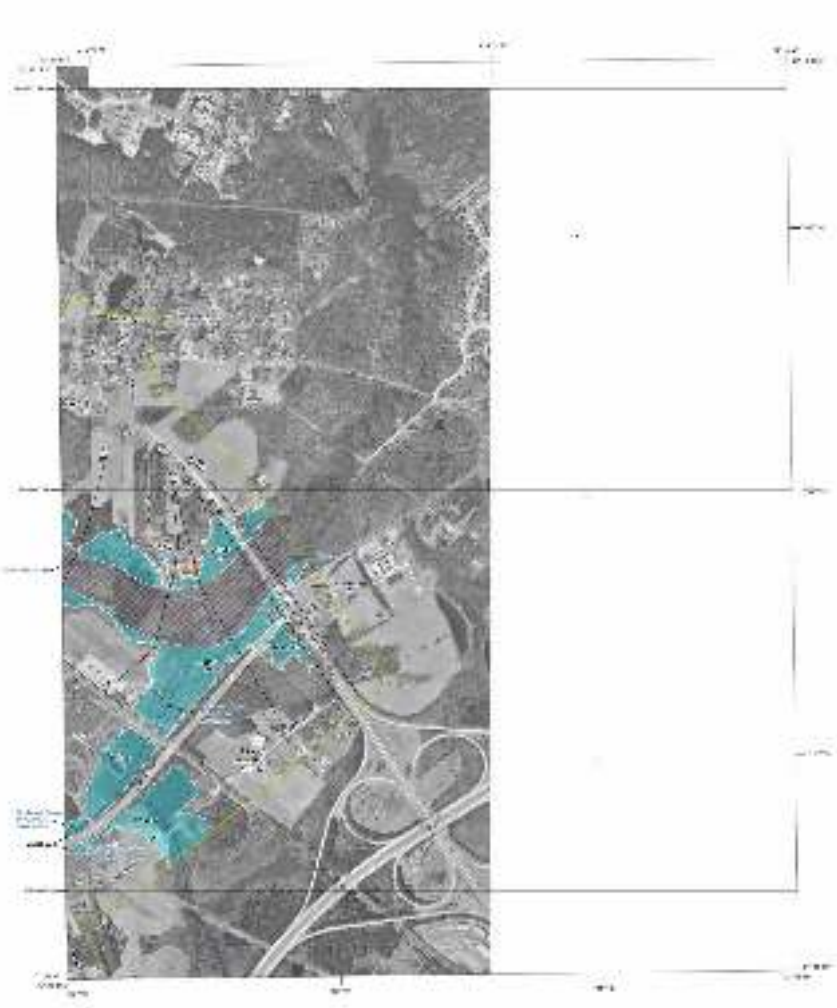


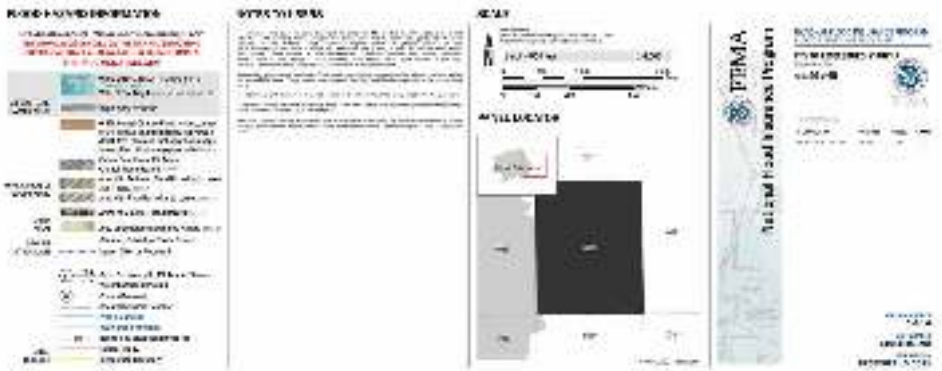


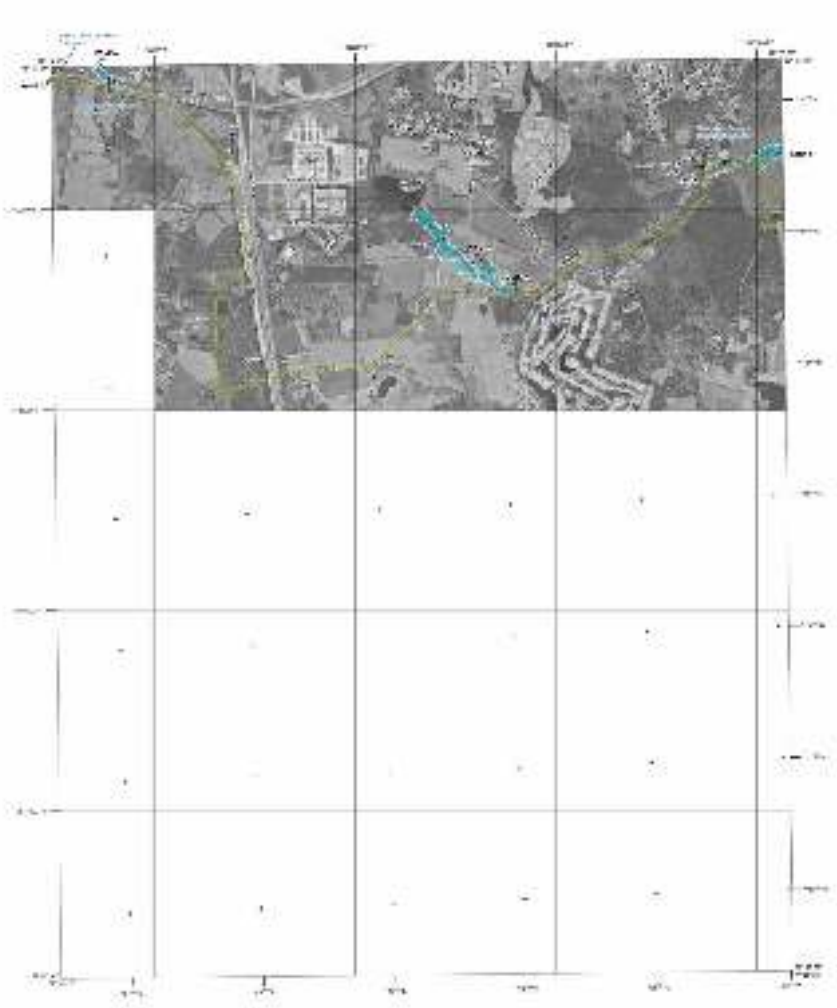


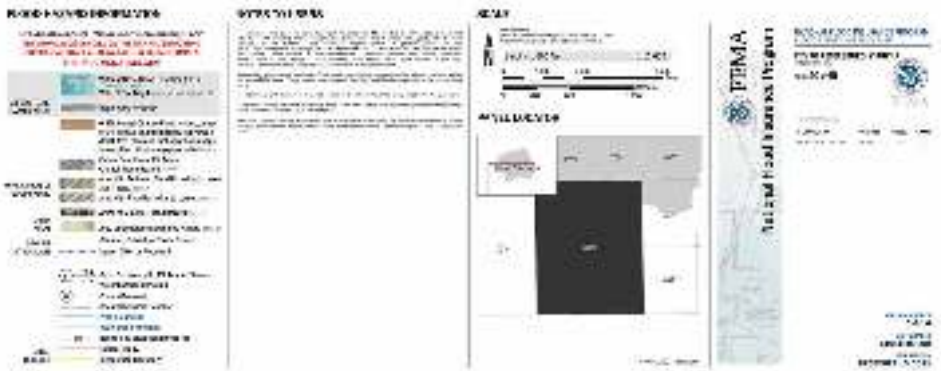


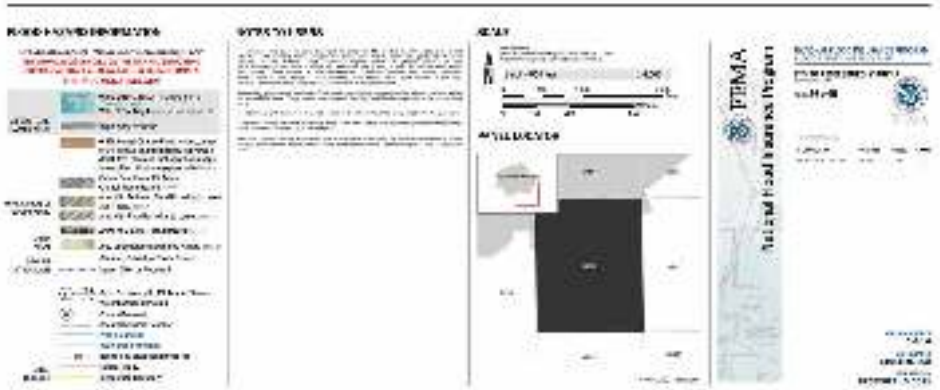


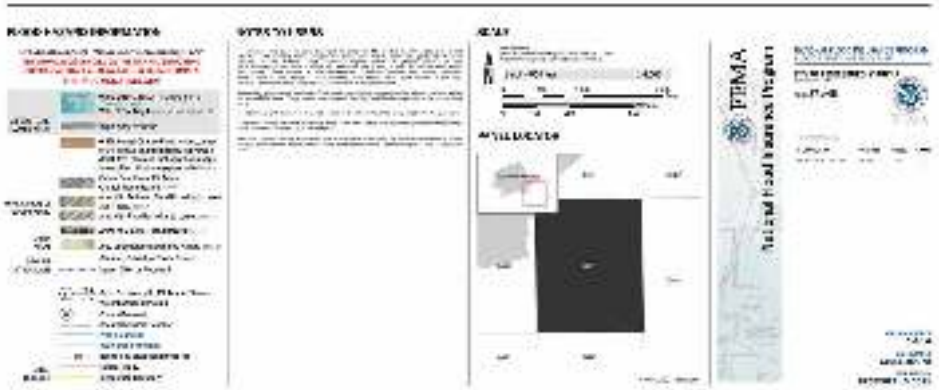








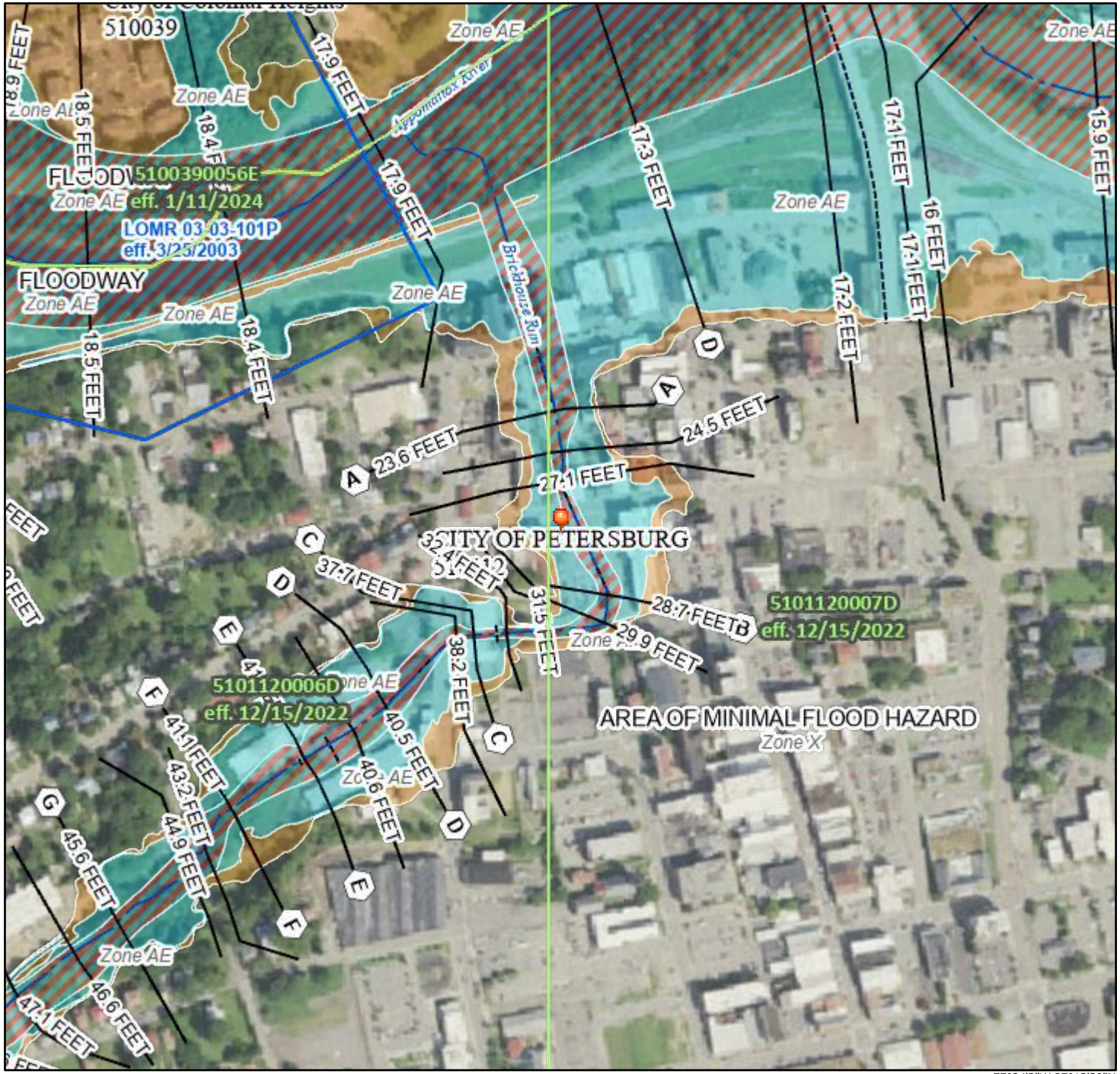




Prepared By:

National Flood Hazard Layer FIRMette

77°24'41"W 37°14'8"N



77°24'3"W 37°13'39"N

Feet

0 250 500 1,000 1,500 2,000

1:6,000

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 12/20/2024 at 6:13 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Richmond – Crater Multi-Regional Hazard Mitigation Plan (2017 Update)

Executive Summary for the City of Petersburg

1. Introduction

Disasters have the potential to devastate a community's economic, social, and environmental well-being. Hazard mitigation is the effort to reduce loss of life and property by lessening the potential impact of future disasters. Mitigation planning is a key process to break the cycle of disaster damage, reconstruction, and repeated damage.

The 26 localities of the Richmond and Crater regions of Virginia have worked together to update the *Richmond-Crater Multi-Regional Hazard Mitigation Plan* to identify vulnerabilities associated with natural disasters and develop long-term strategies to reduce or eliminate long-term risks. The effort was guided by the Hazard Mitigation Technical Advisory Committee (HMTAC) consisting of emergency management staff from each of the 26 localities (appointed by each locality's chief administrative official).

While the full plan is an exhaustive review of hazard mitigation within the multi-regional planning area, this executive summary highlights key information specific to City of Petersburg with emphasis on the results from the Hazard Identification and Risk Assessment (HIRA). Additional information on the region, analysis methodologies, and mitigation actions can be found in the full plan posted on the RRPDC website (www.richmondregional.org)

2. Hazard Mitigation Planning in City of Petersburg

2.1 Demographic Characteristics

Population (2014):	32,439
Population projection (2040):	28,613
Land Area (2010):	22.93 sq. miles
Density (2014):	1414.70 persons per sq. mile
Median household income (2014):	$33,927
Percent below poverty level (2014):	27.50%
Housing units (2014):	16,475
% of housing units in multi-unit structures (2014):	33.50%
Homeownership rate (2014):	52.00%
Median value owner occupied housing unit (2014):	$109,800
Source: 2014 American Community Survey, 2010 Decennial Census, U.S. Census Bureau	

2.2 About City of Petersburg

The City of Petersburg has a finite amount of land for growth as annexation of county land is not an option. Developable land is limited by Chesapeake Bay Preservation Act requirements and other physical site constraints. About 3,586 acres are available for future development (about 70% of the vacant land). Land use fragmentation is a major issue in Petersburg with incompatible uses often located side by side. Petersburg has shown steady population loss in the 1990, 2000, and 2010 Census. However, the same chart shows an increase in population between 2010 and 2020 with continued increases through 2040.

The city has two distinct residential patterns. The first is found in the "Old City," north of I-85. A mix of residential types (e.g., single family, multi-family, and duplexes) is found here. Newer developments, mainly suburban subdivisions, have sprung up south of I-85. Some infill of single-family homes and duplexes has also been seen.

Commercial development has occurred along the major thoroughfares leading from the central business district. There has been commercial infill development, and a new shopping center has been built on U.S. Route 301. A marina is planned for the area between the I-95 Bridge and the U.S. Route 1/301 bridge.

Industrial uses can be found along the Appomattox River in the central business district. New industrial parks have also been built in the southwest (near I-85 and U.S. Route 604) and southeast (I-95 and Route 632) parts of the city.

2.3 Critical Facilities

A critical facility is defined as a facility in either the public or private sector that provides essential products and services to the public; is otherwise necessary to preserve the health, welfare, and quality of life in the community; or fulfills important public safety, emergency response, and/or disaster recovery functions. In some instances, one or more critical facility is located within the identified hazard area and is so noted. For this update, critical facilities are defined as follows:

- **Public Safety:** Police, Emergency Operations Centers, Sheriff, Fire, Correctional Facilities, and Emergency Management
- **Infrastructure:** Cell towers, fuel storage, pumping stations, water and wastewater treatment facilities, and transportation structures
- **Government Facilities:** Courthouses and judicial facilities, government offices and facilities
- **Medical Facilities:** Hospitals, nursing facilities, rehabilitation centers and outpatient centers
- **Education:** K – 12 public schools, colleges and universities, and technical schools

2.4 Identified Hazards

A solid fact base is a key component of any plan. The Hazard Identification and Risk Assessment (HIRA) serves as the fact base for the regional hazard mitigation plan and evaluates the region's vulnerability to natural hazards so that mitigation strategies, activities, and projects can be developed to minimize hazard risks. It includes the

identification of natural hazards and risks that are likely to impact the region based on historical experience, an estimate of the frequency and magnitude of potential disasters, and an assessment of potential loss to life and property. Emphasis is on hazards with a high likelihood of occurring, a significant level of impact, or both.

The information below summarizes the effects on City of Petersburg of the hazards identified for the multi-regional plan area. The statistics come from a National Climatic Data Center (NCDC) database. For some hazards, no data was available.

(1) Flooding (Moderate Threat)

Repetitive Loss Structures:	0
Severe Repetitive Loss Structures:	0
RL/SRL Claims:	0
RL/SRL Building and Contents Payments:	0
Critical Facilities within Identified Floodplain Areas:	2
Annualized Flood Damages:	$50,761
NFIP Policies:	137
NFIP Policy Coverage:	$38,183,500
NFIP Claims Since 1978:	76
NFIP Payments Since 1978:	$481,948

Significant Events:

- **8/27/2011:** Hurricane Irene impacted the area with heavy rainfall and gusty winds which knocked power out to millions of people in the area. It took electrical crews several days to fully restore power in the planning area. Irene originated east of the Lesser Antilles and tracked north and northwest into the western Atlantic. The hurricane reached Category 3 intensity with maximum sustained winds of near 120 mph at its strongest point. The hurricane made an initial U.S. landfall in the eastern portions of the North Carolina Outer Banks on August 27, 2011 as a Category 1 hurricane. The storm then tracked north/northeast along the coast slowly weakening before making its final landfall in Brooklyn, New York on August 28 as a high-end tropical storm. Rainfall totals with the hurricane ranged from around two inches in western sections of the planning region to 5 to 9 inches in eastern sections closest to the coast. At its closest pass, Irene brought sustained winds of 30 to 45 mph with gusts of 60 to nearly 70 mph to the planning area. The winds downed power lines and trees throughout the area. A man was killed when a tree fell on his home near Colonial Heights.
- **9/4/2011:** Tropical Storm Lee moved inland along the Mississippi/Louisiana Gulf Coast on September 4, 2011. The remnants of the weakening storm tracked northeast, producing rainfall over a wide swath extending from the Gulf Coast to New England. Rainfall totals generally ranged from 4 to 8 inches in the planning area with the heaviest totals falling just east of Interstate 95. The rain fell on soils saturated only days earlier with Hurricane Irene's passage. The result was

widespread flooding, particularly over the eastern sections of the planning region. Gusty winds in thunderstorms knocked down trees that had already been weakened from the hurricane resulting in thousands of power outages.

(2) Wind (Limited Threat), including winds from Hurricanes and Thunderstorms

- **Annualized wind damages** *including thunderstorm winds***:** $0
- **Annualized hurricane wind damages:** $0

Significant Events:

- **8/27/2011:** Hurricane Irene – See full description in Flood section
- **9/4/2011:** Hurricane Lee – See full description in Flood section.
- **6/29/2012:** A devastating line of thunderstorms known as a derecho moved east-southeast at 60 miles per hour (mph) from Indiana in the early afternoon to the Mid-Atlantic region around midnight. Winds were commonly above 60 mph with numerous reports of winds exceeding 80 mph. Some areas reported isolated pockets of winds greater than 100 mph. Nearly every county impacted by this convective system suffered damages and power outages. To make matters worse, the area affected was in the midst of a prolonged heat wave. Unlike many major tornado outbreaks in the recent past, this event was not forecast well in advance. Warm-season derechos, in particular, are often difficult to forecast and frequently result from subtle, small-scale forcing mechanisms that are difficult to resolve more than 12-24 hours in advance.
- **10/26/2012:** Hurricane Sandy made landfall along the southern New Jersey shore on October 29, 2012, causing historic devastation and substantial loss of life. The National Hurricane Center (NHC) Tropical Cyclone Report estimated the death count from Sandy at 147 direct deaths. In the United States, the storm was associated with 72 direct deaths in eight states: 2 in Virginia. The storm also resulted in at least 75 indirect deaths (i.e., related to unsafe or unhealthy conditions that existed during the evacuation phase, occurrence of the hurricane, or during the post-hurricane/clean-up phase). These numbers make Sandy the deadliest hurricane to hit the U.S. mainland since Hurricane Katrina in 2005, as well as the deadliest hurricane/post-tropical cyclone to hit the U.S. East Coast since Hurricane Agnes in 1972.

(3) Tornado (Significant Threat)

- **Total tornado touchdowns since 1950:** 11
- **Annualized tornado damages:** $891,490

(4) Thunderstorm, including Hail and Lightning (Moderate Threat)

- **Annualized Thunderstorm Events, 1956 – 2016:** 0.82
- **Annualized Thunderstorm damages:** $3,764

Significant Events:

- **6/29/2012:** The June 2012 Mid-Atlantic and Midwest derecho was one of the most destructive and deadly fast-moving severe thunderstorm complexes in North American history. The progressive derecho tracked across a large section of the Midwestern United States and across the central Appalachians into the mid-Atlantic states on the afternoon and evening of June 29, 2012, and into the early morning of June 30, 2012. It resulted in 20 deaths, widespread damage and millions of power outages across the study region.
- **6/13/2013:** On the morning of the 13, another linear complex of severe storms developed along a line near the southern border of Ohio. The storms eventually strengthened into a powerful derecho and raced to the south and east. Fatalities and injuries occurred as a result of falling trees and power lines as the storms ripped through Virginia, along with numerous reports of damaging winds and power outages. The derecho downed numerous tress and damaged structures winds up to 80 mph (130 km/h) in some areas.
- **5/22/2014:** A large Hail and Thunderstorm event came through the region. Some hail was reported to be as large as ping pong balls. Several areas were affected from fallen electric lines. The NCDC data reports that 12 direct deaths in the study region resulted from this event.
- **2/24/2016:** This storm started in the north eastern states and traveled down through Virginia and south. During the thunderstorm, hail in some parts of the region were as large as 3 inches in diameter.

(5) Winter Weather (Moderate Threat)

- **National Weather Service Alerts** (1986-2016): 0
- **Annualized winter weather damages:** $0

Significant Events:

- **12/25/2010:** A 4- to 10-inch snowfall blanketed the region with the heaviest amounts falling over the south and eastern sections. Amounts ranged from 4 inches northwest of the City of Richmond, 6 to 7 inches in the Cities of Petersburg and Emporia, and around a foot near the Town of Wakefield.
- **2/10/2014:** This was a major ice and snow storm that affected the entire region and elsewhere in the Eastern United States. This event produced devastating amounts of freezing rain and snow along and east of Interstate 95 all the way down to the coast. Overall temperatures throughout the winter were much colder in 2014. This was rated as 3 (Major) on the NESIS scale. A Presidential Disaster event was declared in Chesterfield.
- **1/22/2016:** What transpired was reasonably close to what was forecast, with a major snowstorm for our entire region, which also included a mix of some sleet across portions of the area as well as small amounts of freezing rain. NOAA ranks Northeast U.S. storms according to overall impact, part of which is dependent on societal and economic factors, thus population density is a key component. This particular storm was ranked as a 4 (crippling) on the NESIS scale of 1-5. It is now 4th on the list of historic storms that have been ranked on the NESIS scale, with

only two storms ever ranked as a 5 (extreme). Presidential Disasters for this study region were declared for Sussex and Henrico Counties.

(6) Drought (Limited Threat)

- **Annualized drought damages**: $0

Significant Events:

- **November 1976 – September 1977:** The region experienced ten months of below average precipitation. The drought began in November 1976 when rainfall totaled only 50% to 75% of normal. During the rest of the winter, storms tracked across the Gulf. During the spring and summer storms tracked across the Great Lakes. These weather patterns created significant droughts throughout most of Virginia.
- **June – November 1998:** A heat wave over the Southeast produced warm and dry conditions over much of Virginia. Unusually dry conditions persisted through much of the fall. The drought produced approximately $38.8 million in crop damages over portions of central and south-central Virginia.
- **December 2001 – November 2004:** Beginning in the winter of 2001, the Mid-Atlantic began to show long-term drought conditions. The NWS issued reports of moisture-starved cold fronts that would continue throughout the winter. Stream levels were below normal with record lows observed at gauges for the York, James, and Roanoke River basins. By November 2002, the U.S. Secretary of Agriculture had approved 45 counties for primary disaster designation, while 36 requests remained pending.
- **2007:** Unusually dry conditions persisted through a significant portion of the year through much of southern and central Virginia. Virginia as a whole experienced its tenth driest year on record.
- **7/21/2011:** This was one of the hottest July's in the last 75 years, breaking records for multiple. According to the NCDC data, all counties were recorded as having excessive heat waves and drought throughout the entire month.
- **7/5/2012:** Another year of record setting highs and ties throughout the states. These high were accompanied with droughts and heat waves.

(7) Mass Evacuation (Limited Threat)

- Mass evacuations from urban areas can strain a community's resources and cause gridlock on major transportation routes, overcrowding of hospitals and shelters, and increased load on local utility infrastructures leading to potential failure.

(8) Wildfire (Limited Threat)

Annualized wildfire damages:	$0
Total acres burned (1995-2008):	26.4
Total dollar damage (1995-2008):	$0
Annualized number of wildfire events:	0.31
High fire risk woodland communities:	4
Number of homes in high fire risk woodland communities:	271
Critical facilities within high risk wildfire areas:	13

(9) Landslide/Shoreline Erosion (Limited Threat)

- The greatest landslide hazards are found in the higher elevations of western and southwestern Virginia. Analysis of the hazard here is limited by the availability of data. There is no comprehensive database documenting all landslide occurrences within the Commonwealth.

(10) Land Subsidence/Karst/Sinkholes (Limited Threat)

- According to the Virginia State Hazard Mitigation Plan, there have been no Federal Declared Disasters or NCDC recorded events for karst related events in the Commonwealth. Land subsidence is very site-specific. There is no comprehensive long-term record of past events in Virginia.

(11) Earthquake (Limited Threat)

- **Annualized earthquake losses**: $78,970

Significant Events:

- Significant earthquakes were first recorded in Virginia in 1774. Virginia has had more than 160 earthquakes since 1977, of which 16% were felt. This averages to approximately one earthquake every month, with two felt each year. There have been four significant earthquakes centered in the region. There is quaternary faulting in the Central Virginia Seismic Zone, running through Powhatan, Goochland, Fluvanna, and Cumberland Counties. Quaternary faults and folds are believed to be sources of earthquakes greater than magnitude 6 in the past 1,600,000 years; however, the USGS reports that only liquefaction features are evidence of strong shaking and that individual faults in the Central Virginia Seismic Zone remain unidentified.
- **8/23/2011:** A 5.8 magnitude quake centered near Mineral, VA occurred at 1:51 pm EDT on August 23, 2011. The earthquake was reportedly felt as far north as Boston, as far south as Georgia and as far west as Chicago. Effects of the earthquake were reported to the USGS through its online survey from over 8,434 zip codes, and ranged from weak intensity to very strong. In terms of damage, particularly hard-hit were brick and unreinforced structures and infrastructure near the quake's epicenter. In addition to cracks and buckling, some buildings were knocked off of their foundations. Minor injuries were reported as a result of the damage and

debris. The earthquake forced the North Anna Power Station nuclear power plant offline pending an all-clear from a Nuclear Regulatory Commission review. Aftershocks of a lesser magnitude continued to plague the area for several weeks after the event. The strongest aftershock measured 4.5 and occurred on August 25 at 1:08 am EDT.

2.5 2017 – 2022 Mitigation Actions identified by City of Petersburg

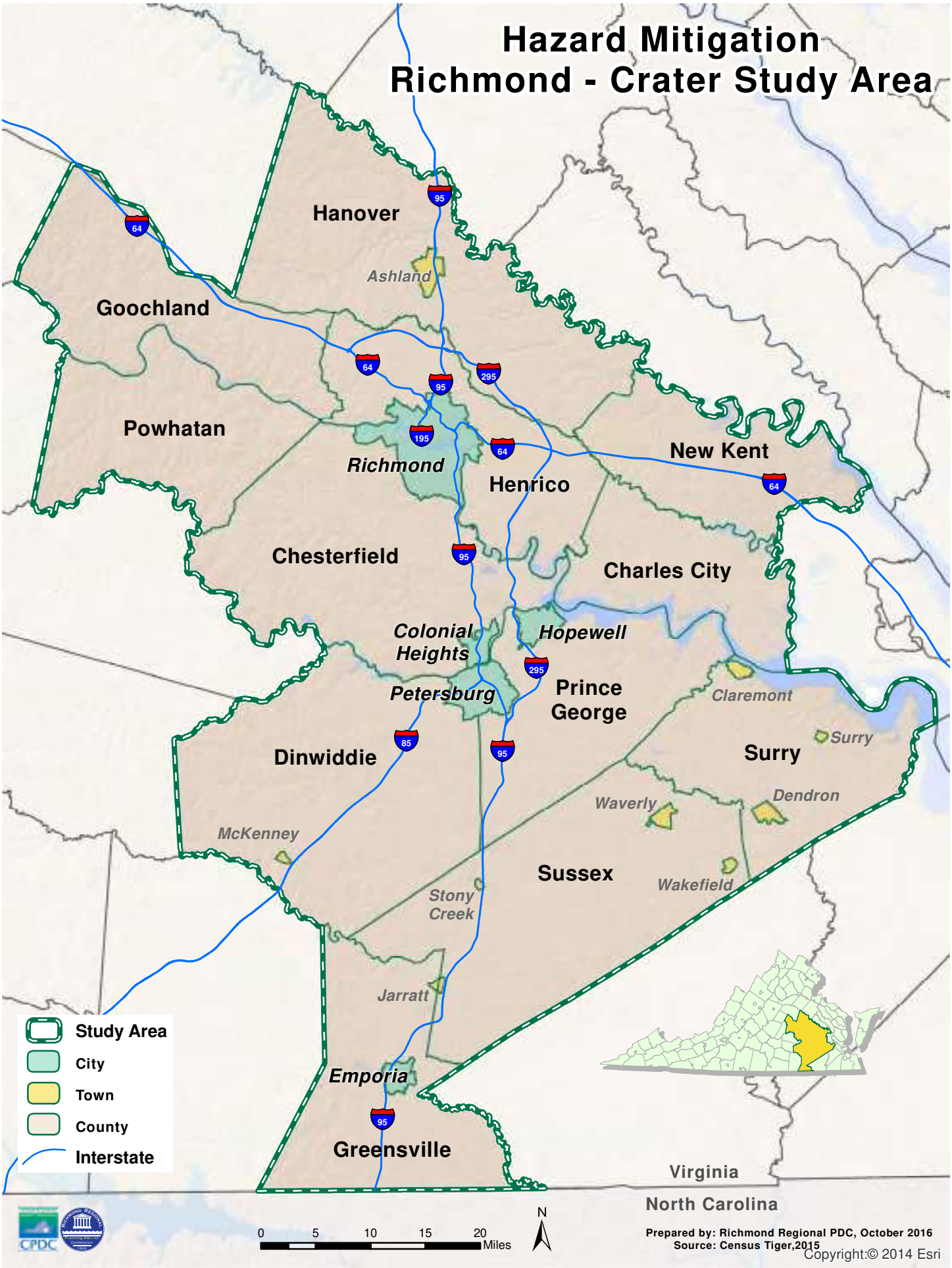
City of Petersburg 2017 - 2022 Mitigation Actions							
Number	**Strategy**	**Responsible Department**	**Priority**	**Goals Supported**	**Hazards Addressed**	**Timeframe**	**Resources**
Petersburg - 1	Continue to enforce zoning and building codes, with emphasis on floodplain management.	Building Department	High	1, 2	Flooding	Ongoing	Staff
Petersburg - 2	Partner with parent-teacher associations and local schools to implement existing curriculum related to natural hazards (e.g., Masters of Disaster, Risk Watch).	Emergency Management	Low	2	All	Ongoing	Staff
Petersburg - 3	Complete application for StormReady Program.	Emergency Management	Low	1, 2, 3, 5	All	2018	Staff
Petersburg - 4	Consider participating in FEMA's CRS.	Public Works	Medium	1, 2	Flooding	Ongoing	Staff
Petersburg - 5	Inspect and clear debris (or encourage VDOT to) from stormwater drainage system.	Public Works	High	4	Flooding	Ongoing	Staff, VDOT
Petersburg - 6	Finish implementation of Reverse 911 system.	Emergency Management	Medium	1, 3, 5, 6, 7	All	Ongoing	City budget, grants
Petersburg - 7	Establish flood-level markers along bridges and other structures to indicate the rise of water levels along creeks and rivers in potential flood-prone areas.	Public Works	Medium	1, 2, 3	Flooding	Ongoing	Grants
Petersburg - 8	Investigate all public utility lines to evaluate their resistance to flood, wind, and winter storm hazards.	Public Works	Medium	7	Flood, wind, winter storm,	Ongoing	Staff

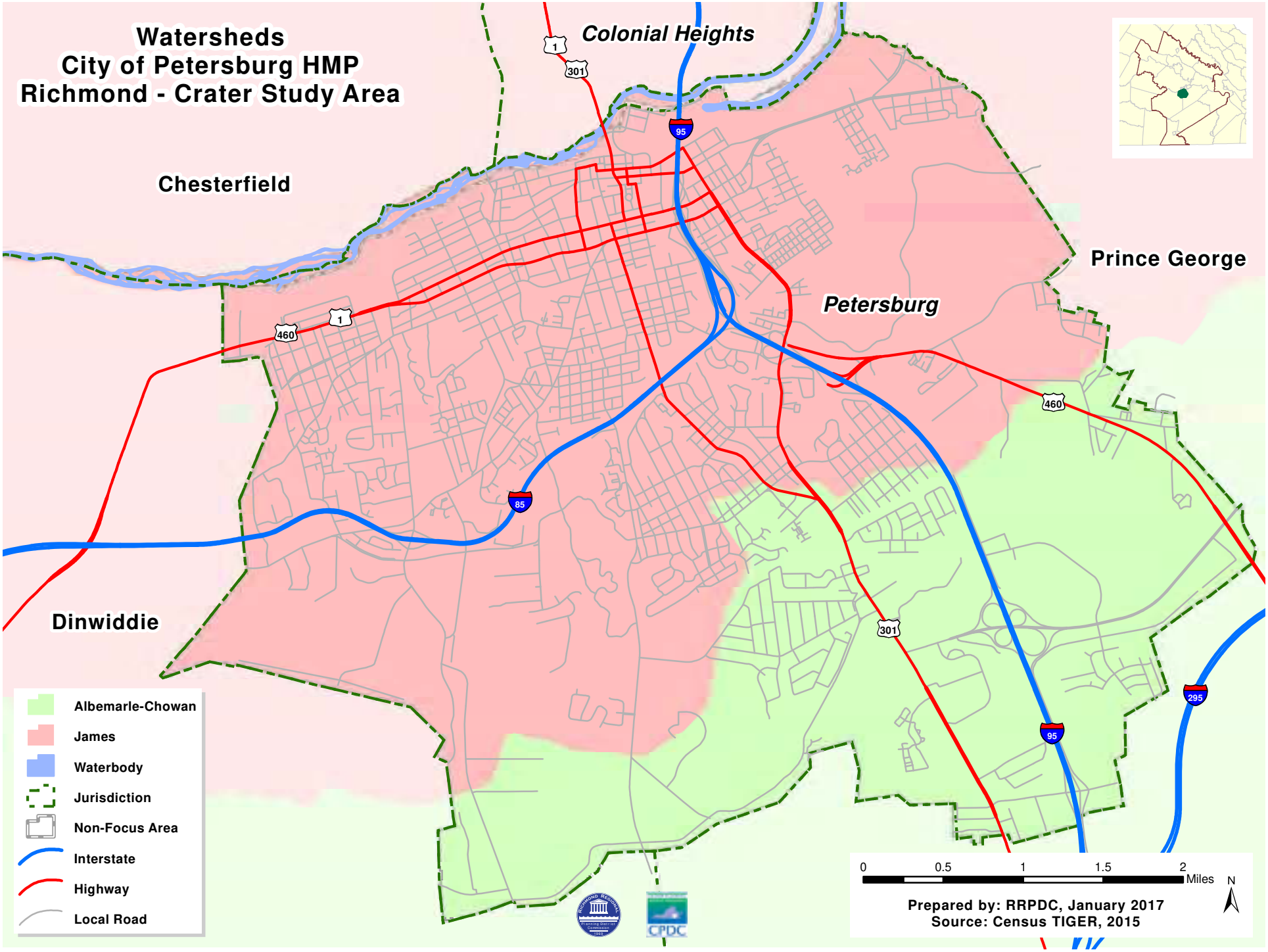
City of Petersburg 2017 - 2022 Mitigation Actions							
Number	**Strategy**	**Responsible Department**	**Priority**	**Goals Supported**	**Hazards Addressed**	**Timeframe**	**Resources**
					severe storm		
Petersburg - 9	Work with VDOT, private utilities, and/or private homeowners to trim or remove trees that could down power lines.	Public Works	Low	7	Flood, wind, winter storm, severe storm	Ongoing	Staff, VDOT
Petersburg - 10	Distribute brochures and use other means to educate the public regarding preparedness and mitigation.	Emergency Management	Medium	1, 2, 3	All	Ongoing	Staff
Petersburg - 11	Request list from VDEM or VA DCR and conduct annual review of RL and SRL property list to ensure accuracy. Review will include verification of the geographic location of each RL property and determination if mitigated and by what means. Provide corrections if needed by filing form FEMA AW-501.	Planning/ Assessor	Low	1, 2	Flooding	Annually	Staff
Petersburg - 12	Review locality's compliance with the NFIP with an annual review of the floodplain ordinances and any newly permitted activities in the 100-year floodplain.	Emergency Management	Medium	1, 2	Flooding	Annually	Staff
Petersburg - 13	Install quick connects for generators at critical facilities.	Emergency Management	Medium	1, 7	All	Ongoing	Grants

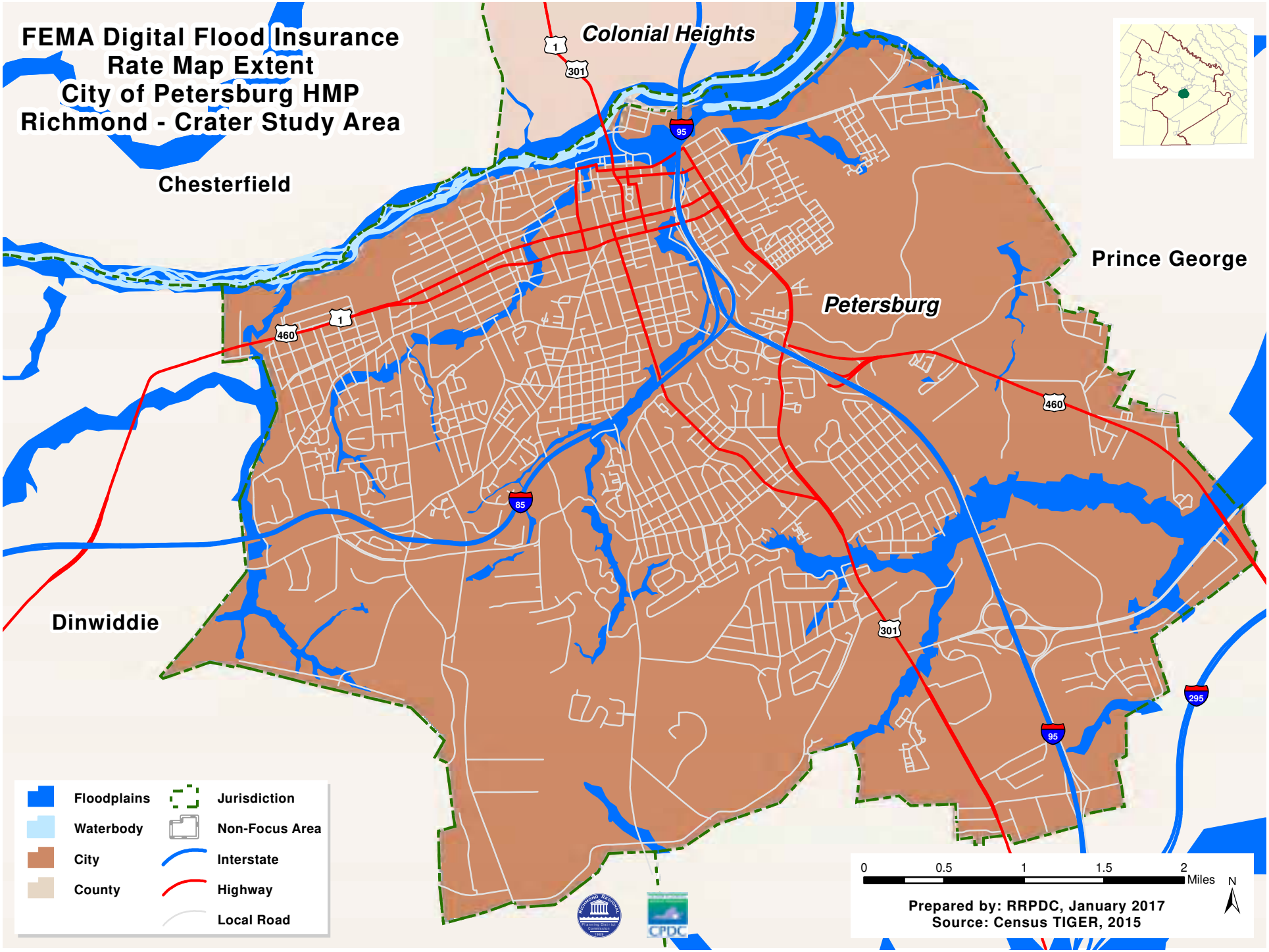
City of Petersburg 2017 - 2022 Mitigation Actions							
Number	**Strategy**	**Responsible Department**	**Priority**	**Goals Supported**	**Hazards Addressed**	**Timeframe**	**Resources**
Petersburg - 14	Work with state partners and neighboring localities to monitor and implement Next Generation 911 GIS data standards.	GIS Manager, PDC	High	1, 7	All	Ongoing	Staff
Petersburg - 15	Support mitigation projects that will result in protection of public or private property from natural hazards. Eligible projects include but are not limited to: 1. acquisition of flood prone property 2. elevation of flood prone structures 3. minor structural flood control projects 4. relocation of structures from hazard prone areas 5. retrofitting of existing buildings, facilities and infrastructure 6. retrofitting of existing buildings and facilities for shelters 7. critical infrastructure protection measures 8. stormwater management improvements 9. advanced warning systems and hazard gauging systems (weather radios, reverse-911, stream gauges, I-flows) 10. targeted hazard education 11. wastewater and water supply system hardening and mitigation	Community did not respond to status update request.	Community did not respond to status update request.	1, 2, 4, 5, 7	All	Ongoing	FEMA Grants
Petersburg - 16	Integrate mitigation plan requirements and actions into other appropriate planning mechanisms such as comprehensive plans and capital improvement plans.	Community did not respond to status update request.	Community did not respond to status update request.	1, 2	All	Ongoing	Staff

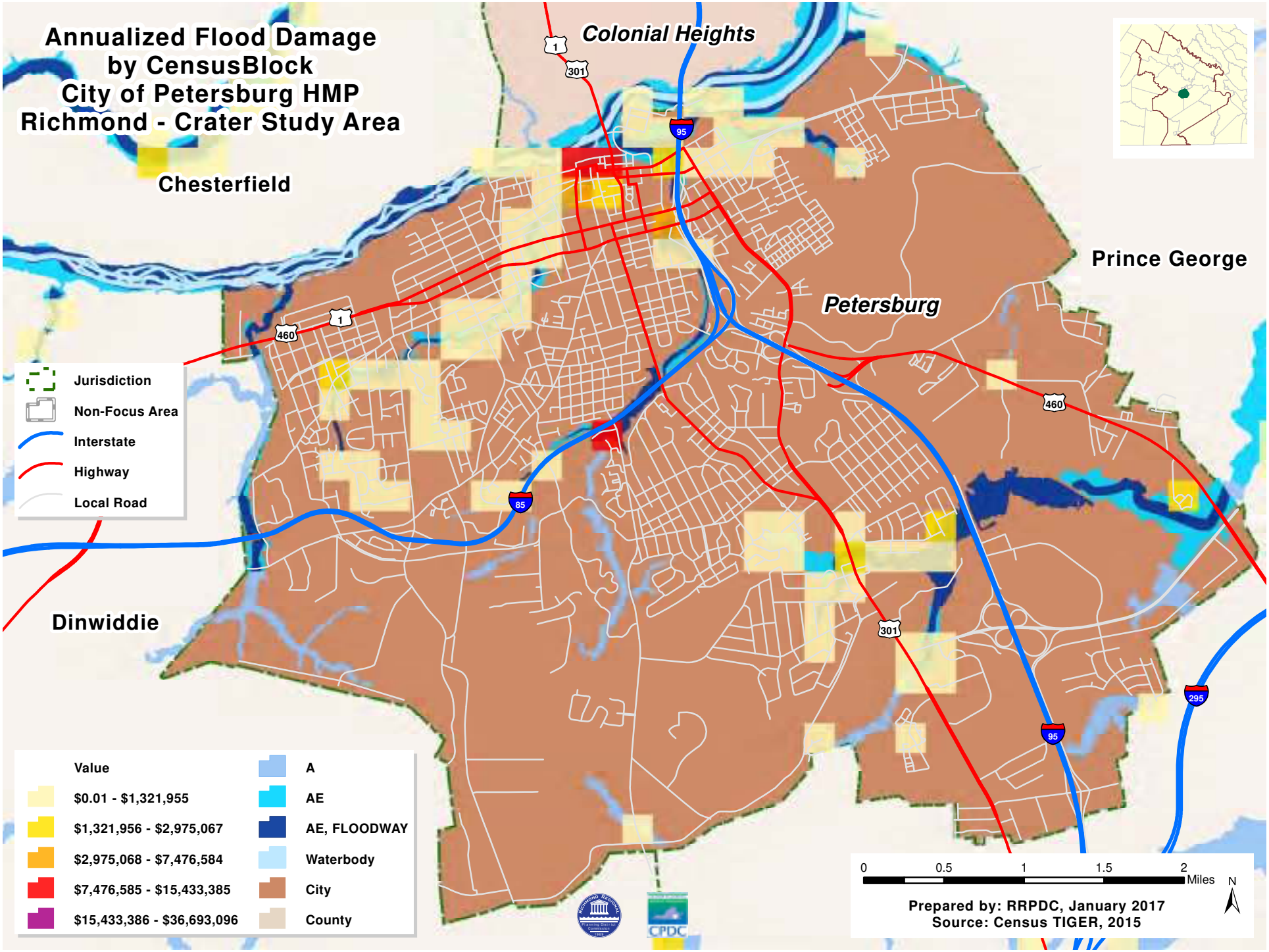
The Richmond-Crater Multi-Regional Hazard Mitigation Plan 2017 was developed by the Richmond Regional and Crater Planning District Commissions with the assistance and support of local planning, emergency management, and other local staff from the participating localities, as well as from Dewberry Consultants, LLC.

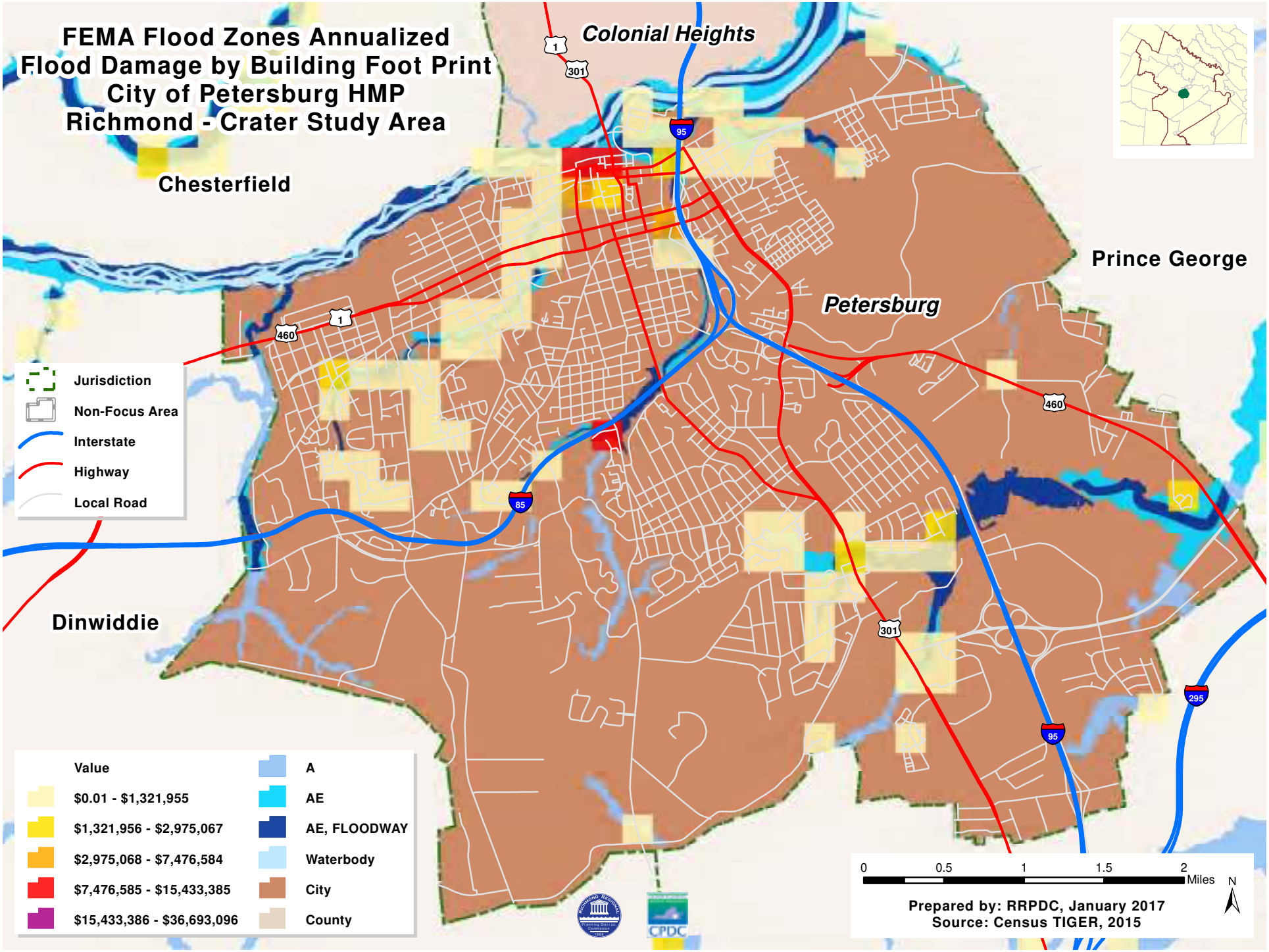
This document and the full plan on which it is based were prepared under a grant from FEMA's Grant Programs Directorate, U.S. Department of Homeland Security. Points of view or opinions expressed in this document are those of the authors and do not necessarily represent the official position or policies of FEMA's Grant Programs Directorate or the U.S. Department of Homeland Security.

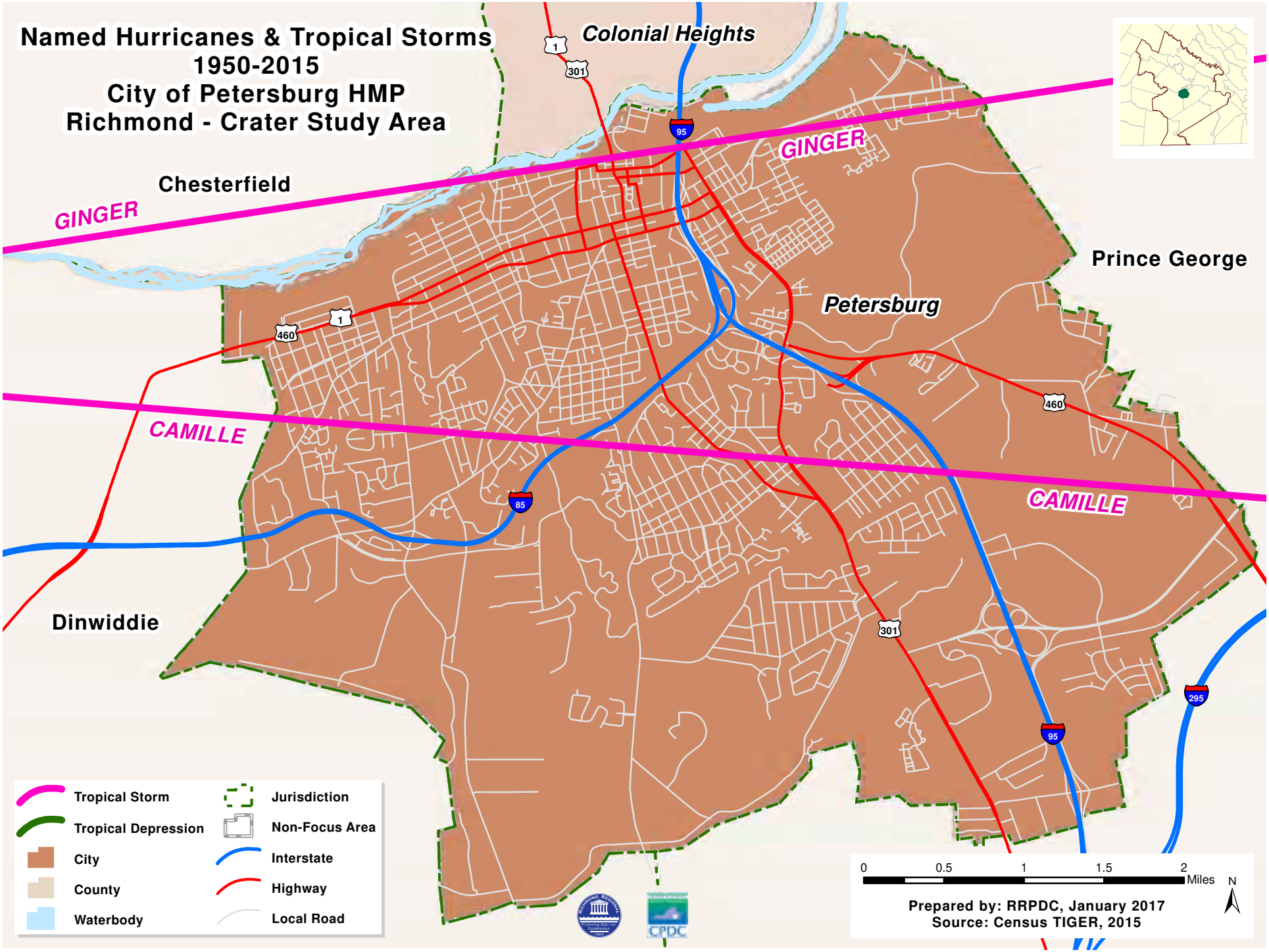

Hazard Mitigation
Richmond - Crater Study Area
Hanover
Ashland
Goochland
Powhatan
Richmond
Henrico
New Kent
Chesterfield
Charles City
Colonial Heights
Hopewell
Petersburg
Prince George
Claremont
Surry
Dinwiddie
Waverly
Dendron
McKenney
Sussex
Wakefield
Stony Creek
Jarratt
Emporia
Greensville
Virginia
North Carolina
Study Area
City
Town
County
Interstate
0 5 10 15 20 Miles
N
Prepared by: Richmond Regional PDC, October 2016
Source: Census Tiger,2015
Copyright:© 2014 Esri

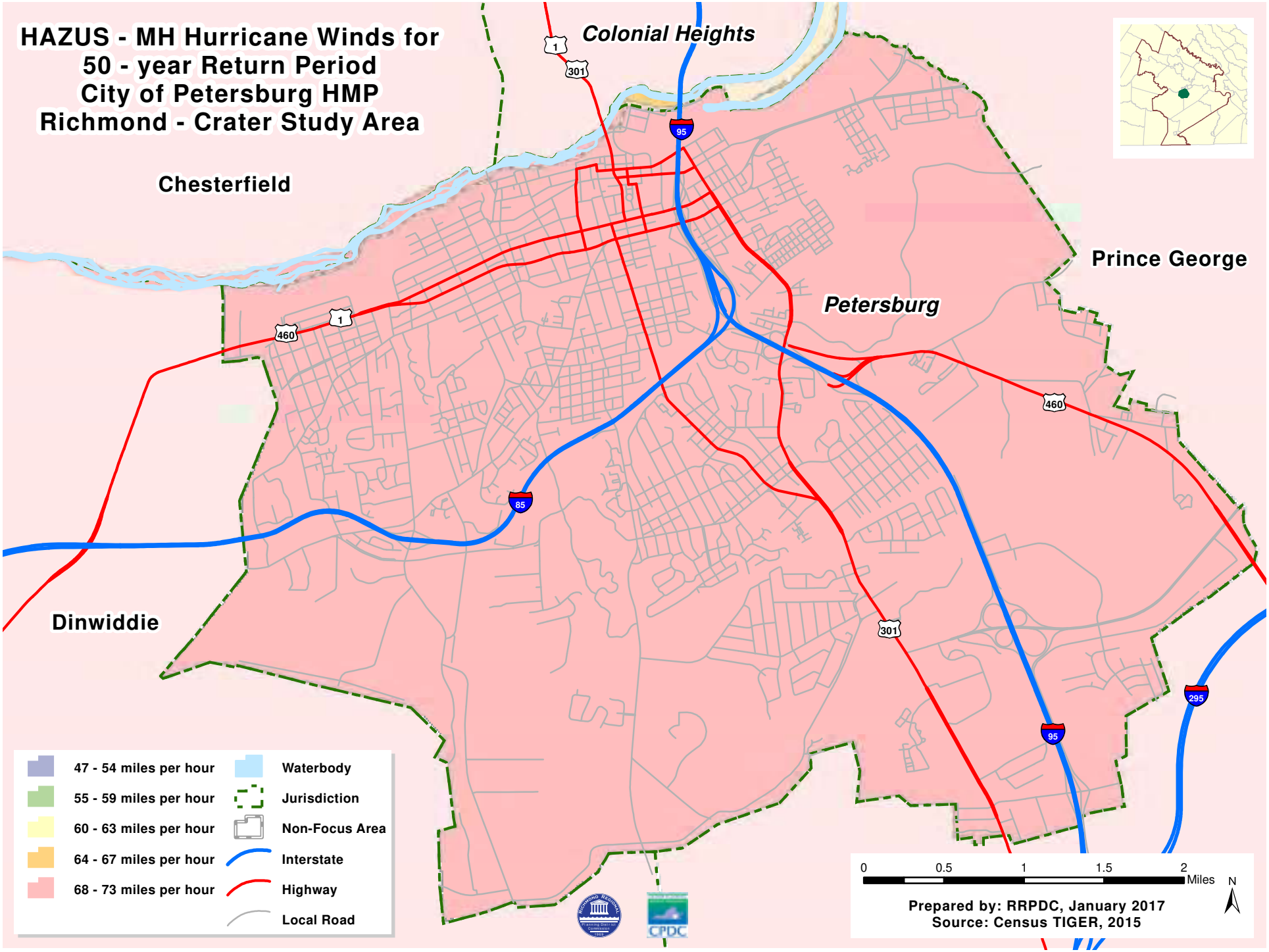

Watersheds
City of Petersburg HMP
Richmond - Crater Study Area
Colonial Heights
Chesterfield
Prince George
Petersburg
Dinwiddie
Albemarle-Chowan
James
Waterbody
Jurisdiction
Non-Focus Area
Interstate
Highway
Local Road
0
0.5
1
1.5
2
Miles
N
Prepared by: RRPDC, January 2017
Source: Census TIGER, 2015
CPDC

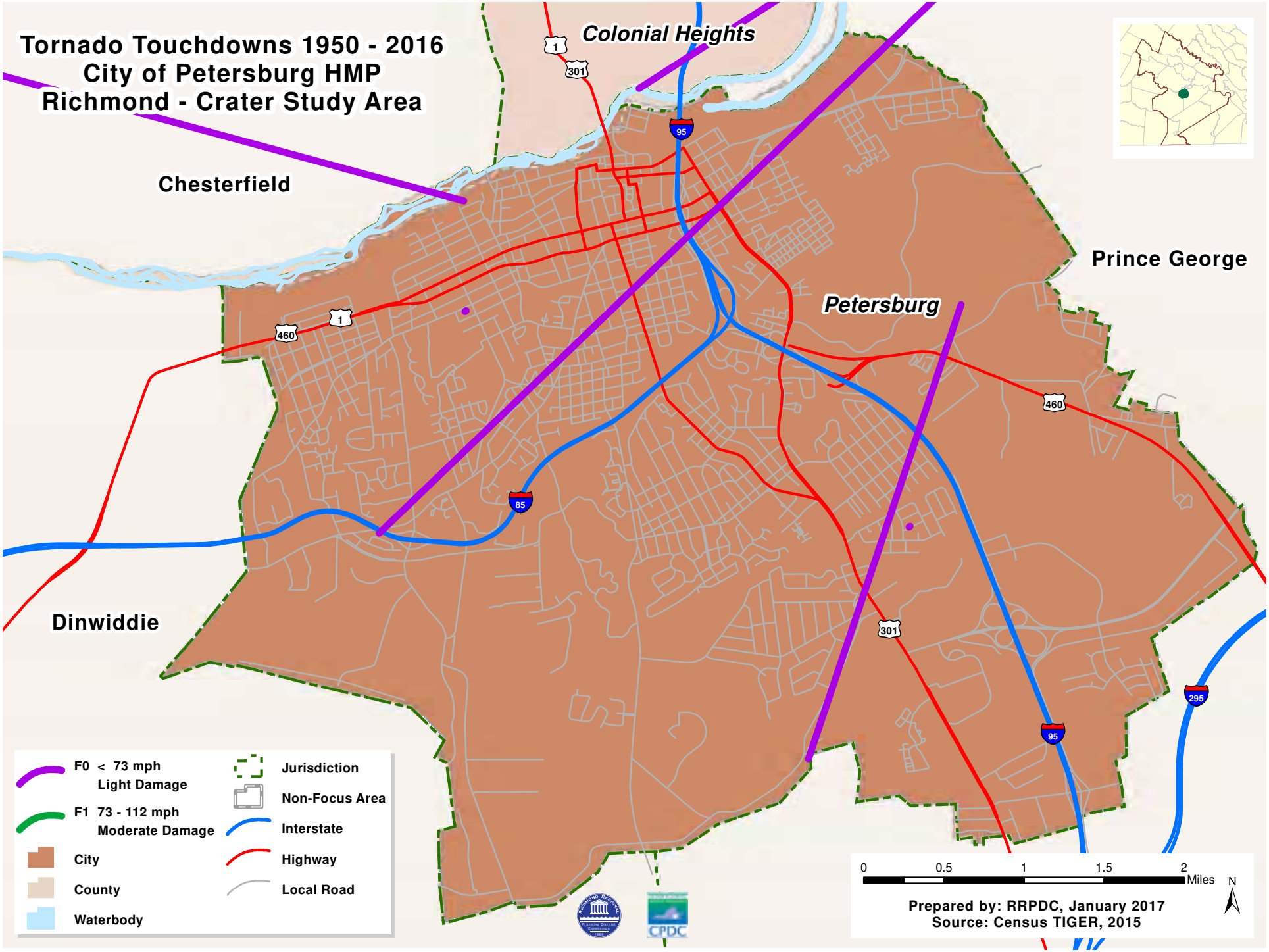

FEMA Digital Flood Insurance
Rate Map Extent
City of Petersburg HMP
Richmond - Crater Study Area
Colonial Heights
Chesterfield
Prince George
Petersburg
Dinwiddie
1
301
95
460
85
295
Floodplains
Waterbody
City
County
Jurisdiction
Non-Focus Area
Interstate
Highway
Local Road
0
0.5
1
1.5
2
Miles
N
Prepared by: RRPDC, January 2017
Source: Census TIGER, 2015
CPDC

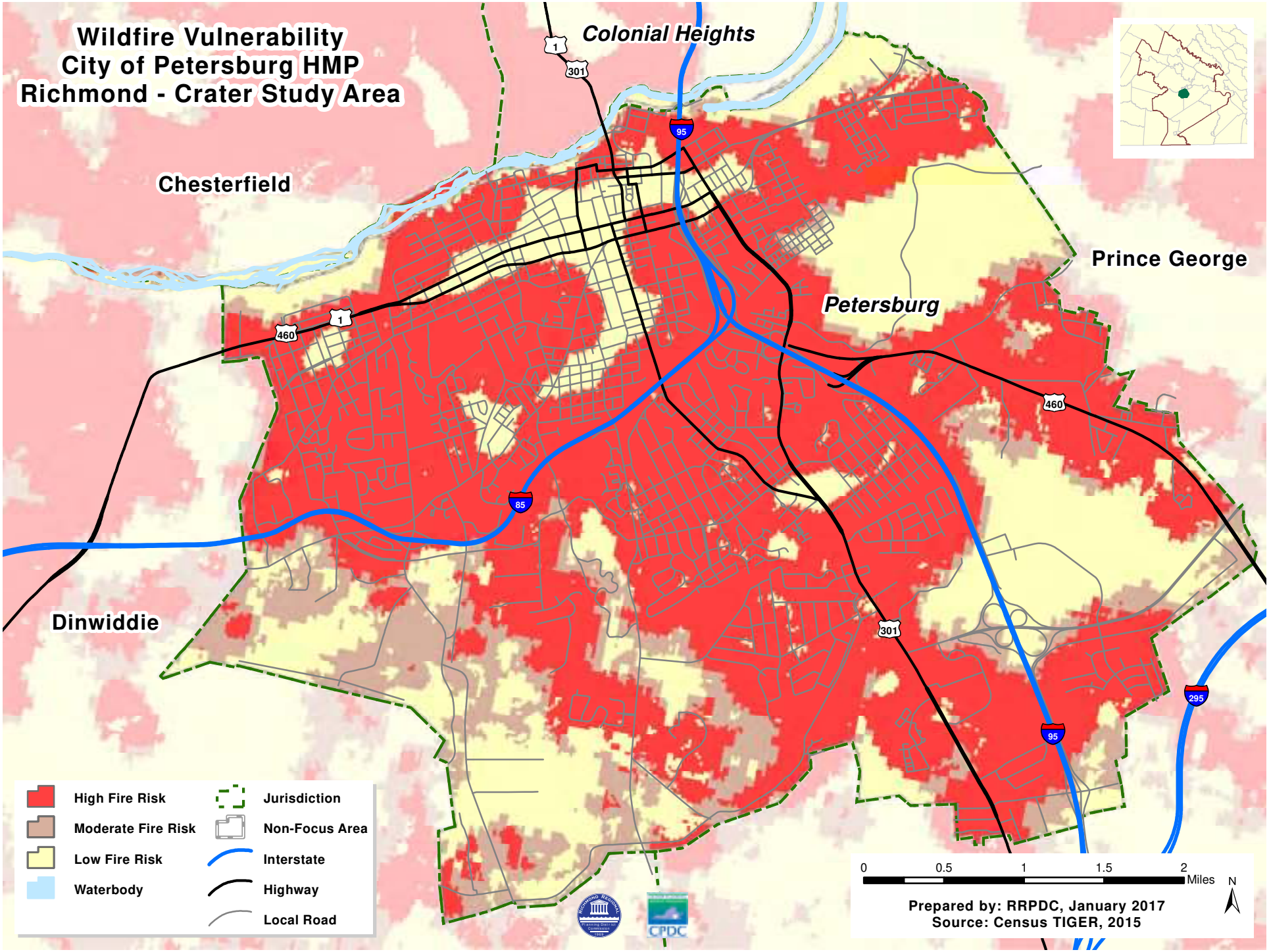

Annualized Flood Damage
by CensusBlock
City of Petersburg HMP
Richmond - Crater Study Area
Colonial Heights
Chesterfield
Prince George
Petersburg
Dinwiddie
Jurisdiction
Non-Focus Area
Interstate
Highway
Local Road
Value
$0.01 - $1,321,955
$1,321,956 - $2,975,067
$2,975,068 - $7,476,584
$7,476,585 - $15,433,385
$15,433,386 - $36,693,096
A
AE
AE, FLOODWAY
Waterbody
City
County
0
0.5
1
1.5
2
Miles
N
Prepared by: RRPDC, January 2017
Source: Census TIGER, 2015
CPDC


FEMA Flood Zones Annualized
Flood Damage by Building Foot Print
City of Petersburg HMP
Richmond - Crater Study Area
Colonial Heights
Chesterfield
Prince George
Petersburg
Dinwiddie
Jurisdiction
Non-Focus Area
Interstate
Highway
Local Road
Value
$0.01 - $1,321,955
$1,321,956 - $2,975,067
$2,975,068 - $7,476,584
$7,476,585 - $15,433,385
$15,433,386 - $36,693,096
A
AE
AE, FLOODWAY
Waterbody
City
County
0 0.5 1 1.5 2 Miles
N
Prepared by: RRPDC, January 2017
Source: Census TIGER, 2015
CPDC

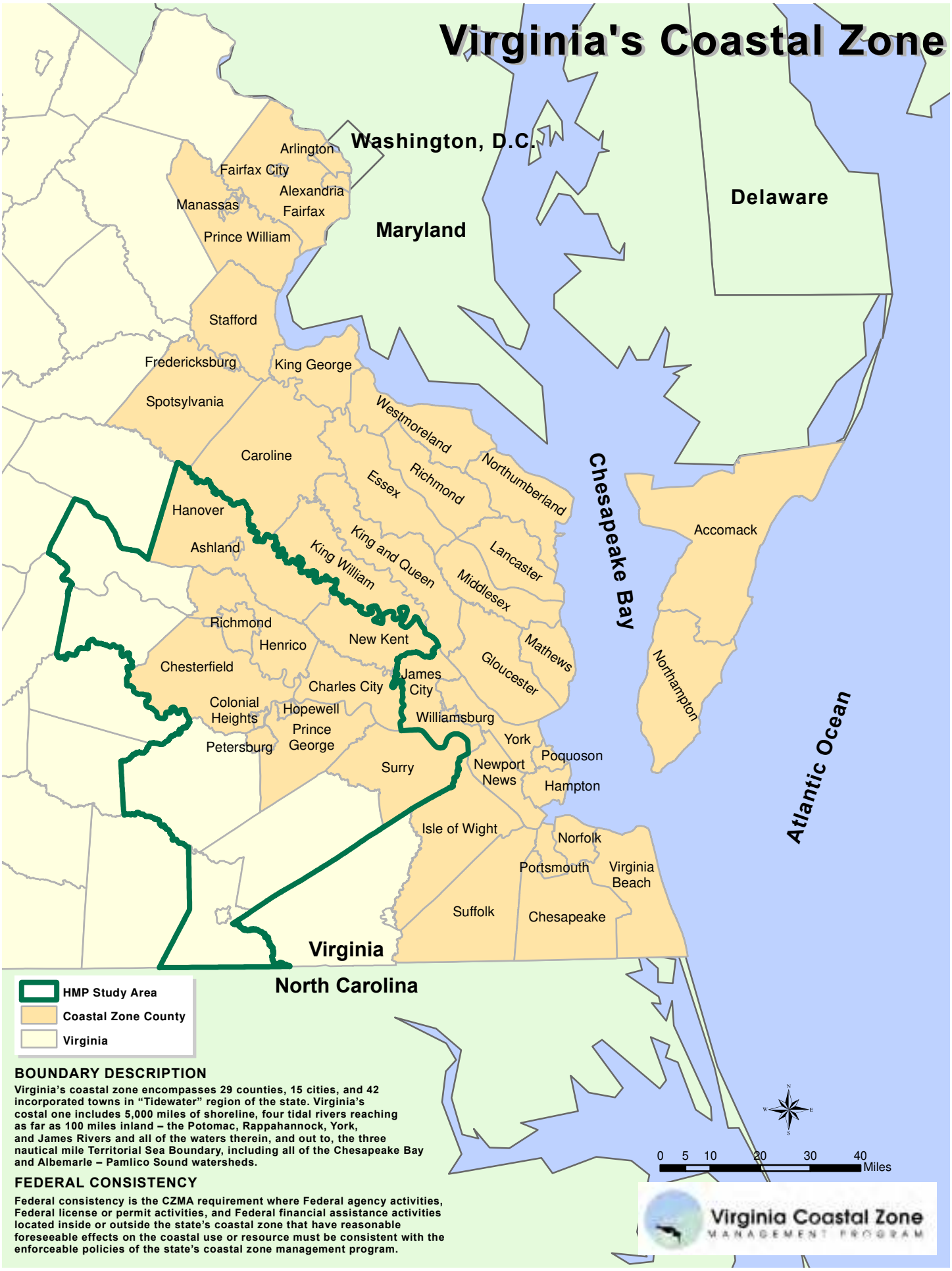

Named Hurricanes & Tropical Storms
1950-2015
City of Petersburg HMP
Richmond - Crater Study Area
Colonial Heights
Chesterfield
Prince George
Petersburg
Dinwiddie
GINGER
GINGER
CAMILLE
CAMILLE
1
301
95
460
85
295
Tropical Storm
Tropical Depression
City
County
Waterbody
Jurisdiction
Non-Focus Area
Interstate
Highway
Local Road
0
0.5
1
1.5
2
Miles
N
Prepared by: RRPDC, January 2017
Source: Census TIGER, 2015
CPDC


HAZUS - MH Hurricane Winds for
50 - year Return Period
City of Petersburg HMP
Richmond - Crater Study Area
Colonial Heights
Chesterfield
Prince George
Petersburg
Dinwiddie
47 - 54 miles per hour
55 - 59 miles per hour
60 - 63 miles per hour
64 - 67 miles per hour
68 - 73 miles per hour
Waterbody
Jurisdiction
Non-Focus Area
Interstate
Highway
Local Road
0 0.5 1 1.5 2 Miles
N
Prepared by: RRPDC, January 2017
Source: Census TIGER, 2015
CPDC


Tornado Touchdowns 1950 - 2016
City of Petersburg HMP
Richmond - Crater Study Area
Colonial Heights
Chesterfield
Prince George
Petersburg
Dinwiddie
F0 < 73 mph
Light Damage
F1 73 - 112 mph
Moderate Damage
City
County
Waterbody
Jurisdiction
Non-Focus Area
Interstate
Highway
Local Road
0 0.5 1 1.5 2 Miles
N
Prepared by: RRPDC, January 2017
Source: Census TIGER, 2015
CPDC


Wildfire Vulnerability
City of Petersburg HMP
Richmond - Crater Study Area
Colonial Heights
Chesterfield
Prince George
Petersburg
Dinwiddie
1
301
95
460
85
295
High Fire Risk
Moderate Fire Risk
Low Fire Risk
Waterbody
Jurisdiction
Non-Focus Area
Interstate
Highway
Local Road
0
0.5
1
1.5
2
Miles
N
Prepared by: RRPDC, January 2017
Source: Census TIGER, 2015
CPDC

Virginia's Coastal Zone



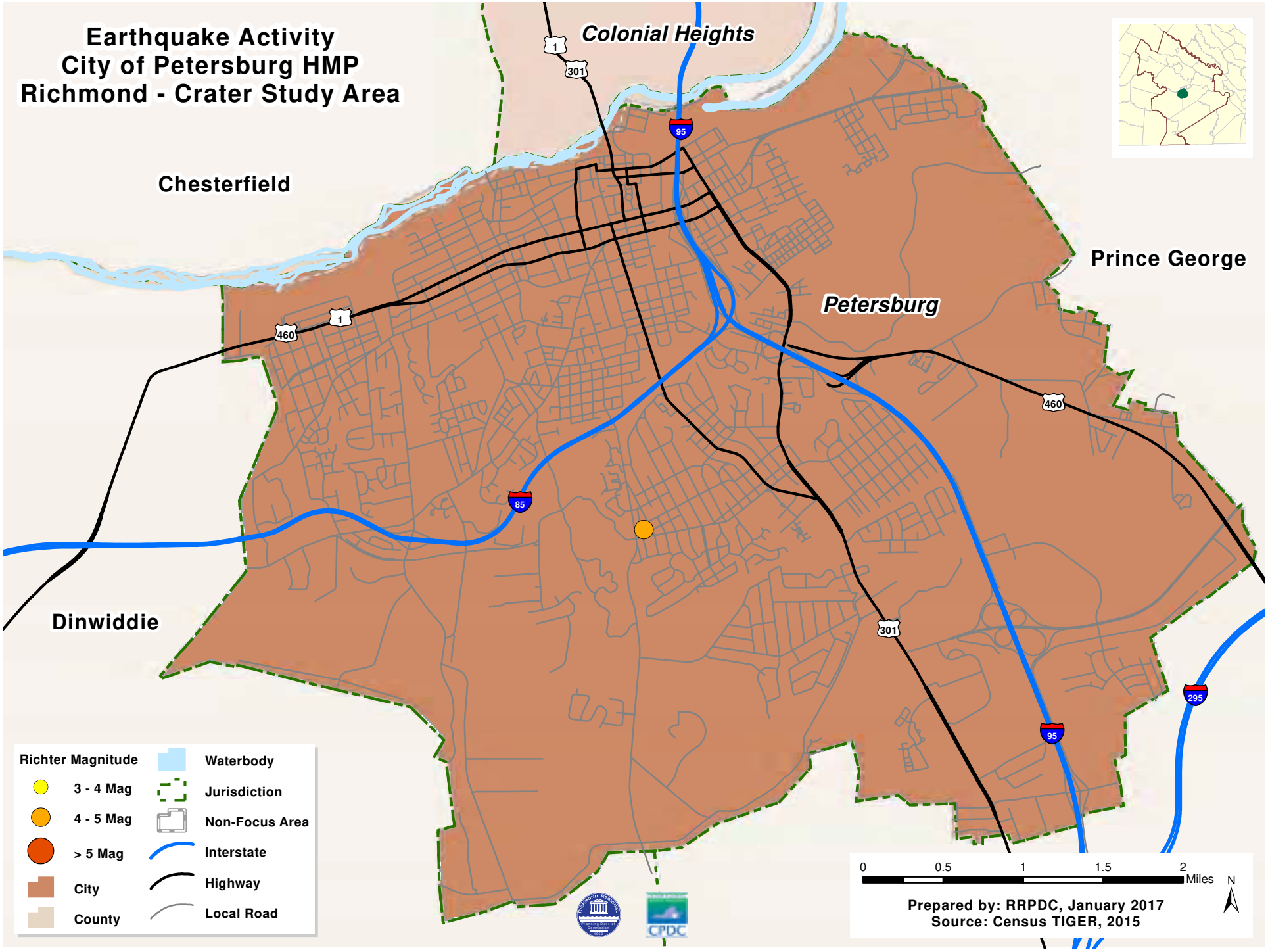
BOUNDARY DESCRIPTION

Virginia's coastal zone encompasses 29 counties, 15 cities, and 42 incorporated towns in "Tidewater" region of the state. Virginia's costal one includes 5,000 miles of shoreline, four tidal rivers reaching as far as 100 miles inland – the Potomac, Rappahannock, York, and James Rivers and all of the waters therein, and out to, the three nautical mile Territorial Sea Boundary, including all of the Chesapeake Bay and Albemarle – Pamlico Sound watersheds.

FEDERAL CONSISTENCY

Federal consistency is the CZMA requirement where Federal agency activities, Federal license or permit activities, and Federal financial assistance activities located inside or outside the state's coastal zone that have reasonable foreseeable effects on the coastal use or resource must be consistent with the enforceable policies of the state's coastal zone management program.

Virginia Coastal Zone
MANAGEMENT PROGRAM


Earthquake Activity
City of Petersburg HMP
Richmond - Crater Study Area
Colonial Heights
Chesterfield
Prince George
Petersburg
Dinwiddie
1
301
95
460
85
295
Richter Magnitude
3 - 4 Mag
4 - 5 Mag
> 5 Mag
City
County
Waterbody
Jurisdiction
Non-Focus Area
Interstate
Highway
Local Road
0
0.5
1
1.5
2
Miles
N
Prepared by: RRPDC, January 2017
Source: Census TIGER, 2015
CPDC

Richmond-Crater Multi-Region Hazard Mitigation Plan

AUGUST
2022

PlanRVA
THE REGIONAL COMMISSION

CRATER PLANNING
DISTRICT COMMISSION

REPORT DOCUMENTATION

TITLE	REPORT DATE
Richmond-Crater Multi-Region Hazard Mitigation Plan	JULY 2022

ABSTRACT

The *Richmond-Crater Multi-Region Hazard Mitigation Plan* has been updated for 2022. The region is vulnerable to a wide range of hazards that threaten the safety of residents and have the potential to damage or destroy both public and private property and disrupt the local economy and overall quality of life. While the threat from hazards may never be fully eliminated, the *Richmond-Crater Multi-Region Hazard Mitigation Plan* recommends specific actions designed to protect residents, business owners and the built environment.

GRANT/SPONSORING AGENCY	ACKNOWLEDGEMENTS
FEMA This report was funded by the Federal Emergency Management Agency through the Virginia Department of Emergency Management, via grant Agreement number FEMA-DR-4411-VA-013 for $262,500.	Salter's Creek Consulting wood. The PDCs would like to acknowledge the contributions of Salter's Creek Consulting, Inc., Hampton, Virginia, and Wood throughout the planning process, and contributions of members of Steering Committee.
PlanRVA THE REGIONAL COMMISSION PlanRVA is where we come together to look ahead. Established in 1969, the Richmond Regional Planning District Commission, known as PlanRVA, has been the home of cooperation among the nine jurisdictions of Central Virginia for more than 50 years. Today, we focus in areas of community development, emergency management, the environment and transportation. We are the seer of the future, convener of our member jurisdictions and regional partners, creator of plans of action and shaper of Central Virginia's future.	CRATER PLANNING DISTRICT COMMISSION The Crater Planning District Commission is a regional planning agency with major emphasis in the areas of transportation, economic and small business development, the environment, and serving as the convener for major military-related discussions among the region's communities. The PDCs mission is to strengthen the quality of life throughout the Crater planning District region by serving as a regional forum of member local governments to address issues of regional significance, providing technical assistance to localities, and promoting and enhancing the collective consensus on the economic, transportation, social, environmental, and demographic interests of the region.

Table of Contents

1.0 Executive Summary

The Richmond-Crater Multi-Region Hazard Mitigation Plan is an update to plans approved in 2006 by the jurisdictions of PlanRVA and Crater Planning District Commission (PDC), and the combined Richmond-Crater 2011 and 2017 Multi-Regional Hazard Mitigation Plans.

PlanRVA and Crater PDC convened a joint Hazard Mitigation Steering Committee and Working Group, comprised of representatives from the participating localities. The committee and working group met several times during the planning process and worked closely with Salter's Creek Consulting, Inc., to develop the multi-regional plan update. Public input was sought throughout the process in accordance with Federal requirements. The planning process is documented in Section 3.

The area covered by this plan includes the following communities:

Town of Ashland
Charles City County
Chesterfield County
City of Colonial Heights
Dinwiddie County
City of Emporia
Goochland County
Greensville County
Hanover County
Henrico County
City of Hopewell
Town of Jarratt
Town of McKenney
New Kent County
City of Petersburg
Powhatan County
Prince George County
City of Richmond
Town of Stony Creek
Town of Surry
Sussex County
Town of Wakefield
Town of Waverly

1.1 Hazard Identification and Risk Assessment

The Hazard Identification and Risk Assessment (HIRA) serves as the fact base for the regional hazard mitigation plan. The HIRA consists of three parts, found in Section 5:

1. Identification of which hazards could affect the Richmond-Crater region;

2. Profile of hazard events and determination of what areas and community assets are the most vulnerable to damage from these hazards; and,

3. Estimation of losses and prioritization of the potential risks to the community.

For this plan update, hazards in the previous plan were examined and discussed in detail. Several hazards were combined and new hazards were added as a result. A discussion of the impacts of climate change on each hazard, and the social vulnerability of the study area to hazard impacts were added. **Table 1.1** summarizes which hazards were retained and how they were ranked by the planning participants.

Table 1.1: Conclusions on Hazard Risk for Richmond-Crater Region

CRITICAL HAZARD - HIGH RISK	FLOODING SEVERE WIND EVENTS TORNADOES
CRITICAL HAZARD - MODERATE RISK	SEVERE WINTER WEATHER DROUGHTS AND EXTREME HEAT THUNDERSTORMS
NONCRITICAL HAZARD - LOW RISK	WILDFIRES INFECTIOUS DISEASES EARTHQUAKES SHORELINE EROSION FLOODING DUE TO IMPOUNDMENT FAILURE RADON EXPOSURE
NEGLIGIBLE CONSEQUENCES	SINKHOLES LANDSLIDES

1.2 Capability Assessment

The capability assessment (Section 6) evaluates the current capacity of the communities of the Richmond-Crater region to mitigate the effects of the natural

hazards identified in the HIRA. By providing a summary of each jurisdiction's existing capabilities, the capability assessment serves as the foundation for designing an effective hazard mitigation strategy.

The capability assessment includes an examination of the following local government capabilities:

- *Administrative Capability* – describes the forms of government in the region, including the departments that may be involved in hazard mitigation.
- *Technical Capability* – addresses the technical expertise of local government staff.
- *Fiscal Capability* – examines budgets and current funding mechanisms.
- *Policy and Program Capability* – describes past, present, and future mitigation projects in the region and examines existing plans (e.g., emergency operations plan, comprehensive plan).
- *Legal Authority* – describes how jurisdictions in the region use the four broad government powers (i.e., regulation, acquisition, taxation, and spending) to influence hazard mitigation activities.

1.3 Mitigation Strategy

As part of the plan update, the committee examined and evaluated the goals stated in the 2017 plan word for word. Each of the following updated goal statements represents a broad target to achieve through associated objectives which are fulfilled through implementation of specific Mitigation Action Plans, both for the region as a whole and for each community.

Goal 1: Equitably prepare and protect the whole community against natural hazards

1.1 Increase staff capabilities regarding multi-hazard management and mitigation

1.2 Conduct outreach and educational opportunities for diverse groups of citizens

1.3 Share mitigation successes with citizens and stakeholders

1.4 Reduce disparities in how communities prepare for, respond to, and recover from hazards.

Goal 2: Strengthen and develop partnerships for mitigating and reducing hazard impacts

2.1 Include stakeholders and other regions in planning and training actions.

2.2 Expand outreach and educational opportunities to influence and inform a broad spectrum of stakeholders.

2.3 Collaborate on public safety and support effective system redundancies

Goal 3: Encourage sustainable government practices that support the short- and long-term health, safety and welfare of citizens

3.1 Identify and protect important elements of the economic, social, cultural, historic, and environmental fabric of the community and neighborhoods

3.2 Address restoration of long-term housing and continuity of basic government services for affected populations, especially socially vulnerable communities, during recovery from hazard events

Goal 4: Protect critical infrastructure

4.1 Identify opportunities for information- and intelligence-sharing regarding threats and hazards

4.2 Collaborate on utility management and support effective system redundancies

4.3 Identify and assist owners to maintain and upgrade high hazard potential dams, and protect the people and property downstream

Section 7 contains all of the mitigation action plans for each participating jurisdiction and the region, as well as information on how and when the community expects to implement the actions.

1.4 Plan Maintenance Procedures

The plan outlines a procedure for implementation, maintenance, and plan updates. PlanRVA and Crater PDC will be responsible for monitoring this plan. Annual progress reports from the communities will include corrective action plans if needed.

In accordance with Federal Emergency Management Agency (FEMA) regulations, a written update will be submitted to the Commonwealth and FEMA Region III every five years from the original date of the plan, unless circumstances (e.g., Presidential disaster declaration, changing regulations) require a formal update earlier. The public will be continually informed of changes to the plan as they occur.

1.5 Conclusion

This Richmond-Crater Multi-Regional Hazard Mitigation Plan embodies the continued commitment and dedication of the local governments and community members of the Richmond-Crater region to enhance the safety of residents and businesses by taking actions before a disaster strikes. While little can be done to prevent natural hazard events from occurring, the region is poised to minimize the disruption and devastation that so often accompanies these disasters.

2.0 Introduction

2.1 Updates for 2022

Each section of this plan has been broadly updated as part of the 2022 update process. At the beginning of each section, there is a synopsis of the changes made to that section as part of the update.

Section 2 was updated to modify the scope to include all 23 communities participating in this planning process.

2.2 Background

Mitigation is commonly defined as sustained actions taken to reduce or eliminate long-term risk to people and property from hazards and their effects. A mitigation plan states the aspirations and specific courses of action that a community intends to follow to reduce vulnerability and exposure to future hazard events. These plans are formulated through a systematic process centered on the participation of residents, businesses, public officials, and other community stakeholders.

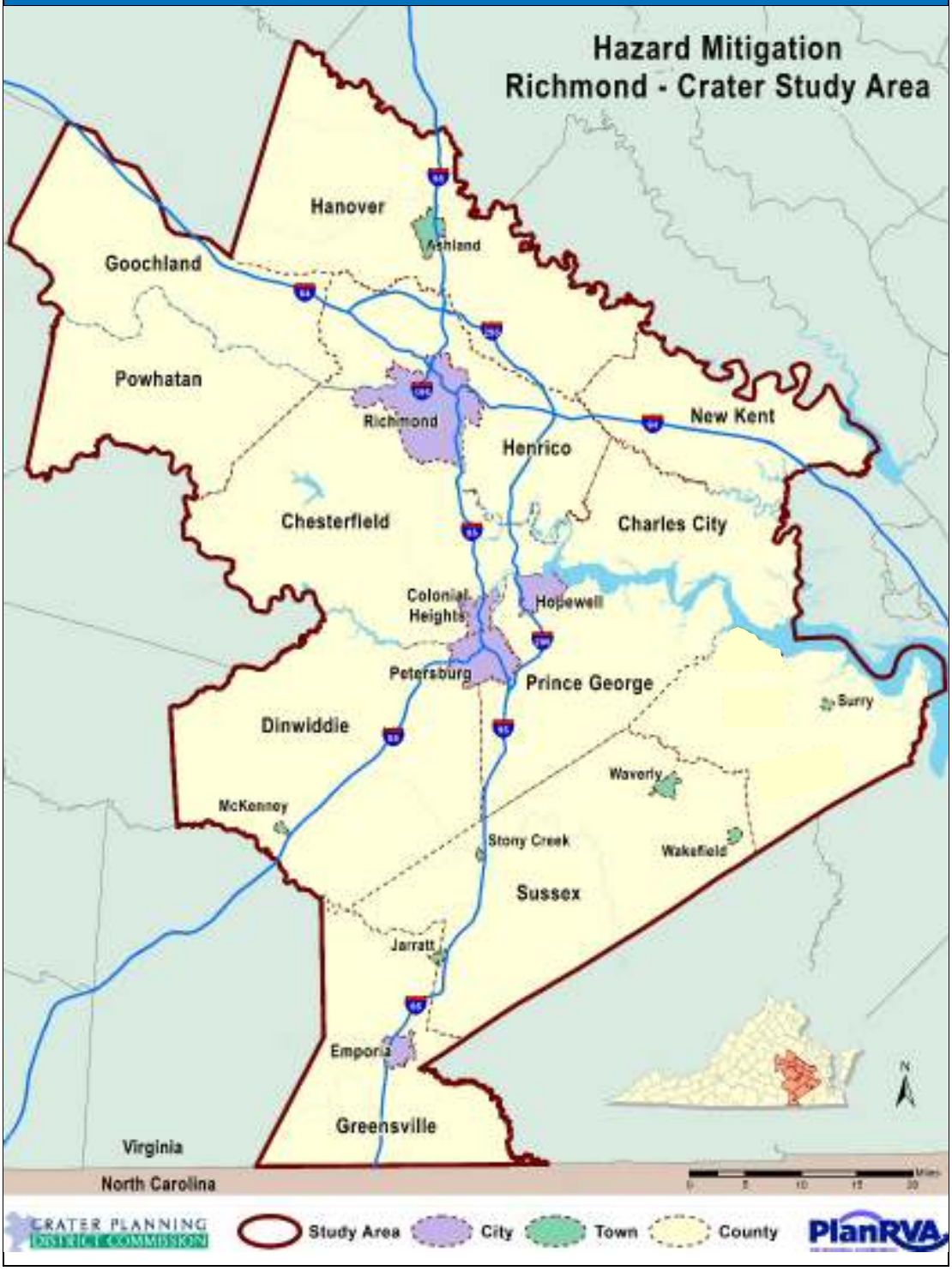
A local mitigation plan is the physical representation of a jurisdiction's commitment to reduce risks from natural hazards. Local officials can refer to the plan in their day-to-day activities and in decisions regarding regulations and ordinances, granting permits, and funding of capital improvements and other community initiatives. Additionally, these local plans will serve as the basis for states to prioritize future grant funding as it becomes available.

The Richmond-Crater Multi-Regional Hazard Mitigation Plan will continue to be a useful tool for all community stakeholders by increasing public awareness about local hazards and risks, and providing information about options and resources available to reduce those risks. Educating the public about potential hazards will help each jurisdiction protect itself against the effects of future hazards, and will enable informed decision-making regarding where to live, purchase property, or locate business.

The area covered by this plan includes the following communities, as shown in **Figure 2.1**:

- Town of Ashland
- Charles City County
- Chesterfield County
- City of Colonial Heights
- Dinwiddie County
- City of Emporia
- Goochland County
- Greensville County
- Hanover County
- Henrico County
- City of Hopewell
- Town of Jarratt
- Town of McKenney
- New Kent County
- City of Petersburg
- Powhatan County
- Prince George County
- City of Richmond
- Town of Stony Creek
- Town of Surry
- Sussex County
- Town of Wakefield
- Town of Waverly

Figure 2.1: Study Area Communities



2021

2.2 The Need for Local Mitigation Planning

On October 30, 2000, President Clinton signed into law the Disaster Mitigation Act of 2000 (DMA 2000), which required state and local mitigation plans that would help to reduce loss of life and property, human suffering, economic disruption, and disaster assistance costs resulting from natural disasters.

DMA 2000 amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act and added a new section to the law, Section 322, Mitigation Planning. Section 322 requires local governments to prepare and adopt jurisdiction-wide hazard mitigation plans for disasters declared after November 1, 2004, as a condition of receiving Hazard Mitigation Grant Program (HMGP) project grants and other non-disaster related mitigation grant assistance programs. Local governments must review and, if necessary, update their mitigation plans every five years from the original date of the plans in order to continue Hazard Mitigation Assistance (HMA) program eligibility.

The requirements for local mitigation plans are found in Section 44 Code of Federal Regulations Part 201.6. FEMA's *Local Multi-Hazard Mitigation* Planning Guidance issued on October 1, 2011 provides updated FEMA interpretation and explanation of local plan mitigation regulations and FEMA's expectations for mitigation plan updates. In addition, the Virginia Department of Emergency Management (VDEM) and FEMA now use the 2021 *Local Mitigation Plan Review Tool* to ensure that a plan meets FEMA's regulatory requirements as well as additional requirements identified by the Commonwealth.

2.3 Organization of the Plan

Section 3.0 – Planning Process defines the process followed throughout the update of this plan, including a description of the Richmond-Crater region's stakeholder involvement and the plan for public involvement.

Section 4.0 – Community Profile provides a physical description and demographic profile of the region, and examines characteristics including geography, hydrology, development patterns, demography, and land use.

Section 5.0 – Hazard Identification, Risk Assessment and Vulnerability Analysis identifies, describes and evaluates the natural hazards likely to affect the Richmond-Crater region, and provides a quantification of the impacts those hazards have on the people, infrastructure and resources of the region.

Section 6.0 – Capability Assessment analyzes the region's and each of the local jurisdictions' policies, programs, plans, resources, and capabilities to reduce exposure to the hazards identified in Section 5.0.

Section 7.0 – Mitigation Strategy addresses the Richmond-Crater region's issues and concerns for hazards by establishing a framework for mitigation activities and policies. The strategy includes updated goals and a range of updated mitigation actions to achieve these goals.

Section 8.0 – Plan Maintenance Procedures specifies how the plan will be monitored, evaluated, and updated.

Appendices are included at the end of the plan, and contain supplemental reference materials, including 2022 resolutions of plan adoption and the 2017 mitigation action status updates.

3.0 Planning Process

3.1 Updates for 2022

Summaries of each meeting and the procedures followed during the update process were updated for each subsection. Summaries of previous planning processes were removed for brevity and because they are available in previous plans.

3.2 Overview of Mitigation Planning

Local hazard mitigation planning involves the process of organizing community resources, identifying and assessing hazard risks, and determining how to minimize or manage those risks. This process results in a hazard mitigation plan that identifies specific actions designed to meet the goals established by those that participate in the planning process. To ensure the functionality of each mitigation action, responsibility is assigned to a specific individual, department or agency along with a schedule for its implementation. Plan maintenance procedures are established to help ensure that the plan is implemented, as well as evaluated and enhanced as necessary. Developing clear plan maintenance procedures helps ensure that the Hazard Mitigation Plan remains a current, dynamic, and effective planning document over time.

Participating in a hazard mitigation planning process can help local officials and residents achieve the following results:

- save lives and property;
- save money;
- speed recovery following disasters;
- reduce future vulnerability and increase future resiliency through wise development and post-disaster recovery and reconstruction;
- enhance coordination within and across neighboring jurisdictions;
- expedite the receipt of pre-disaster and post-disaster grant funding; and
- demonstrate a firm commitment to improving community health and safety.

Mitigation planning is an important tool to produce long-term recurring benefits by breaking the repetitive cycle of disaster loss. A core assumption of hazard mitigation is that pre-disaster investments will significantly reduce the demand for post-disaster assistance by lessening the need for emergency response, repair, recovery, and reconstruction. Furthermore, mitigation practices will enable local residents, businesses, and industries to re-establish themselves in the wake of a disaster, getting the community economy back on track sooner and with less interruption.

The benefits of mitigation planning go beyond reducing hazard vulnerability. Measures such as the acquisition or regulation of land in known hazard areas can help achieve multiple community goals, such as preserving open space, improving water quality, maintaining environmental health, and enhancing recreational opportunities. It is the intent of this document to help identify overlapping community objectives and facilitate the sharing of resources to achieve multiple aims, and to include information wherever possible

to demonstrate when the plan is or has been implemented through other planning mechanisms.

44 CFR Requirement

44 CFR Part 201.6(c)(1): The plan shall include documentation of the planning process used to develop the plan, including how it was prepared, who was involved in the process and how the public was involved.

3.3 Preparing the Plan

The PDCs used FEMA guidance (FEMA Publication Series 386) to develop and update this Hazard Mitigation Plan. A *Local Mitigation Plan Review Tool*, found in Appendix A, provides a detailed summary of FEMA's current minimum standards of acceptability for compliance with DMA 2000 and notes the location where each requirement is met within the Plan. These standards are based upon FEMA's Interim Final Rule as published in the Federal Register on February 26, 2002, and October 31, 2007, in Part 201 of the Code of Federal Regulations (CFR).

The planning process included eight major steps that were completed during 2021 through 2022; they are shown in green and yellow in Figure 2.1. Each of the planning steps illustrated in **Figure 3.1** resulted in work products and outcomes that collectively make up the Hazard Mitigation Plan.

Table 3.1 provides a summary of the National Flood Insurance Program's Community Rating System (CRS) User's Manual 10-step guidance for plan preparation and how that guidance fits within the 10-step, 4-phase process advocated by FEMA. This plan strives to accomplish the steps in each of these processes.

Figure 3.1: Richmond-Crater Hazard Mitigation Planning Process

Table 3.1: Guidance for Hazard Mitigation Plan Preparation	
FEMA Guidance	**CRS Guidance**
Phase I: Organize Resources Step 1. Get Organized Step 2. Plan for Public Involvement Step 3. Coordinate with Other Departments & Agencies	Step 1. Organize Step 2. Involve the Public Step 3. Coordinate
Phase II: Assess Risk Step 4. Identify the Hazards Step 5. Assess the Risks	Step 4. Assess the Hazard Step 5. Assess the Problem
Phase III: Develop Mitigation Plan Step 6: Review Mitigation Alternatives Step 7: Draft an Action Plan Step 8: Set Planning Goals	Step 6. Set Goals Step 7. Review Possible Activities Step 8. Draft an Action Plan
Phase IV: Adopt & Implement Step 9: Adopt the Plan Step 10: Implement the Plan	Step 9. Adopt the Plan Step 10. Implement, Evaluate, Revise

3.4 The Planning Committee

A community-based planning team made up of local government officials and key stakeholders has continually helped guide the development of this Plan. The committee organized local meetings and planning workshops to discuss and complete tasks associated with preparing the Plan, including reviewing plan drafts and providing timely comments. Additional participation and input from residents and other identified stakeholders were sought through public meetings that described the planning process, the findings of the risk assessment, and the proposed mitigation actions. The committee convened in 2021.

3.4.1 Richmond-Crater Planning Committee

Due to the large geographic area covered and the number of communities participating, the project leaders felt that a Steering Committee was necessary to help more efficiently guide the planning process and facilitate the numerous Working Group members. Thus, the representatives for the communities and stakeholders were divided into a primary Steering Committee and a Working Group. The division was based on discussions with potential committee members from each community and stakeholders and a determination as to which members were most willing to commit themselves to the entire process, to do the majority of the work, to debate goals and objectives and discuss alternatives, and to report back to their constituencies and Working Group members. The participants listed in **Table 3.2a** are the Steering Committee and **Table 3.2b** shows the Working Group members for the 2022 Richmond-Crater Hazard Mitigation Plan Update. Names marked with an asterisk indicate the lead person responsible for that community in the planning, update and maintenance process. Specifically, the tasks assigned to the Steering Committee members included:

- participate in mitigation planning meetings and workshops;

- provide best available data as required for the risk assessment portion of the Plan;
- provide copies of any mitigation or hazard-related documents for review and incorporation into the Plan;
- support the development of the Mitigation Strategy, including the design and adoption of community goals and objectives;
- help design and propose appropriate mitigation actions for incorporation into the Mitigation Action Plan;
- review and provide timely comments on all study findings and draft components of the plan; and
- support the adoption of the Hazard Mitigation Plan by community leaders.

The Working Group includes the Steering Committee members. Working Group members were provided the opportunity and invitation to participate in workshops and public meetings, asked for best available data, asked to review and comment on plan elements, and relied upon to ensure successful adoption of the plan in their community. In many cases, the Working Groups for individual communities also met outside of the more official planning process in additional meetings facilitated by Steering Committee members. Additional participation and input from other identified community staff and stakeholders was sought by the Steering Committee during the planning process primarily through e-mails and phone calls. Stakeholder involvement is discussed in more detail later in this section.

Table 3.2a: Hazard Mitigation Planning Steering Committee Members

Name and Title	Community and Agency	Expertise
Troy Aronhalt, Acting Major	Town of Ashland Police Department	Emergency Management/Public Information
*Nora Green Amos, Director	Town of Ashland, Planning & Community Development	Planning/Preventive Measures, Property Protection, Resiliency, Natural Resource Protection
Christopher A. Workman, FPA/Environmental Engineer	Chesterfield County Environmental Engineering	Structural Flood Control Projects, Property Protection, Planning/Preventive Measures
*Jessica Robison, Emergency Management Coordinator	Chesterfield County, Emergency Management	Emergency Management/Public Information
*Tim Blumenschine, Emergency Manager	City of Colonial Heights, Fire & EMS	Emergency Management/Public Information

Table 3.2a: Hazard Mitigation Planning Steering Committee Members		
Name and Title	**Community and Agency**	**Expertise**
*John Woodburn, Environmental Manager	Goochland County, Dept of Public Utilities	Planning/Preventive Measures, Property Protection, Resiliency, Natural Resource Protection
*Corey Beazley, Deputy Coordinator	Hanover County, Fire-EMS Department	Emergency Management/Public Information
Gregory Martin, Battalion Chief	Hanover County, Fire-EMS Department	Emergency Management/Public Information
Danielle Curtis, Engineering Technician (Floodplain)	Henrico County, Public Works	Planning/Preventive Measures, Property Protection, Resiliency, Natural Resource Protection
*Kristin Owen, Floodplain & Dam Safety Manager	Henrico County, Public Works	Planning/Preventive Measures, Property Protection, Resiliency, Natural Resource Protection
*Kate Hale, Deputy Emergency Management Coordinator	New Kent County, Emergency Management	Emergency Management/Public Information
Joshua Airaghi, Director	New Kent County, Environmental Dept	Planning/Preventive Measures, Property Protection, Resiliency, Natural Resource Protection
*Darryl Walker, Manager	City of Petersburg, Stormwater Program	Structural Flood Control Projects, Property Protection
*Frank Hopkins, FPA/Planning Director	Powhatan County, Planning	Planning/Preventive Measures, Property Protection, Resiliency, Natural Resource Protection
*Brianne Fisher, Coordinator	City of Richmond, Office of Sustainability	Planning/Preventive Measures, Property Protection, Resiliency
Surani Olsen, Manager & CRS Coordinator	City of Richmond, Water Resources	Planning/Preventive Measures, Property Protection, Resiliency, Natural Resource Protection
*Michael Poarch, County Planner	Sussex County, Planning	Planning/Preventive Measures, Property Protection, Resiliency, Natural Resource Protection
Kathryn Tolliver, Government Operations Liaison	American Red Cross, Stakeholder	Emergency Management/Public Information
Michael Tolliver, Government Operations Liaison	American Red Cross, Stakeholder	Emergency Management/Public Information
Dana Adkins, Tribal Environmental Director	Chickahominy Indian Tribe, Stakeholder	Natural Resource Protection
Jay Ruffa, Director of Planning	Crater PDC, Stakeholder	Planning/Preventive Measures, Property Protection, Resiliency, Natural Resource Protection

Table 3.2a: Hazard Mitigation Planning Steering Committee Members		
Name and Title	**Community and Agency**	**Expertise**
Heather Barrar, Regional Trails Program Director	FOLAR, Stakeholder	Natural Resource Protection
Warren Taylor, Natural Resource Manager	Pamunkey Indian Tribe, Stakeholder	Natural Resource Protection
Sarah Stewart, Program Manager - Environmental Program	PlanRVA, Stakeholder	Planning/Preventive Measures, Property Protection, Resiliency, Natural Resource Protection
Katie Moody, Emergency Management Program Coordinator	PlanRVA, Stakeholder	Emergency Management/Public Information
Rebekah Cazares, Planner	PlanRVA, Stakeholder	Planning/Preventive Measures, Property Protection, Resiliency, Natural Resource Protection
Leigh Chapman, President	Salter's Creek Consulting, Inc., Stakeholder	Planning/Preventive Measures, Property Protection, Resiliency, Natural Resource Protection
Tony Williams, Mobility Manager	Senior Connections, Stakeholder	Emergency Management/Public Information
Anne Witt, Geohazards Geologist	Va Dept. of Energy, Stakeholder	Natural Resource Protection
Alanna Ostrowski, Forest Technician	Va Dept. of Forestry, Stakeholder	Natural Resource Protection
Jeremey Falkenau, Senior Area Forester	Va Dept. of Forestry, Stakeholder	Natural Resource Protection
Mark Killgore, Lead Dam Safety Engineer	Va Dept. of Conservation & Recreation, Dam Safety, Stakeholder	Structural Flood Control Projects, Property Protection
Angela Davis, NFIP State Coordinator & Floodplain Program Planner	Va Dept. of Conservation & Recreation, Floodplain Management, Stakeholder	Planning/Preventive Measures, Property Protection, Resiliency, Natural Resource Protection
Amanda Weaver, All Hazards Planner	Va Dept. of Emergency Management Region 1, Stakeholder	Emergency Management/Public Information
Nicole Mueller, Planning Specialist	Va. Dept. of Transportation, Stakeholder	Structural Flood Control Projects, Property Protection
Jim Kaste, Professor	College of William & Mary, Stakeholder	Natural Resource Protection
David Stroud, Emergency & Hazard Mitigation Lead	Wood, Stakeholder	Planning/Preventive Measures, Property Protection, Resiliency, Natural Resource Protection

* Lead person responsible for that community in the planning, update and maintenance process outlined in Section 8.

Table 3.2b: Hazard Mitigation Planning Working Group Members		
Name and Title	**Community and Agency**	**Expertise**
*Rhonda Russell, Asst County Administrator	Charles City County	Planning/Preventive Measures, Property Protection, Resiliency, Natural Resource Protection
Steven Herring, Public Outreach & CERT Coord	Chesterfield County Fire & EMS	Emergency Management/Public Information
Darshan Parikh, Deputy Emergency Mgmt Coordinator	Chesterfield County Emergency Management	Emergency Management/Public Information
Janet Llewellyn, Planning Manager	Chesterfield County Parks & Recreation	Natural Resources Protection
Kimberly Conley, Asst Director	Chesterfield County Citizen Information and Resources	Public Information
Susan Pollard, Public Information Officer	Chesterfield County, Communications & Media	Public Information
Rachel Chieppa, Senior Planner	Chesterfield County, Planning & Community Development	Planning/Preventive Measures, Property Protection, Resiliency, Natural Resource Protection
David Kissner, Deputy Fire Chief	Colonial Heights Fire & EMS	Emergency Management/Public Information
Doug Smith, City Manager	Colonial Heights	Emergency Management/Public Information
Brandy Payne, Assistant Director	Colonial Heights, Planning & Community Development	Planning/Preventive Measures, Property Protection, Resiliency, Natural Resource Protection
*Kevin Kiddy, Emergency Manager	Colonial Heights, Emergency Mgmt	Emergency Management/Public Information
Kevin Massengill, County Administrator	Dinwiddie County	Emergency Management/Public Information
*Dennis Hale, Division Chief	Dinwiddie County, Fire & EMS	Emergency Management/Public Information
Morgan Ingram, Director	Dinwiddie County, Economic Development	Planning/Preventive Measures
Tammie Collins, Deputy County Administrator	Dinwiddie County	Planning/Preventive Measures, Property Protection, Resiliency, Natural Resource Protection
*Michael Rae, Emergency Services Coordinator	Emporia, Emergency Management	Emergency Management/Public Information
Paul Drumwright, Administrative Services Manager	Goochland County Administration	Public Information
Robin Hillman, Deputy Emergency Services Coordinator	Goochland County	Emergency Management/Public Information
Amanda Huskey, GIS Manager	Greensville County, Geographic Information Systems	Public Information

Table 3.2b: Hazard Mitigation Planning Working Group Members		
Name and Title	**Community and Agency**	**Expertise**
*Lin Pope, Planning Director/Zoning Official	Greensville County, Planning & Community Development	Planning/Preventive Measures, Property Protection, Resiliency, Natural Resource Protection
Mike Flagg, Director	Hanover County, Public Works	Structural Flood Control Projects, Property Protection
Brendan McHugh, Planner	Hanover County, Planning	Planning/Preventive Measures, Property Protection, Resiliency, Natural Resource Protection
Randy Hardman, Deputy Director	Hanover County, Public Works	Structural Flood Control Projects, Property Protection
Michael Dieter, Engineering Manager	Hanover County, Public Works	Structural Flood Control Projects, Property Protection
Alex Mease, Civil Engineer	Hanover County, Public Works	Structural Flood Control Projects, Property Protection
Courtney Cornell, Information Technology System Engineer	Hanover County, Information Technology	Public Information
Bill Rose, Manager	Hanover County, Information Technology	Public Information
Donald Lee, Deputy Director	Hanover County, General Services	Planning/Preventive Measures, Property Protection
Tom Harris, Public Information Officer	Hanover County	Public Information
Ben Felton, Project Engineer	Henrico County, Dept of Public Works	Structural Flood Control Projects, Property Protection
Rob Rowley, Chief	Henrico County, Emergency Mgmt & Workplace Safety	Emergency Management, Public Information
Jen Cobb, Director	Henrico County, Engineering & Environmental Services Director	Natural Resource Protection
Tevya W. Griffin, Director	Hopewell, Dept of Development	Planning/Preventive Measures, Property Protection, Resiliency
Robert Williams, Emergency Services Specialist	Hopewell Bureau of Fire	Emergency Management/Public Information
*Ben Ruppert, Emergency Services Coordinator	Hopewell, Office of Emergency Mgmt	Emergency Management/Public Information
Chris Ward, Senior Planner	Hopewell, Development Department	Planning/Preventive Measures, Property Protection, Resiliency
Reginald Tabor, Director	Petersburg, Planning	Planning/Preventive Measures, Property Protection, Resiliency, Natural Resource Protection
Joanne Williams, Public Information Officer	Petersburg	Public Information
Cynthia Boone, Project Manager	Petersburg, Economic Development	Planning/Preventive Measures, Property Protection

Table 3.2b: Hazard Mitigation Planning Working Group Members		
Name and Title	**Community and Agency**	**Expertise**
Curt Nellis, Asst Emergency Mgmt Coordinator	Powhatan County, Emergency Management	Emergency Management/Public Information
*Donald Hunter, Deputy Emergency Mgmt Coordinator	Prince George County, Emergency Management	Emergency Management/Public Information
Tim Graves, Planner	Prince George County Planning & Zoning	Planning/Preventive Measures, Property Protection, Resiliency
Jeff Stoke, County Administrator	Prince George County	Public Information
Julie Walton, Director	Prince George County, Community Development	Planning/Preventive Measures, Property Protection, Resiliency, Natural Resource Protection
Dave Alley, Acting Building Commissioner	Richmond, Permits & Inspections	Planning/Preventive Measures, Property Protection, Resiliency
Bill Lawson, Deputy Emergency Coordinator	Richmond, Office of Emergency Management	Emergency Management/Public Information
Reid Foster, Public Safety Coordinator	Sussex County, Public Safety Department	Emergency Management/Public Information
Beverly Walkup, Director	Sussex County, Planning	Planning/Preventive Measures, Property Protection, Resiliency, Natural Resource Protection
Richard Douglas, Administrator	Sussex County	Planning/Preventive Measures, Property Protection, Resiliency, Natural Resource Protection
*Bennie Savedge, Mayor	Town of Surry	Public Information
Molly Rickmond, Town Clerk	Town of Surry	Public Information
*Melanie Willson, Mayor	Town of Jarrett	Public Information
*Meagan S. Haire Abby, Mayor	Town of McKenney	Public Information
Martha Stone, Clerk of Council	Town of McKenney	Public Information
*Brian Laine, Mayor	Town of Wakefield	Public Information
Anne Monahan, Town Clerk	Town of Wakefield	Public Information
*Angela McPhaul, Mayor	Town of Waverly	Public Information
*Franklin Jackson, Mayor	Town of Stony Creek	Public Information
Marsha Bishop, Town Clerk	Town of Stony Creek	Public Information

Table 3.2b: Hazard Mitigation Planning Working Group Members		
Name and Title	**Community and Agency**	**Expertise**
John Fitzgerald, Fire Chief	Capital Region Airport Commission	Planning/Preventive Measures, Property Protection
Ron Svejkovsky, MPO Director	Crater PDC - TCAMPO	Planning/Preventive Measures, Property Protection
Rashaunda Lanier-Jackson, Community Engagement Manager	PlanRVA	Public Information
Michelle Hamor, Chief of Planning and Policy Branch	USACE, Norfolk	Planning/Preventive Measures, Property Protection, Resiliency, Structural Flood Control Projects
John Highsman, Forester	VA Dept of Forestry	Natural Resource Protection
Heather Dowling, Senior Area Forester	VA Dept of Forestry	Natural Resource Protection
Brandy Buford, Floodplain Program Planner	VaDCR, Floodplain Management	Planning/Preventive Measures, Property Protection, Resiliency, Natural Resource Protection
Michael Barber, Floodplain Program Planner	VaDCR, Floodplain Management	Planning/Preventive Measures, Property Protection, Resiliency, Natural Resource Protection
Tiffany Dubinsky, Statewide Transit Planning Manager	Va Dept of Rail & Public Transportation	Emergency Management/Public Information

* Lead person responsible for that community in the planning, update and maintenance process outlined in Section 8.

3.5 2021/2022 Community Meetings and Workshops

Below is a summary of the key meetings and community workshops during the 2021/2022 update process. Routine discussions and additional meetings were held by local officials to accomplish planning tasks specific to their department or agency. A consultant (Salter's Creek Consulting, Inc., of Hampton, Virginia) was hired with grant funds to update the hazard identification and vulnerability analysis, to guide the committee through the planning process based on the revised information and to assist each community with adoption of the final plan. All meeting summary information is included in Appendix C, which includes committee and public meeting minutes, attendance sheets, and correspondence with committee members and stakeholders.

NOVEMBER 20, 2021: PROJECT KICKOFF MEETING

Participants in the Kickoff Meeting discussed the overall approach to updating the Hazard Mitigation Plan, including strategies for outreach and public participation, as well as the

steps necessary to meet the requirements of the DMA 2000, and the CRS of the National Flood Insurance Program (NFIP). The consultant initiated data collection efforts at the meeting and reviewed the existing list of hazards with the representatives present.

The group discussed project schedule and potential stakeholders and how they would be asked to participate, including tasks such as: reviewing drafts, participating on the committee, and/or attending public meetings. Due to the ongoing COVID 19 safety protocols in place at the time , the group and the consultant decided that each of the main three meetings would be held virtually through online meeting software. Committee meetings would be held virtually, as well.

JUNE 21, 2021: FIRST PLANNING COMMITTEE MEETING

The consultant provided an overview of the proposed update approach to committee members. The Committee reviewed the Hazard Identification and Vulnerability Assessment information presented. Committee members discussed the hazards of most critical concern to the region, and concurred to adjust the names of several hazards, removed several hazards and added hazards.

The committee members present voted on their mitigation priorities and ranked hazards using the methodology described in Section 5. The committee considered a list of hazards that included flooding, coastal and tropical storms, severe thunderstorm/hail/lightning, winter weather/storms, drought, high hazard dam failure, tornado, extreme heat, earthquake, wildfire, coastal erosion/landslides/sinkholes, radon exposure and pandemic flu.

The first part of the meeting focused on the flood analysis, including the hybrid modeling analysis conducted. Participants discussed their frustration with obtaining NFIP repetitive flood loss data and the inability to know flood insurance coverage happening in private flood insurance market. The group discussed nomenclature for Infectious Disease or Pandemic Flu.

OCTOBER 15, 2021: SECOND PLANNING COMMITTEE MEETING

The second Planning Committee meeting was the beginning of the "Mitigation Strategy Workshops." The meeting began with a presentation on how a complete capability assessment contributes to identification of effective mitigation strategies. The discussion focused on local capabilities and the capability matrix each community was asked to complete.

The consultant helped Committee members review several documents in preparation for the goal setting exercise which was the focus of the workshop. This background helped Committee members maintain continuity and to develop linkages between various local, regional, and state planning efforts.

Data, documents, plans and procedures reviewed as part of the goal setting portion of the planning process included, but were not limited to, the following:

- 2018 *Commonwealth of Virginia Hazard Mitigation Plan* goals and objectives;
    - These items were reviewed by committee members prior to the work on updating the goals and objectives to help ensure that the regional plan supports and does not contradict the State's goals and objectives.
- Goals and objectives from Virginia Beach Resiliency planning effort;
- Goals and objectives from the *Virginia Coastal Resilience Master Planning Framework*, 2020;
- Draft goals and objectives from the 2022 *Hampton Roads Hazard Mitigation Plan* update going on concurrently;
- Goals and objectives from the 2016 *Middle Peninsula Hazard Mitigation Plan;*
- Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards, FEMA January 2013;
- Each of the existing plan's three primary goals and related objectives; and
- Dam safety reports for state-regulated dams, state dam safety regulations and interviews with dam safety officials at the Virginia Department of Conservation and Recreation (DCR).

The group was provided a list of potential, broad community goal key phrases extracted from the existing plans in order to encourage brainstorming about revising the goal statements. The members also reviewed existing goal statements from the current plan and other plans pertinent to the region. The group then went to work carefully reviewing the existing mitigation plan goal statements. Participants were encouraged to critique each word in light of the goal key words identified earlier and any changes that had taken place in their communities in the previous five years. The facilitator provided early recommendations, reworked, grouped together, and then presented the revised goals and objectives in real time during the meeting so that the group could arrive at a consensus on the broader mitigation goals and objectives associated with the updated mitigation plan. Detailed notes on the reasoning behind why the mitigation goals and objectives were modified is included in Section 7, which shows the changes and the revised goals and objectives.

The group discussed the current status of COVID 19 protocols and the ability to meet in person for the third workshop. Those present preferred a hybrid approach for Workshop #3 and the development of new and revised mitigation actions for 2022. The consultant proposed a virtual group workshop that would discuss the types of mitigation actions and provide examples and some suggested reading materials, followed by a series of in-person working group meetings, termed "office hours" at three locations in the study area to facilitate review, revision and development of each community's existing mitigation actions.

NOVEMBER 23, 2021: THIRD MITIGATION PLANNING COMMITTEE MEETING

The group reviewed a general list of potential mitigation actions categorized by type and the consultant provided examples, both local and national, of various successful mitigation actions. A brief discussion of the various categories followed. The consultant discussed a variety of mitigation categories for considering and evaluating possible mitigation action alternatives appropriate to each community. Suggested reading materials for the group included:

Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards, FEMA 2013;

Mitigation Best Practices – FEMA web site;

Mitigation Success Stories, Association of State Floodplain Managers, 2002;

Mitigation Matters: Policy Solutions to Reduce Local Flood Risk, Pew Charitable Trusts web site;

Zoning for Coastal Flood Resiliency, New York City Planning;

Mitigation Action Portfolio, FEMA web site;

Buoyant City: Historic District Resiliency & Adaptation Guidelines, Miami Beach, 2020; and

Coastal Flood Resilience Design Guidelines, Boston Planning & Development Agency, 2019.

The consultant then facilitated a discussion on regional mitigation actions from the 2017 plan and made real-time edits to those actions. The group also discussed the addition of several proposed, new regional mitigation actions regarding: NFIP repetitive flood loss data analysis at the state or regional level and preparation of repetitive flood loss area analyses; use of radon test kits to test structures; verifying status of significant hazard dams region-wide; and, strengthening/creating transportation networks for evacuation; and partnering with private companies on critical lifeline continuity.

COMMUNITY-SPECIFIC WORKING GROUP MEETINGS

All communities were invited by email to schedule a one-on-one meeting with the consultant toward the end of the planning process. Most of the communities involved in the plan took advantage of consultant-facilitated brief, in-person meetings at the community level to discuss their final Mitigation Action Plan. Participants worked carefully through a review of the list of existing mitigation actions from their existing plan, deciding which actions to modify or delete based on their progress toward completion. The group then selected and discussed priorities for several new proposed actions provided by the consultant.

The consultant shared additional review notes on several items that varied by community, and that typically included:

- comprehensive plan, resilience plan and strategic plan review notes;

- floodplain management regulation review notes;
- capabilities or capability gaps noted over the course of the planning process;
- repetitive loss area maps (hard copies provided during the meeting);
- community-specific critical facility vulnerabilities as shown in the HIRA, and as discussed in the First Planning Committee Meeting; and
- other pertinent materials such as news clippings.

While previous plans have benefitted from the synergies of having all communities attend a large workshop to address the MAP revisions and share mitigation ideas, COVID 19 protocols in 2021 required a revised methodology to allow some one-on-one discussion of mitigation actions, but to limit the number of people convened at any one time. The meetings were held over the course of several days in December 2021. On Monday December 6, Hanover County, Ashland and Henrico County representatives met at the Hanover ECC Training Room. On Tuesday, December 7, representatives of Powhatan County, Richmond, Sussex County and Goochland County met in the PlanRVA Conference Room. On December 10, representatives of Dinwiddie County, Colonial Heights, Prince George County, Hopewell, Charles City County and New Kent County met in the Crater PDC conference room, and a representative from Friends of the Lower Appomattox River (FOLAR) also met with the contractor separately. The contractor also met virtually with Chesterfield County on December 9. Attendance for each community was as follows:

Hanover County	Courtney Cornell
	Bill Rose
	Donald Lee
	Tom Harris
	Gregory Martin
Ashland	Troy Arnholt
	Nora Amos
	Corey Beazley
Henrico County	Ben Felton
	Kristin Owen
	Rob Rowley
Powhatan County	Curt Nellis
Richmond	Surani Olsen
	Brianne Fisher
	Bill Lawson
Sussex County	Beverly Walkup
	Michael Poarch
Goochland County	John Woodburn
Dinwiddie County	Dennis Hale
	Morgan Ingram

	Tammie Collins
Colonial Heights	Tim Blumenschine
	Brandi Payne
	Kevin Kiddy
	David Kissner
FOLAR	Heather Barrar
Prince George County	Donald Hunter
	Tim Graves
Hopewell	Chris Ward
	Benjamin Ruppert
	Robert Williams
Charles City County	Rhonda Russell
New Kent County	Kate Hale
Chesterfield County	Jess Robison
	Chris Workman
	Rachel Chieppa

In addition, the consultant met virtually with the Mayor of Stony Creek, Frank Jackson, on February 9, 2022, to discuss the town's risk and vulnerability and to brainstorm mitigation actions to address that risk. Several new mitigation actions were developed for the town as a result of this extended conversation.

Initial participation by the communities of Greensville County, Jarratt, McKenney, Surry, Wakefield and Waverly was less than preferred; thus, the planning team checked several times throughout the process to confirm that the communities were all on the email list notifying them of all meetings and planning opportunities. Finally, in June 2022, planners reached out by phone to each community and requested their review of pertinent information in the plan and approval to move forward with the mitigation actions as described. The following communication log documents these phone calls and emails by Jay Ruffa from the Crater PDC:

Town of McKenney: June 7 and 8 email communications with Mayor Meagan Haire Abby confirmed that McKenny is working with Dennis Hale from Dinwiddie County and that they have depended on him to relay and approve information on their behalf.

Town of Surry: On June 9, 2022, Mr. Ruffa spoke with Town Clerk and confirmed that the town worked with Ray Phelps from Surry County on reviewing their actions. Clerk indicated that Mitigation Action 2 is OK, but stated that in regard to mitigation action 1, they really have no flood prone property or structures because they are not in the floodplain. However, the rest of the mitigation strategy sounded adequate. Consultant suggested keeping mitigation action 1 because flood damage can and does occur outside the 100-year mapped floodplain, and retaining the action helps provide financial resources should that type of flooding occur.

Town of Jarrett – June 9, 2022, Town Clerk returned his call and indicated they will have Mayor contact Mr. Ruffa this week. No additional contact to date.

Town of Wakefield - June 8, 2022 – Mr. Ruffa spoke with the Town Clerk and indicated they will get us a response by Monday June 13 at the latest.

Town of Waverly - June 8, 2022 – Mr. Ruffa spoke with Town Clerk. Mr. Ruffa resent actions to Town Clerk and the Mayor. On June 10, 2022, he spoke with the Mayor and she indicated approval of the mitigation actions and invited Mr. Ruffa to come to the August 9th meeting for expected adoption of the plan.

Greensville County – February 10, 2022 and July 18, 2022 – Written correspondence from Linwood E. Pope, Jr., Director of Planning, via email, and E. Lynn Parker, Greensville County Emergency Services Coordinator, via letter, indicated that County personnel had reviewed and approved the plan components and had no further comments or issues with the mitigation action plan in the February 2022 draft. Those written correspondence are provided in Appendix C.

44 CFR Requirement

Part 201.6(b)(1): The planning process shall include an opportunity for the public to comment on the plan during the drafting stage and prior to plan approval.

3.6 Involving the Public

Individual resident involvement provides the planning committee with a greater understanding of local concerns and increases mitigation success by developing community "buy-in" from those directly affected by public policy and planning decisions. As residents become more involved in decisions that affect their life and safety, they are more likely to gain appreciation of the natural hazards present in their community and take personal steps to reduce hazard impacts. Public awareness is a key component of an overall mitigation strategy aimed at making a home, neighborhood, school, business or city safer from the effects of natural hazards.

Public input was initially sought using three primary methods: (1) open public meetings advertised locally; (2) broadly-distributed public survey; and, (3) the posting of the draft Hazard Mitigation Plan on each PDC's web site. Public meetings were held at three stages of the planning process; early in the process to introduce the plan update process, again in the middle stage to share results of the Hazard Identification and Risk Assessment; and again, after the planning committee workshops, but well prior to adoption by governing bodies.

3.6.1 2021/2022 Public Meetings

Three open public meetings were held virtually via Zoom to present the planning process and to review mitigation actions to be included in the Hazard Mitigation Plan.

The first public meeting was held March 9, 2021. The goal was to introduce the public to the planning process and invite their involvement. The group discussed the hazards in the 2017 plan and provided comments on hazards proposed to be included in the update. The facilitator polled the group about their concerns regarding various hazards and provided a question and answer session at the end.

Upon completion of the Hazard Identification and Risk Assessment, the Committee held another open, virtual public meeting on June 28, 2021. This meeting included review of the results of the hazard study for the region, including detailed information regarding exposure, risk assessment and social vulnerability.

Upon completion of a draft Plan, the Committee held another public meeting on the draft Hazard Mitigation Plan on March 16, 2022. The meeting provided further opportunity for the public and identified stakeholders to review and comment on the draft plan. The plan was posted on the PDC web sites earlier that week, and PDC contact information and a comment form were provided to assist the public with submitting comments. The 2-week review period concurrent with the March 16, 2022 meeting provided residents with an opportunity to review the content of the Plan's sections.

All public meetings were advertised broadly by the communities on social media, on physical bulletin boards, and via email to help ensure that local officials, residents, businesses, and other public and private interests in the region, including neighboring communities, were notified on how to be involved in the local mitigation planning process. Additionally, the PDCs and the communities advertised the meetings on their web sites. The public meeting advertisements are included in Appendix C, which also includes all committee and public meeting minutes, attendance sheets, and invitation correspondence.

The public meeting on March 16, 2022 was termed the "Feedback Forum" in an effort to solicit public comment and feedback on the draft plan. Once again, the committee relied on the efforts of multiple community Public Information Officers, web masters, and other communication specialists to use a variety of sources to spread the word about the planning effort. Records of advertisements and solicitations for involvement are included in Appendix C (meeting minutes), Appendix D (public survey response summaries), and Appendix E (responses to public comments).

Additionally, the plan was reviewed and presented to each community's elected officials at a public hearing prior to adoption. Though the plan was in its final format for these meetings, this did provide additional opportunity to answer questions and present findings to the public and elected officials. The resolution of adoption by each community is included in Appendix B. Adoption dates are shown in **Table 3.3**.

Table 3.3: Date of Plan Adoption by Each Jurisdiction	
Community	**Date of Plan Adoption**
Charles City County	November 22, 2022
Chesterfield County	August 24, 2022
City of Colonial Heights	September 13, 2022
Dinwiddie County	August 16, 2022
Town of McKenney	August 11, 2022
City of Emporia	May 16, 2023
Goochland County	September 6, 2022
Greensville County	Not adopted by date of publication
Town of Jarratt	August 9, 2022
Hanover County	September 14, 2022
Town of Ashland	August 16, 2022
Henrico County	October 25, 2022
City of Hopewell	September 27, 2022
New Kent County	October 11, 2022
City of Petersburg	February 21, 2023
Powhatan County	August 22, 2022
Prince George County	August 9, 2022
City of Richmond	October 10, 2022
Town of Surry	February 14, 2023
Sussex County	August 18, 2022
Town of Stony Creek	Not adopted by date of publication
Town of Wakefield	August 8, 2022
Town of Waverly	September 20, 2022

3.6.2 Public Survey

A public survey was distributed early in the planning process to solicit additional feedback from attendees. As indicated above, the public survey was also distributed online in spring 2021 as part of the committee's effort to improve and use public feedback. The results of a total 192 responses collected are summarized in Appendix D.

3.6.3 PlanRVA Web Site

Throughout the planning process, PlanRVA maintained a web site at https://planrva.org/emergency-management-home/the-alliance/hazard-mitigation/ that provided a description of the planning process and posted meeting information. The page included a copy of the draft plan prior to the final Public Meeting to provide the public an opportunity to comment. Those comments are addressed through the standard comment/response format documented in Appendix E. Crater PDC linked to the PlanRVA web site from their web site during the planning process.

3.6.4 Better Together Webinar

On October 21, 2021, PlanRVA used one of their regular "Better Together" webinar series to focus on the 2022 update to the regional hazard mitigation plan. Each month, PlanRVA hosts one of these public forums with a different theme, hosted by experts in that particular topic or field of investigation. The organization invites the public, as well as a variety of public officials, agency representatives and stakeholders to listen in and ask questions to foster discussion, and then posts the forums on their YouTube channel for posterity. The October 2021 webinar is posted online at: https://www.youtube.com/watch?v=XS-H2ph9Hnc.

3.6.5 Brochure

In addition to the public meetings, web site and survey, the Committee issued a brochure template that was distributed by many of the jurisdictions, primarily via social media and web postings on their respective web sites. The brochure template is shown in Figure 3.2 below and provides background information on the planning process, the Community Rating System, and how citizens can become involved. The blank lines are intended for individual jurisdictions to input contact information for their staff point of contact.

Figure 3.2: Richmond-Crater Hazard Mitigation Planning Brochure

2022 Richmond-Crater Regional Hazard Mitigation Plan Update Process

Hazard Mitigation Planning

A Hazard Mitigation Plan is the result of a planning process to identify hazards and develop strategies to reduce loss of life and property. This planning process is structured around the four phases of the Disaster Mitigation Act of 2000, which the region's planning consultant has aligned with the ten steps of the Community Rating System (CRS). Having an adopted Hazard Mitigation Plan that is updated every five years helps ensure each community in the region is eligible for federal disaster funding following a disaster event.

The Community Rating System (CRS)

The CRS is a national program developed by the Federal Emergency Management Agency (FEMA) to encourage communities to reduce their risk to flood-related hazards. The CRS rewards the efforts communities take that go above and beyond the minimum requirements of the National Flood Insurance Program (NFIP) by providing discounts on flood insurance premiums.

Phase 1
1. Organize Planning Team
2. Plan for Public Involvement
3. Coordinate with Other Agencies

Phase 2
4. Identify the Hazards
5. Estimate Losses

Phase 3
6. Identify Goals & Objectives
7. Develop Potential Mitigation Actions
8. Draft the Mitigation Plan

Phase 4
9. Adopt the Plan
10. Implement and Maintain the Plan

Citizen Involvement

Citizen participation is an important component of mitigation planning for any community. The planning team needs your input on the types of hazards that are your priority concern, and your opinion on ways to lessen their impact.

Hazards Addressed by the Richmond-Crater Hazard Mitigation Plan

The planning committee has identified the following hazards for inclusion in the Richmond-Crater Hazard Mitigation Plan:

- Tropical Storms
- Severe Wind
- Tornados
- Severe Thunderstorms
- Flooding
- Winter Weather
- Drought
- Wildfire
- Earthquake
- Geological Events
- Pandemic

- Visit the web site. Get more information and follow the planning process at https://planrva.org/emergency-management-home/the-alliance/hazard-mitigation/. The website contains announcements for upcoming meetings, minutes and presentations from past planning meetings, information on the identified hazards, draft planning documents for review, a public survey, and more.

- Take the survey. A public outreach survey is available online here. Please complete the survey as soon as possible to ensure that your opinion is captured! If you would like a hard copy, please use the email below.

- Send us information or comments. If you have information to share for inclusion in the plan, please contact our planning consultants, Salter's Creek Consulting, by email: leigh.morgan2@verizon.net. The draft plan will be made available for public review on the web site prior to being submitted to FEMA.

3.7 Involving Stakeholders

44 CFR Requirement

Part 201.6(b)(2): The planning process shall include an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process.

A range of stakeholders, including neighboring communities, agencies, businesses, academia, nonprofits, hospitals, and other interested parties were invited and encouraged to participate in the development of the Hazard Mitigation Plan. Stakeholder involvement was encouraged through notifications and invitations to agencies or individuals to participate in Planning Committee meetings, the Mitigation Strategy Workshops and document review.

In addition to the Planning Committee meetings, the committee encouraged open and widespread participation in the mitigation planning process through the design and publication of advertisements that promoted the open public meetings. These media and social media advertisements and the PDC web page postings provided opportunities for local officials, residents, and businesses to offer input.

During the 2021/2022 update process, additional stakeholders were contacted and invited to participate in one of three ways: 1) attend and participate in Committee meetings; 2) attend and participate in the Public Meetings; and/or 3) review draft documents and provide comments and critique. The stakeholders identified as such in **Table 3.2** responded to a more formal request to serve as stakeholders and to participate in the planning process through one of the methods identified above. The additional stakeholders invited that did not choose to participate included:

- State agency representatives;
    - Virginia State Police
    - Virginia Coastal Zone Management Program
    - ChamberRVA
    - Soil & Water Conservation Districts
        - James River
        - Colonial
        - Hanover Caroline
        - Monacan
        - Henricopolis

- Representatives of local tribes;
    - Chickahominy Eastern Division Tribe
    - Rappahannock Tribe
    - Upper Mattaponi Tribe
- Neighboring jurisdictions;
    - Hampton Roads Planning District Commission (HRPDC)
- Representatives from colleges and universities in the region;
    - Virginia Institute of Marine Science
    - Virginia Commonwealth University (several students attended public meetings)
    - Richard Bland College
    - University of Richmond
    - Randolph Macon College
    - Virginia State University
    - Virginia Community College System
- National Weather Service, Wakefield;
- Non-profit organizations;
    - The Nature Conservancy
    - Capital Region Land Conservancy
- Representatives from utilities servicing the region;
    - Dominion Energy
- Social service providers in the region;
    - Central Virginia Healthcare Coalition
    - United Way
- Representatives from military bases in the region; and,
    - Fort Lee
    - Defense Supply Center

- Representatives from the medical community
    - HCA Healthcare
    - Central Virginia Health Services
- Other groups
    - Port of Virginia;
    - Virginia Hispanic Chamber of Commerce;
    - Virginia Asian Chamber of Commerce;
    - National Association for the Advancement of Colored People;
    - Greater Richmond Transit Company
    - Richmond City Schools
    - DuPont

4.0 Community Profile

4.1 Updates for 2022

Section 4 has been updated to reflect more current conditions. Tables and figures have been updated, as necessary, to reflect recent data and to modify discussion for Surry County, and the Towns of Claremont and Dendron, which are all now participating in the HRPDC hazard mitigation planning process. Census data from 2020 were incorporated, where possible.

4.1 Introduction

This Richmond-Crater study area encompasses approximately 3,728 square miles and is bordered generally by Fluvanna, Cumberland, Amelia, Nottoway, and Brunswick Counties to the west; Louisa, Spotsylvania, Caroline, King and Queen, and King William Counties, as well as the Pamunkey River to the north; James City, Newport News, Isle of Wight, Surry and Southampton Counties as well as the James and York Rivers to the east; and the State of North Carolina to the south.

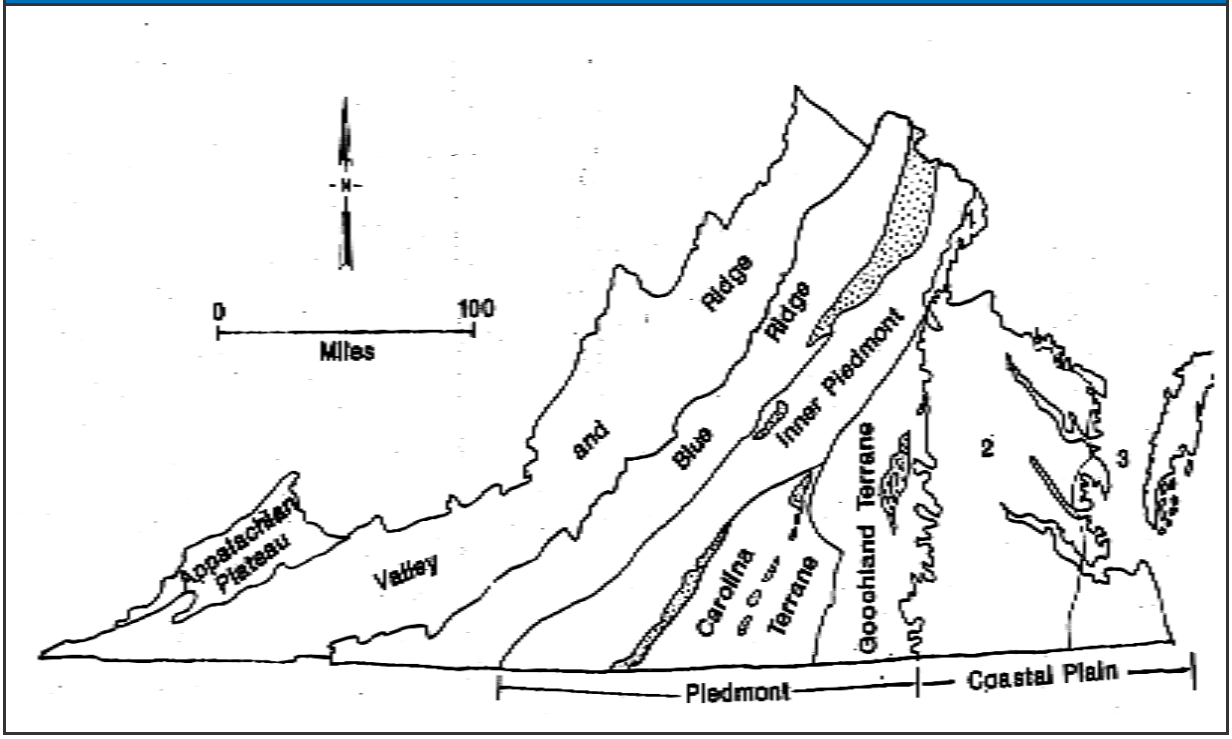
Based on total land mass, Dinwiddie County is the largest jurisdiction at 504 square miles. The Cities of Emporia and Colonial Heights are the smallest jurisdictions in the area at around seven square miles each (excluding the towns), while Charles City County is the smallest county at 182 square miles.

4.2 Physiography

The Richmond-Crater region is characterized by two distinct physiographic regions, the Southern Piedmont and the Atlantic Coastal Plain, as shown in **Figure 4.1**. The Fall Line serves as the dividing line between these two regions. The Southern Piedmont is characterized by deeply weathered, exposed bedrock and a rolling topography. The Fall Line is the easternmost extent of rock-filled river rapids, the point at which east-flowing rivers cross from the hard, igneous, and metamorphic rocks of the Piedmont to the relatively soft, unconsolidated strata of the flat Coastal Plain. The areas of the region in the Coastal Plain are gently dissected by streams but can be locally quite rugged where short, high-gradient streams have incised steep ravine systems.[1] The Cities of Richmond, Petersburg, and Emporia lie approximately at the Fall Line, which is where the James, Appomattox, and Meherrin Rivers, respectively, become unnavigable west of the Fall Line.[2]

[1] "The Natural Communities of Virginia: Classification of Ecological Community Groups (Version 2.4)," DCR, accessed July 18, 2011, http://www.dcr.virginia.gov/natural_heritage/ncintro.shtml.
[2] "Physiographic Regions of Virginia," Virginia Places, accessed July 18, 2011, http://www.virginiaplaces.org/regions/physio.html.

Figure 4.1: Physiographic/Geologic Provinces of Virginia



Source: U.S. EPA, undated

Land elevations in the Richmond-Crater region vary from mean sea level in the eastern, coastal counties to approximately 500 feet above sea level west of Richmond. Generally, the western portions of the region are at higher elevations.

4.3 Hydrology

As shown in **Figure 4.2**, rivers in Virginia drain to one of three main watersheds: the Chesapeake Bay, the North Carolina Sounds, and the Mississippi River. The Richmond-Crater study area lies within three major watersheds. The James and York, which flow into the Chesapeake Bay, and the Chowan, which flows south to the North Carolina Sounds.

The James River watershed is the largest watershed in Virginia, spanning 10,236 square miles, including 39 counties and 19 cities and towns. The watershed covers approximately one-fourth of Virginia's area and is home to one-third of its people, who live largely along the I-64 corridor from Richmond to Hampton Roads. The watershed itself is fed by more than 25,000 miles of tributaries, but primarily the James, Appomattox, Maury, Jackson, and Rivanna Rivers. It is Virginia's largest tributary to the Chesapeake Bay.

The York River watershed covers a much smaller area, comprised of all or portions of 11 counties to the north and east of Richmond. It has a drainage basin of 2,669 square miles and is the only watershed located entirely within the Coastal Plain. Its main tributaries

are the York River, Pamunkey River, and Mattaponi River. It is one of the most studied watersheds in the country and is in relatively good health ecologically. The upper areas of the basin are buffered by freshwater marshes and lowland, hardwood swamps that help protect the surrounding area from the effects of severe weather and human activity. Downstream, saltwater marshes provide a similar service. However, rapid population growth and related construction over the past 20 years has increased the need for more intense land use planning.

The Chowan River basin spans 3,675 square miles and is comprised of the Nottaway River, Meherrin River, and the Blackwater River. These rivers flow southeast toward the North Carolina border and empty into Albemarle Sound, located mostly within North Carolina. The Albemarle-Pamlico Estuarine System is the second-largest estuarine system in the United States. The Virginia portion of the basin is the second largest in area of the three major Virginia watersheds, but the least populated.

Figure 4.2: Physiographic/Geologic Provinces of Virginia

Source: Accessed online at: http://geology.blogs.wm.edu/hydrology/, 2016

The James River flows through the City of Richmond. Numerous small streams flow through the city before discharging into the James. Many of these urban watersheds are contained entirely within city limits. Others originate in suburban areas surrounding the city. The floodplains of these smaller streams contain varied residential, commercial and industrial development. The floodplains of Broad Rock and Grindall Creeks above the Seaboard Coastline, and Powhite Creek above the Powhite Freeway are undeveloped.

Below Powhite Freeway, Powhite Creek parallels the road in an improved channel and the road takes up nearly all the remaining floodplain.

The Meherrin River flows in a southeastern direction through the center of the City of Emporia. The channel is relatively well defined, with overbank areas generally covered with varying amounts of vegetation and tree cover. Fall Run borders the corporate limits of the City of Emporia on the south.

The Appomattox River bisects the City of Petersburg and the City of Colonial Heights, about 20 miles south of Richmond, and approximately 6 miles above its confluence with the James River. The natural development of Petersburg began at the Appomattox River and progressed southward. This progression resulted in heavy industrial and commercial development along the flood plains of the Appomattox River and the lower reaches of the smaller streams penetrating the city. Beyond the highly developed core and along the small streams to the south, there is a mixture of industrial, commercial, and residential development. The Appomattox River forms the southern and eastern boundary of Colonial Heights. Swift Creek, a tributary to the Appomattox River, forms the northern boundary of the city. Swift Creek's watershed is generally rectangular in shape and measures approximately 30 miles long and 9 miles wide at its broadest points. It has a drainage area of approximately 184 square miles. Old Town Creek flows east to the Appomattox River. The creek's narrow watershed is approximately 7.5 miles long and has a drainage area of approximately 13.5 square miles.

The City of Hopewell is located just south of the confluence of the Appomattox and James Rivers. The City's location in the Coastal Plain is typified by its low relief. The land is generally level, but some streams are short in length with steep gradients. Sandy soil and clay subsoil are predominant, where much of the soil has been formed from rock fragments washed down from the Piedmont region. Cabin Creek drains a large portion of the western end of the City, flowing south to north into the Appomattox River. One of the main tributaries of cabin Creek is Bullhill Run. Bailey Creek drains the southern portion of Hopewell and flows west to east along the southern corporate limits before emptying into the James River. Cattail Creek drains the central portions of Hopewell.

Additional rivers in the region include the Blackwater River, Chickahominy River, and the North Anna River. The Blackwater originates in Prince George County as a coastal plain swamp, then meanders east into Surry County. The Chickahominy begins about 15 miles east of Richmond, then continues east for 87 miles. It marks the eastern border of Charles City County. The North Anna River originates in Lake Anna and flows southeast through central Virginia for 62 miles. It is a major tributary to the Pamunkey River.

There are also several large creeks that run through the region. Stony Creek, formed by the merging of White Oak Creek and Butterwood Creek in Dinwiddie County, passes through the center of the Town of Stony Creek. Twenty-one miles in length, it is a tributary of the Nottaway River.

According to the DCR natural heritage inventory, there are at least seven important ecological community groups in the Richmond-Crater study area that are interrelated with the water resources of the region:

- Pine/Scrub Oak Sandhills
- Fluvial Terrace Woodlands
- Bald Cypress – Tupelo Swamps
- Coastal Plain/Piedmont Swamp Forests;
- Coastal Plain/Piedmont Floodplain Forests;
- Tidal Bald Cypress Forests and Woodlands; and,
- Tidal Freshwater and Oligohaline Aquatic Beds

The Virginia Scenic Rivers program, administered by DCR, identifies, recognizes and provides limited protection to rivers whose scenic beauty, historic importance, recreation value, and natural characteristics make them resources of particular importance. Reaches of the Blackwater, lower James, and Nottoway Rivers are all designated scenic rivers through the program, although the part of the Blackwater River that is designated scenic is outside the study area. Similarly, the Nationwide Rivers Inventory is a register of river segments that possess unique, rare or exemplary features that are significant at a comparative regional or national scale. Segments of the Blackwater, Chickahominy, James, Northwest, Nottoway, Ware, Yarmouth, and York Rivers are designated on the Nationwide Rivers Inventory for various reasons.

4.4 Climate

The present-day climate of Virginia is generally classified as humid subtropical, but within-state variation of temperature, precipitation, and length of growing season is dramatic. Average temperatures in the region are about 76 degrees Fahrenheit in the summer and 39 degrees in the winter. Average annual rainfall is around 43 inches, spread fairly evenly throughout the year. Average snowfall ranges from 12 to 17 inches annually, with highest amounts recorded in January and February. Additional discussion of weather extremes, including winter storms, are included in Section 5.

4.5 Land Use and Development Trends

The jurisdictions in the Richmond-Crater region vary dramatically from primarily rural to urban, sometimes within the same jurisdiction. While the Cities of Colonial Heights, Emporia, Hopewell, Petersburg, and Richmond have typical urban/suburban development patterns, most of the counties are rural in character. Charles City, Dinwiddie, Goochland, Greensville, Hanover, New Kent, Powhatan, Prince George, Surry and Sussex Counties are mainly rural with some pocketed areas of suburban development. Approximately 22% of Hanover County is Suburban Service Area and the planned region for about 70% of the county's expected residential growth; the remaining 78% of the county is rural.

Chesterfield and Henrico Counties and the City of Richmond are more suburban and urban in character.

In Virginia, the authority for land use planning and land use regulations resides at the local level. As required by the Code of Virginia, all jurisdictions in the Richmond-Crater region maintain local Comprehensive Plans that include a land use element and manage land development through zoning and subdivision regulatory ordinances.

In addition to local authority, state and regional programs and processes encourage regional coordination when planning for land use, transportation, economic and environmental matters. For example, the urbanized area of the Richmond-Crater region constitutes two regional transportation planning organizations for federal programs: the Richmond Regional Transportation Planning Organization and the Tri-Cities Metropolitan Planning Organization. As required by federal code, these organizations regularly update a long range regional transportation plan that includes population, housing, and employment projections in the urbanized area and considers land use trends. Most of the population in the Richmond-Crater region lives within the urbanized area, which is expected to continue. The Richmond and Crater regions also have Comprehensive Economic Development Strategies (CEDS). Analysis of population and employment data are foundational to the development of the CEDS, as well as their annual updates over successive years.

4.5.1 Charles City County

Charles City County is a rural community located between the more urban areas of Richmond and Williamsburg-Newport News metropolitan areas. The county has a wealth of historic homes and other sites reflecting its pre-European settlement history and more than 400 years of post-European settlement. The county is heavily forested with small residential communities scattered throughout. As of 2014, about 80% of the county was used for agricultural or forestry purposes or was otherwise in a natural state.[3] Development tends to be clustered at road intersections or along the James and Chickahominy Rivers. Much of the undeveloped land is in large tracts under single ownership.

The county is divided into three magisterial districts. Almost half of the population is concentrated in the Harrison District that covers the western portion of the county. Most of the commercial and industrial development is also located in the western part of the county. About one-third of the population lives in the central portion of the county, in the Tyler District. The remaining population is in the Chickahominy District.

Most of the housing stock in Charles City County is single-family homes. Given trends in surrounding areas and the rapid increase in the cost of stick-built homes, it is likely the number of manufactured homes in Charles City County will continue to increase.

[3] "Forest Inventory Data Retrieval (2002-2007)," Virginia Department of Forestry, August 26, 2009, http://www.dof.virginia.gov/resinfo/FIA_2007_StandardTables.htm.

Forests cover approximately 73% of the County's land area. The majority of the forests, about 75%, is owned by private landowners. In 2007, accessible forest area accounted for 67% of the total available land.[6] Land used for rural residential and public/semi-public uses accounted for the difference.

A Dominion Energy substation provides electricity to the county, located on Chambers Road off Roxbury Road (Route 106). Two power substations provide electricity to the county. Efforts are underway to ensure that the courthouse and municipal complex are on both grids.

Charles City County seeks to preserve its rural character by establishing development controls which direct growth to neighborhood residential areas within centralized development centers. This marks a break from the historical growth pattern, which encouraged sprawl and consumed agriculture and farm lands. New controls are expected to relieve the pressure on agriculture and forest lands, leading to more orderly and attractive development patterns and allowing for efficient use of tax dollars. Transportation growth is anticipated to become focused due to this new policy of directing growth within development centers.

Commercial development is very low in Charles City County when compared to neighboring localities. Commercial land within Charles City County typically consists of country stores with gas pumps, antique shops, garages, greenhouses, banks, marinas, and retail and professional services. Charles City County encourages commercial growth, primarily in the development centers.

Light and heavy industrial growth is expected to continue, given the continued expansion of Ft. Lee in Prince George County. The fort's mission is focused on military supply, subsistence, transportation, maintenance, and munitions. In 2015, Ft. Lee became the US Army's third-largest training site after completing a ten-year expansion period. More recently, it was made the temporary home of approximately 2,500 Afghan refugees, primarily interpreters and their families. It can be reasonably assumed that a portion of these families will choose to make the area their permanent home, meaning that residential growth will continue to expand, as well.

Contrary to earlier projections, the population in Charles City County shrank 6.66% between 2010 and 2020, contracting from 7259 people to 6773 according to the US Census. It had previously been expected to increase by approximately seven percent. According to the Weldon Cooper Center for Public Service, the County's population is expected to increase slightly to 6941 in 2030 before declining to 6816 in 2040, thus remaining almost completely flat for the next 20 years. For comparison, Virginia's population grew 7.9% over the past decade, increasing from 8 million to 8.63 million people. Projections for Virginia's growth rates over the next two decades will be released by the Weldon Cooper Center in 2022.

The Charles City County Planning Commission expects a population increase of 819 people, or 11.9%, by 2040, based on four different projection scenarios. This will require the

construction of approximately 350 additional housing units at a rate of 17-18 per year but will otherwise have only minimal impact on the area. Commercial and industrial growth is expected to increase but only moderately.[4]

4.5.2 Chesterfield County

Chesterfield County, which arcs below the south side of Richmond, has been split into numerous small areas for planning purposes and the development pattern varies immensely between these areas. Portions of the county are built out at suburban densities while other portions of the county remain undeveloped and rural. For instance, the western part of the Southern and Western Planning Area is designated as "rural conservation," meaning that uses should be restricted to large-lot residential, forestry, or agriculture. Closer to the City of Richmond, however, the development intensity increases. In this area, the Midlothian Turnpike corridor continues to be one of the county's prime locations for planned light industrial, commercial, and office uses.

Leapfrog development has characterized the Central Area, creating a disjointed development pattern. The types of development in the Central Area have included single-family subdivisions, scattered multi-family complexes, and small- to medium-sized shopping areas often along highway corridors, large employment centers, industrial parks, and an airport. This area is experiencing rapid growth, particularly west of U.S. Route 10.

Significant commercial and industrial development has occurred in the Eastern Area in recent years, and this trend is expected to continue. The Eastern Area also has a great deal of residential development, often adjacent to older commercial-strip zoning and uses. This pattern is particularly seen along U.S. Route 10.

A dominant theme of the county's comprehensive plan is a commitment to maintain a strong and growing economic base in Chesterfield County. New and existing business and industrial development provides diverse employment opportunities and revenue, and is vitally important in providing the types of services that promote a high quality of life in the county.

Since the 19th century, development patterns have been greatly influenced by the changing transportation and public utilities networks. Traditionally, the economic development base consisted primarily of large manufacturing and chemical industries. Today, the economic base has been enhanced by development of a variety of commercial and corporate office uses providing a range of services and employment opportunities for the county and region. In 2017, there were 136,000 jobs within the county, an increase of 20% over the number of jobs in 2010. PlanRVA projects that Chesterfield County will have approximately 166,000 jobs by 2035, an increase of 47 percent over 2010.

Chesterfield County is a community committed to promoting and maintaining a high quality of life for all residents and employers. As such, it is important that the county's

[4] Charles City County web site, accessed online at: http://charlescitycountyva.info/AgendaCenter/ViewFile/Agenda/_02272020-325

neighborhoods and business corridors be maintained in the highest quality possible and stabilized to ensure continued vitality. The public sector's role for ensuring long term stability and supporting a high quality of life is to provide equitable distribution and efficient allocation of public resources. Provision of equitable public services will promote private investment and reinvestment in aging and maturing areas.

Between 2010 and 2020, the County's population increased just over 15% to 364,548 people. This is a slower rate of growth than the County experienced between 2000 and 2010 when the population increased by 22%. Still, the total recorded in the census was nearly 10,000 more than the County had been projecting. Residents under the age of 14 constituted the largest segment of the population while residents over the age of 65 made up the fastest growing segment and those 55 and older the second largest. In coming years, a slowing birthrate is expected to keep the youth population stable while the population of older residents will continue to grow. The County is becoming more racially and ethnically diverse and approximately 12% of households speak a language other than English at home. Of those who speak English "less than 'very well'," the vast majority are Spanish-speakers.

Chesterfield County boasts a population that is better-educated and better paid than others in the region and the average population of Virginia. Lastly, the size of the average household has increased slightly over the past decade to 2.74 members.[5]

4.5.3 City of Colonial Heights

Colonial Heights is located at the Fall Line, or where the Coastal Plain meets the Piedmont. The city shows a linear development pattern along U.S. Route 1. The City is almost completely developed, with very few options for new building other than scattered infill possibilities. More land is devoted to residential purposes than any other use, with single-family detached homes representing the norm. There is some multi-family housing, including duplexes, townhomes, and apartment buildings. The 500 new housing units built since 2000 are primarily two, new multi-family units. The city recognizes that there is a need for increased housing suitable for its growing population of senior residents and for younger, single people if it wants to attract new residents, and is considering the feasibility of mixed-use property, particularly near the Southpark Mall Regional Shopping Center.

The city's comprehensive plan indicates that most commercial property is located along major transportation corridors, specifically The Boulevard (US Route 1/301), Temple and Ellerslie Avenues, and at the Southpark Mall. Industrial properties are primarily located in specific segments of West Roslyn Road, on Ellerslie Avenue, and on Charles Dimmock Parkway, although most of these properties are really for more intense commercial use than traditional industrial properties like factories.

Institutional properties, mostly churches and buildings owned by civic organizations, are scattered throughout Colonial Heights, as are parks and public schools. About 29% (1,625

[5] Chesterfield County Demographic Report, accessed online at: https://www.chesterfield.gov/DocumentCenter/View/20197/Chesterfield-County-Demographic-Report-2020,

acres) of the city is not developed, but the majority of the undeveloped land (983 acres) is unbuildable because of site constraints such as the presence of wetlands, floodplains, or steep slopes.

Land use patterns are generally well-established in Colonial Heights, and there is minimal need for significant land use change. The city has existing plans for development and revitalization of particular areas of Colonial Heights, while taking care to protect the elements that make living in the city desirable. These plans currently extend to 2044.

There is minimal need for additional public facilities; however, there may be need for additional public parks and open spaces in specific sections of the city that are currently underserved. Where possible, Colonial Heights will incorporate transitional land uses between higher activity uses, such as commercial, to lower activity uses such as single-family neighborhoods with less intense commercial or higher density residential uses, and create a mixture of recreational, commercial and residential uses along the river as recommended in the Appomattox River Corridor Plan.

The most significant growth period for the city was between 1950 and 1960. This was due, in part, to the 1954 and 1957 annexations. The city continued to grow at a relatively fast pace until the 1980s when the population stabilized. Between 2010 and 2020, the population of Colonial Heights increased from 17,411 to 18,170 and is expected to continue to increase slightly through 2040.

The city is also expected to become more racially diverse over this time period. According to Data USA, in 2019 there were nearly five times more whites than people of any other ethnicity in Colonial Heights. Blacks made up 14.6% of the population, Asians 4.15%, and Hispanics 5.87%. Approximately 7.32% of the city's population is foreign-born. According to the Weldon Cooper Center, the number of Black people in Colonial Heights is expected to decrease over the next two decades while the percentage of Asians is expected to increase. The number of Hispanics is expected to remain essentially flat. The white population is expected to decrease.

According to the Virginia Employment Commission, there were 8,363 people employed in the City of Colonial Heights as of June 2020. Retail is the largest industry with 27% of workers, followed by health care-related and food service/hospitality, both with 17% of workers. Local, State, and Federal Government employment combined equals approximately 15% of the workforce[6].

4.5.4 Dinwiddie County

Dinwiddie County, like many of the jurisdictions in the Crater Planning District, 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 is located in the Piedmont Plain. The major rivers that flow through this area, the Appomattox and Nottoway, occupy narrow floodplains with only minor meandering. These rivers divide the

[6] Virginia Employment Commission, Economic Information & Analytics, Quarterly Census of Employment and Wages, 2nd Quarter [April, May June], 2020

County into two unequal portions, with the Appomattox River Basin defining the northern 16% of the county and the Nottaway River Basin the southern 83%. The Appomattox River drains into the James River Basin and the Nottoway into the Chowan River Basin. The eastern portion of the county in the Coastal Plain tends to be flat and swampy, which deters development.

The county has grown in three distinct areas. The first area is along major highways such as River Road, U.S. Route 1, and U.S. Route 460. Such development occurs individually or in small strips. Clusters of development are also located in the fringe parts of the Town of McKenney and existing villages and crossroads such as Dinwiddie Courthouse and Sutherland areas. Finally, as the City of Petersburg has expanded, development has begun to cluster in its outskirts in the northeastern part of the county. Approximately 40% of county residents live in this portion of the county. It is also one of the areas where public utilities are available. Residential development patterns include single-family and duplex units, apartment complexes, and manufactured housing parks.

In Dinwiddie County, commercial development tends to occur near residential development. Most of the commercial establishments are located in the northeastern section of the county, a few businesses are located in the Courthouse area, and travel service facilities such as gasoline stations, motels, and restaurants are located mainly along U.S. Routes 1 and 460. The county has an industrial park at the municipal airport. There is also some industrial presence in the Town of McKenney.

Most of the open space land in Dinwiddie County is under the ownership of timber companies. It is estimated that 244,049 acres of land, or 73% of the county's land area, are in some sort of timber production. The timber stands are mainly located in the western half of the county.

Future growth will be centered in the urban Northeastern Area of the county and scattered throughout the rest of the county. There is concern that farmers will find it difficult to continue using their land for agricultural purposes as development increases.

According to the Bureau of the Census, the increase for Dinwiddie County during the decade of 2000 to 2010 was about 14.2% or 3,468 persons. From 2010 to 2020, the population dropped slightly, from 28,001 to 27,947, which contravened the Virginia Employment Commission projection of 5.5% growth. Approximately 62% of County residents were white alone (not Hispanic or Latino), just over 32% were Black, almost 4% were Hispanic or Latino, and the remainder were multi-racial or Asian. The Virginia Employment Commission projects population growth between 2020 and 2030 of 3.3% and an additional 2.49% by 2040.

4.5.5 City of Emporia

The City of Emporia is located approximately 65 miles south of Richmond, 10 miles north of the North Carolina border, in the center of Greensville County. The Meherrin River runs from west to east through the center of town. Like several other cities in Virginia, Emporia is located at the Fall Line, with the western side of the city in the Piedmont and the eastern

part in the Coastal Plain. The Meherrin River flows to the southeast and eventually drains into the Chowan River Basin.

Thanks to its location, Emporia has always been a trade center. Originally, there were two towns – Hicksford, founded in 1796 on the south bank, and Belfield, founded in 1798 on the north bank. Following the establishment of the Atlantic and Danville Railroad in the 1870s, the railroad's president (and local General Assembly representative) Sam Tillar convinced the Assembly to approve a merger of the two towns in 1887 and renamed it Emporia. Today, Emporia is a crossroads for cars and trucks traveling on I-95 and Route 58, with much of the city's commercial activity located near the intersection of the two highways and most recent development located to the immediate northwest of it.

In addition to providing travel services for drivers, Emporia is the county seat. The primary use of land within the city limits is residential, with mostly single-family detached homes, some multi-family developments and a few trailer parks. Most of the higher-density units are found in the northeastern part of the city while most of the newer residential developments are single-family homes on larger lots scattered around the periphery of the town. There has also been some construction of single-family homes on infill properties in the older parts of town.

Industrial use is the second most common land use in Emporia. These developments tend to be concentrated near major transportation routes, such as adjacent to railroad tracks and near the Meherrin River Dam. There are three main retail areas. One is north of the river and is made up of a part of the central business district and the Emporia Shopping Center. The second is south of the river and is comprised of the other part of the central business district and the area near the courthouse. The third area is at the intersection of I-95 and U.S. Route 58, which is the site of a large shopping center.

The Emporia comprehensive plan states that demand for development will continue along its traditional pattern. Single-family homes will continue to be in demand as will auto-oriented commercial uses. The plan notes a focus on downtown revitalization and a desire to discourage rampant strip development.

As of 2014, 44.2% of the land (1897 acres) within the city limits was vacant or underdeveloped, a drop from 52.6% in 2007 About a quarter of this land has site constraints such as floodplains or steep slopes that prevent it from being developed. Of the remaining area, vacant land was mostly concentrated in two places: around Route 58 and East Atlantic Avenue on the eastern edge of the city and the area extending north from Route 58 to the northern boundary of the city. New construction will have to be built in those locations or on limited infill property.

According to the latest census, the population of Emporia dropped from 5,927 in 2010 to 5,766 in 2020, contravening the Weldon Cooper Center's 2017 projection of an increase to 6,214. The Center projected a population of 6,447 in 2030 and 6,586 in 2040 but will likely revise these figures downward in the future to reflect the reality of the 2020 census results. The existing population of Emporia is aging, which will likely increase the demand for one-

level houses, independent living communities, assisted living centers, and full-service retirement homes with nursing and medical facilities. A growing elderly population will also create demand for specialized types of health care, social, and human services. In addition, both families and seniors benefit from access to parks and recreational opportunities.

Heavily-traveled corridor growth has fueled strip development along Route 58 and Market Drive. These developments have negatively affected Emporia's traditional commercial centers in the downtown areas. However, the growth of regional retail and travel services also benefit the city. Many people traveling along I-95 view Emporia as a destination city and one which is able to provide goods and services required by travelers.

Over the next twenty years, industrial growth will continue to play an important role in shaping Emporia's future. This will be particularly true of the city's surrounding environs, where larger, more favorable sites for industry are generally located. Although Emporia enjoys a diverse economy, growth prospects for the surrounding area will hinge on the community's ability to retain and attract industry.

4.5.6 Goochland County

Goochland is located approximately 30 miles west of downtown Richmond, 45 miles east of Charlottesville, and 105 miles south of Washington, D.C. It is squarely in the Piedmont Province of Virginia with the James River serving as the county's southern boundary for more than 40 miles. Goochland County is still mostly rural with land that is well-suited to its agriculture and forestry operations.

Development has been deliberately concentrated in the eastern part of the county closest to the Richmond metropolitan area. Development pressure from the western Richmond suburbs has led to the County's creation of a development plan showing a strong commitment to preserving the open space, rural nature, and agricultural and forest lands of the county while allowing the growth of residential and commercial areas in the eastern portion.

Since the 1970s, Goochland County has been using zoning and the comprehensive plan to implement the village concept. These land use tools have been shaping development that supports the county's goals of preserving open space and retaining rural character while directing new development toward established villages. Goochland's Land Use Plan divides population centers into Major Villages and Rural Crossroads. Population growth is directed toward the Major Villages where County services (water, sewer, electricity, etc.) are already established and can be expanded when needed with the least amount of difficulty and expense. Rural Crossroads are meant to provide necessary goods and services to the surrounding area but where population growth is not encouraged to protect the rural nature of the area.

While the population was expected to grow 4.77% between 2010 and 2020, it actually grew 13.86% and is projected to grow another 5.87% by 2030 and another 11.43% by 2040, according to the Weldon Cooper Center projections of 2017. The county attributes its

attractiveness to its strong school system, rural atmosphere, and proximity to the amenities and businesses located in western Henrico County. In addition, pandemic-related shifts in where people live and work may make Goochland County a more attractive option to those who no longer need to be physically close to their jobs.

The county's comprehensive plan defines its goal of balanced development as:

- High quality commercial, industrial, and employment hubs
- Vibrant, healthy villages that respect the character of each community
- High quality residential development that is compatible with adjacent land uses
- Preserved natural, cultural, and historic resources
- Viable agricultural and forestry resources that are important components of the local economy

The county also has recently completed a Major Thoroughfare Plan Update that lays out plans for the development of the road network to support and complement the expected land development through 2040. The plan examines the assets and needs of multiple forms of transportation (car, bicycle, etc.) and serves as a living document that can be modified over the years to keep pace with both the county's plans and any modifications that may be necessary.

Goochland's location in the central Piedmont region with the James River on the southern border, away from most developed areas, makes it less subject to hazards related to weather and water. The James River has three watershed regions – the upper, middle, and lower. Goochland County lies in the Middle James River region. Most of Goochland County is drained by the James River and its tributaries, but eastern portions of the county are drained by Tuckahoe, Dover, and Genito Creeks. This area is mostly agricultural, with a few low-density subdivisions. Central Goochland County is drained by the Beaverdam Creek/Courthouse Creek watershed and the James River/Mohawk Creek watershed. This area also mostly agricultural with low-density residential housing, but with higher density in the Goochland Courthouse area. Finally, the western portion of the County is drained by Byrd, Little Lickinghole, and Big Lickinghole Creeks. The land use there is almost entirely agricultural or forest lands with very few residential units. The watersheds are of particular interest in this County, as approximately 87% of households rely on wells for drinking water and the quality of the groundwater is a major consideration where development is being considered.

4.5.7 Greensville County

Rolling hills give way to flat land midway through Greensville County, which is bisected by the Fall Line and I-95. Like many other counties in the Richmond-Crater area, Greensville's highest elevations lie in the west and slope downward to the southeast. This topography has a strong influence on development patterns in the county, as the location, size, and prevalence of slopes, drainage patterns, wetlands, floodplains, soil types, and land cover dictate where and how development can occur.

The land cover of Greensville is 54.5% forest, 14.1% wetlands, and 12.6% active croplands. An additional 8.6% of the land is harvested forest/disturbed land. The County is further defined by its network of rivers, creeks, ponds, small lakes, and swamps, with the Meherrin and Nottoway Rivers comprising the main surface waters. The Nottoway serves as the county's northern border, while the Meherrin River flows through the middle of the county from west to east. Both rivers drain into the Chowan River system.

The county's 2020 population of 11,399 represents a drop of 7.5% from 2010. The highest concentration of people in the region is found in the City of Emporia, located in the center of the County. The next-largest town is Jarratt, which has 554 residents. There is some residential development scattered along the primary roads and highways in the county. Approximately 59.4% of the population is Black, 37.7 % is white, and 2.5% is of Hispanic or Latino heritage. The population of the county is projected to remain flat through 2040, though steadily increasing in median age. The demographic profile of the county is skewed by the inclusion of Greensville Correctional Center, which houses 3,123 institutionalized adult men. That number accounts for 27.1% of the county population.

Single-family detached homes dominate the housing stock, with very few multi-family units. Mobile homes account for more than 20% of single-family housing. The supply of affordable housing is a major concern of residents.

Other concerns include the lack of job opportunities, the quality of local education and school buildings, the lack of population growth, and the lack of internet and broadband. These issues present challenges to the improvement of the school system and the growth of business and commercial opportunities.

Residents treasure their rural character and open space, the sense of community in Greensville, and the natural environment. The area's strength as a transportation crossroads is recognized as a valuable asset, along with its manufacturing economy and an industrial mega site in the county. Greensville's proximity to Richmond, Hampton Roads, and Raleigh – all within 80 miles of the county – is also an asset. Because of the importance of transportation infrastructure, the need to invest in road maintenance and public transportation is widely supported.

Future growth will be shaped by the county's priorities, physical topography, financial resources, as well as the county's commitment to remaining primarily rural. Growth areas are expected in the Emporia fringe area and along the I-95/U.S. Route 301 corridor. In recent years, Greensville County has made significant investments in housing, economic development, and infrastructure. The county's next priority is to refocus their efforts on some of the issues of greatest concern to its residents, as described above.

4.5.8 Hanover County and the Town of Ashland

Hanover County is the northernmost county in the Richmond-Crater region, located immediately north of Henrico County and includes the northern edge of the Richmond Metropolitan Area. Although most of the county's population lives in the southern portion that lies closest to Richmond, much of the county is rural. County policies have been shaped

around the goal of retaining the rural and agricultural nature of Hanover County while accommodating the needs of the ever-growing population.

Population growth is one of the biggest issues – possibly the biggest issue – faced by Hanover County in recent decades. Since the 1990s, the county has seen steady population growth of 1% or more each year. In 2010, the county's population was 99,863, in 2020 it was 109,979. For planning purposes, the county assumes a growth rate of 1.5% annually. To preserve the rural nature of the county, planners have deliberately directed approximately 70% of development into the Suburban Service area around I-95 that serves as the major commuter route between Hanover and Richmond. The remainder of county land is categorized according to its primary use(s), and each type of land use has guidelines for development and restrictions on density to ensure that growth proceeds in an orderly and efficient fashion that will not overtax county resources or significantly change the primarily rural and agricultural feel of the county.

These categories are: Rural Areas (open land, wetlands, wildlife habitats, and forests), with the subcategories of Agricultural Land Use (farms and farmed forests, low-density residential), Rural Villages (small towns) and Rural Commercial Node Land Use (mostly road intersections with commercial services for the local community); the Suburban Service Area near Richmond, which includes several subcategories for residential, commercial, industrial, and recreational uses; Commercial Land Use that can be located anywhere in the county; Destination Commerce Land (businesses that serve an entire region and are unique in character); Planned Business Land Use (office and industrial parks); and several subcategories that are industrial in nature. Each category has its own strategies and goals for usage that, combined, meet the county's overall strategic goals for shaping where and how growth takes place.

Like other counties in the Richmond-Crater district, the Fall Line divides the land between the Piedmont and the Coastal Plains. The highest elevation in the county lies in the west at approximately 370 feet and drops gradually to the east until it reaches sea level. Most of the county is located within the York River watershed but the southernmost part falls within the James River watershed. Hanover County is located within three primary sub-watersheds: the Pamunkey, the Middle James, and the Lower James. Most of the steep slopes of the county are found along rivers and streams. Around the Fall Line, the banks of several rivers, particularly the South Anna River, have fairly steep bluffs characterized by exposed rock. Further to the east, there are some steep slopes along the tributaries that flow into the Pamunkey River.

The Town of Ashland is located in the heart of Hanover County. Established in 1858, the early growth of the town was fueled by the railroad. In more recent times, Randolph-Macon College and I-95 have influenced the town's development. The town is approximately 7 square miles. Ashland is largely developed, so emphasis is placed on community stabilization and preservation. Although the area to the north and west of Ashland has been under consideration for further development, no plans have yet been made.

4.5.9 Henrico County

Henrico County forms a rough semicircle around the northern portion of Richmond, and much of the land closest to the city is urban or suburban. The county is a major transportation hub, hosting Richmond International Airport, an Amtrak station, and portions of I-95, I-295, I-64, and Route 895. The county has seen steady increases in both population and new businesses, gradually increasing the amount of land used for residential and commercial purposes. Over the last three decades, much of the county has gone from rural to suburban or commercial, which has brought both challenges and benefits. Henrico County has responded by creating a detailed comprehensive plan outlining guidelines and strategies for the county's growth through 2026.

While the largest category of land use is described as "vacant," this is misleading as a lot of this land is actually used for agricultural purposes. Additionally, some of this land cannot be developed because it lies in a floodplain, contains wetlands, or is otherwise undevelopable. The second-largest category is single-family residential, occupying a quarter of the county's land area. Other categories occupy considerably less area, including public and semi-public land, commercial property, and industrial purposes. Approximately 3% of the County is occupied by water, including the James and Chickahominy Rivers and Tuckahoe Creek.

The population of Henrico increased nearly 9% between 2010 and 2020, growing from 306,935 to 334,389. This is significantly lower than the Weldon Cooper Center's projection of 352,577 for 2020. Projections for 2030 and 2040 are 400,396 and 450,630, respectively. Although previous trends were consistent with an annual 2% growth rate, the county has now adopted a scenario that uses a declining growth rate over the subsequent planning period.

The planning department expects that demand for retail, residential, and office space will be concentrated in the western portion of the county while industrial demand will be primarily in the eastern portion, but significant residential development continues in the eastern portion of the county. During this plan update, Henrico County began the process of updating its Comprehensive Plan. The new Comprehensive Plan will provide the framework for how the county will grow and develop through 2045 and will be incorporated into future iterations of this plan.

4.5.10 City of Hopewell

The City of Hopewell is located 18 miles southeast of Richmond at the confluence of the James and Appomattox Rivers. Hopewell was founded more than 400 years ago and is the second oldest continually inhabited English settlement after Hampton. It is known for its historic buildings and architecture, although much of the city was destroyed by fire in 1915. Unfortunate urban renewal projects in the 1960s did further damage to the city's character, although recent projects have begun a turnaround. Most significantly, an attractive Riverwalk was completed in 2019.

The city occupies approximately 11.3 square miles and is comprised of an industrial sector, regional commercial properties, and several compact urban neighborhoods. Approximately

80% of Hopewell's working population commutes outside of the city for work, mostly to Richmond. The proximity of the capital is a major influence on Hopewell, providing employment, shopping and services not found locally.

Hopewell's population began steadily declining in 1980, then increased slightly in 2010 and again in 2020 when the population reached 23,033. The Weldon Cooper Center projects the population to increase at a rate of about 1,000 people (4.8%) every ten years through 2040

The Appomattox River serves as the city's northern border and the James River serves as most of the eastern border. Neighboring counties are Chesterfield to the north, Charles City to the northeast, and Prince George to the east, south, and west.

The City of Hopewell falls entirely within the Coastal Plain (close to the western edge of the province) and the area governed by the Chesapeake Bay Preservation Act. The steepest slopes in the county can be found along the James and Appomattox Rivers.

Residential properties dominate the land use pattern of the city. Single-family homes are the main housing type, though there are some multi-family units such as apartments, townhomes, and condominiums. Much of the housing was built in the 1900s for workers. Five large subdivisions have been built since 2000.

Industrial uses are found in the northeastern part of the city along the James River and Bailey Creek. The vacant industrial land is owned by existing businesses and is reserved for their future growth. According to the comprehensive plan, a large part of the industrial development is in the floodplain.

The amount of vacant land in the city is not enough to meet future demands for growth. Infill development and redevelopment of existing parcels will have to be pursued. As of 2010, there was limited vacant land available at the new I-295 interchange for commercial development. One goal of the city is to promote industrial development through a commercial business park, but available land is limited. Significant residential structures are being converted to business uses in core village areas. Most residential "development" is infill.

In comparison to peer communities, Hopewell's economic and demographic metrics show room for improvement. The income for city residents is substantially below Virginia's average and the rate of new employment is static. A disproportionate number of city residents (8,300+) are out-commuters for employment. The in-commuter city workforce (6,700+) spends little non-work time and money in the city. Unemployment rates are high. The marketplace for goods and services is severely underperforming.

4.5.11 New Kent County

Rural land uses have long dominated New Kent County's landscape but the last decade has seen significant change and growth. After the 2020 Census was completed, New Kent was seen as the fastest growing county in Virginia after Loudoun County in northern Virginia, jumping from 18,429 people in 2010 to 22,945 in 2020 – an increase of 24.5%. The arrival of more than 4,400 new residents in one decade is attributed primarily to New Kent's appeal

as an attractive location with a high quality of life and home prices that compare favorably to other counties in the greater Richmond area. Like Loudoun, New Kent County is a desirable exurb.

New Kent County is located in the northeast corner of the Richmond-Crater district. Hanover and Henrico counties lie to the west and Charles City County to the south. The county is located well east of the Fall Line in the Coastal Plain.

Although the county is still predominantly rural, with population clusters scattered along rural roads, New Kent County also has clusters of subdivisions of various kinds, with most of them concentrated in the western third of the county closest to Richmond. This is the area currently experiencing the highest levels of growth. However, there are also population clusters located in the eastern third, particularly around Lanexa and the Diascund Creek Reservoir, where commuting to jobs in Williamsburg is feasible.

Commercial centers are located at Bottoms Bridge, Providence Forge, and Eltham, all of which are complemented by nearby residences. There are smaller clusters of residential and commercial development at Lanexa, Barhamsville, and Quinton. New Kent Courthouse has few commercial uses but is a center for government and institutional uses with residences interspersed and nearby. Perhaps the most significant area of commercial growth in recent years is at the old Colonial Downs racetrack where Rosie's Gaming Emporium opened in 2021. Lastly, several golf course residential communities and vineyards have proven attractive to residential development and have brought festival events to the county. The 2012 comprehensive plan called for concentrating future development in mixed-use village centers. The exception was industrial uses, which should take advantage of the large amount of vacant property along I-64 and U.S. Route 33. While an updated comprehensive plan has not yet been published, the process of creating Envision New Kent Strategic Plan was kicked off in January, 2020, with a draft writing process begun in April, 2021. This document will define the county's vision for growth and change through 2040.

4.5.12 City of Petersburg

The City of Petersburg is in the heart of the Richmond-Crater district, located 23 miles southeast of Richmond and 9 miles southwest of Hopewell. It is bordered by Chesterfield County to the northwest, Dinwiddie County to the southwest, and Prince George County to the east. The City of Colonial Heights is just north of Petersburg, separated from it only by the Appomattox River. Petersburg is 23.1 square miles (14,784 acres) and in 2020 had a population of 33,458, an increase of 3.2% from 2010. The percentage of Black residents is 76.7% of the population compared to about 20% in Virginia as a whole. Petersburg is a nexus of major roadways, with 1-85 and Routes 1/301 and 460 all merge with or cross 1-95 in the heart of the city.

In 2016, after years of mismanagement, Petersburg was in financial crisis with $19 million dollars in unpaid bills and a $12 million budget gap. A team of outside consultants imposed drastic budget cuts that staved off complete financial collapse. Since then, Petersburg has

reached a new level of financial soundness that has increased its ratings by various agencies and improved its reputation with surrounding localities and with the Commonwealth. While the City is still years away from being debt-free and still struggles with high poverty and crime rates, local developers, entrepreneurs, and artists have been working hard to turn Petersburg around.

Given that annexation of county land is not an option, the City of Petersburg has a finite amount of land available for growth. Furthermore, developable land is limited by Chesapeake Bay Preservation Act requirements and other physical site constraints. Therefore, development and revitalization efforts are focused on existing neighborhoods with infill properties and/or properties in need of extensive renovation. Land use fragmentation is a major issue in Petersburg with incompatible uses often located side by side.

The city has two distinct residential patterns. The first is found in the "Old City," north of I-85. A mix of residential types (e.g., single family, multi-family, and duplexes) is found here. Newer developments, mainly suburban subdivisions, have sprung up south of I-85, in large part due to the Southside Regional Medical Center now located there. Some infill of single-family homes and duplexes has also taken place.

Recent progress has energized efforts to revitalize Petersburg. Some financial grants and funding have been secured and work is underway. The research and recommendation phase is complete and decisions are currently being finalized. Priorities include: building or redesigning the city's gateway areas, redevelopment of the riverfront Harbor Project, neighborhood revitalization in several specific areas, and working with Virginia State University regarding their expansion plans, among others.

4.5.13 Powhatan County

Powhatan County was one of the fastest-growing counties in the country earlier this century, experiencing a population jump of 46% between 1990 and 2000 and another 25% by 2010. The county's growth rate over the last 10 years slowed to 8% (30,333 people in 2020), but is projected to rise by another 13% by 2030 before slowing again. Powhatan's growth is largely due to its proximity to Richmond. Like Goochland and New Kent Counties, Powhatan offers an attractive rural location with a lower cost of living, higher quality of life, and lower housing costs than the Richmond Metropolitan Area. Like many exurban/rural areas, Powhatan is significantly wealthier and has more married-couple families than Virginia's population as a whole.

The eastern edge of Powhatan County is located about 15 miles west of downtown Richmond, with Chesterfield County lying between them. The county is bordered on the north by Goochland County and the James River, and on the south by Amelia County and the Appomattox River. Cumberland County lies to the west. The county is located entirely within the Lower Piedmont region and encompasses 272 square miles.

Originally inhabited by the Monacan Indians, Powhatan was first explored by Europeans in 1608 when Christopher Newport led an expedition up the James River. The first European

settlers came in 1699 when hundreds of Huguenot refugees arrived after fleeing persecution in France. They gradually spread throughout the area and some of their original buildings still stand.

The county has always been primarily agricultural, and experienced steady population declines from the mid-nineteenth through the mid-twentieth century. In the 1970s, the county's population began to increase again as suburban development spread beyond Chesterfield County to the eastern edge of Powhatan County. Since 2000, most new development in the county has been in subdivisions that feature 5-acre lots, especially around the Route 711 corridor and near Courthouse Village. Commercial growth has been concentrated mostly alongside the Route 60 corridor and east of the interchange at Route 711 and Route 288. Agriculture is now made up mostly of smaller family farms and niche agricultural industries such as greenhouses, vineyards, or equestrian facilities. Some forestry is also still found in the county; however, government, construction, and retail trade are now the dominant employment industries.

Maintaining Powhatan County's rural character is paramount to the county's vision and plans for growth. Any development proposals will be considered with an eye to whether the plans would interfere with the preservation of "signature" parts of the county, wooded and rural landscapes, or cultural and environmentally-sensitive resources. The county supports reasonable levels of development, but only that which will allow the county to maintain its rural character, provide adequate services, and maintain fiscal sustainability.

4.5.14 Prince George County

Prince George County is situated about 25 miles southeast of Richmond and 75 miles northwest of Norfolk. The City of Hopewell and the James River form its northern border, Charles City County lies to the northeast, Surry County to the east, Sussex County to the southeast, and, continuing clockwise, Dinwiddie County, the City of Petersburg, and the Appomattox River to the west. The county is east of the Fall Line and within the Coastal Plain. In the northern half of the county, water drains into the Appomattox and James Rivers and eventually into the Chesapeake Bay. In the southern part, water flows into the Nottoway River and Blackwater River watershed and then into the Chowan River before reaching the Albemarle-Pamlico Sound.

Prince George County's character is shaped less by its location and more by Fort Lee, a large and growing military base located in the northwestern part of the county that lies between the Cities of Petersburg, Colonial Heights, and Hopewell. In 2005, under directives from the U.S. Congress's Base Realignment and Closure (BRAC) Commission, specific Army and Air Force training operations were combined at Fort Lee, transforming the base into a major military facility. Prince George County and the surrounding area reaped tremendous economic benefits from the BRAC expansion and used Federal monies to build a public library, and elementary school, and make a number of other investments in local infrastructure to accommodate the needs of the growing base and the families who came with it.

The daily population on Fort Lee rose from about 32,000 to 48,000 between 2005 and 2011. Military personnel came from all across the South to Fort Lee as well as from Alexandria and Fort Eustis, Virginia. In January 2009, the combined Sustainment Center of Excellence Headquarters was opened and transformed Fort Lee into the third largest Army training installation in the country. In July 2009, the Army Logistics University opened and began offering more than 200 courses and training 2,300 military and civilian students in logistics and military management techniques.

Since the expansion was completed in 2011, the county has been able to turn its attention to capital facility needs, including the improvement of parks and recreation facilities, school repairs and other maintenance and upkeep projects.

Largely because of Fort Lee, the population of Prince George County has continued to grow. Between 2010 and 2020, the population grew from 35,725 to 43,010, slightly more than 20%. The current population exceeds the numbers projected by the Weldon Cooper Center even through 2040. Given that no further base expansions are expected in the near future, growth population will likely be modest; however, 2,500 Afghan refugees were relocated to Fort Lee on a temporary basis in 2021, and it is likely that at least some will elect to stay in the area.

Aside from Fort Lee, Prince George County has a flourishing industrial base located in several industrial parks, along with product distributors like Ace Hardware, Goya Foods, and Service Center Metals. This has helped balance the tax base in the county. Rolls-Royce is a major investor in the county, beginning the manufacture of aircraft engines there in 2010 and investing in the Commonwealth Center for Advanced Manufacturing educational training facility that opened in the county back in 2011.

Approximately 89% of the county is forested or in crop production. The Virginia Department of Forestry (VDOF) estimates that roughly 74% of the total land area is forested, some of which is commercially owned, and 15% is cropland. The remaining 11% of land is used for residential, commercial, industrial, or public uses.. Single-family homes comprised about 74% of the housing stock, followed by manufactured homes that accounted for about 12%. Most of the single-family homes are found in subdivisions near the two cities. The remainder of the residential development is scattered throughout the county. Commercial development occurs primarily as strip development along major routes.

When considering future development, the county must assess a number of environmental factors as well as land use plans, etc., before approving rezoning requests or specific proposals. Not all land is suitable for development and the residents of Prince George County have expressed the desire to protect agricultural uses and environmentally important areas of the County.

4.5.15 City of Richmond

Richmond is located at the Fall Line of the James River, a feature central to the city since it was founded in 1737. The James River runs from west to east through the center of the city, although slightly more of Richmond is located on the north bank than the south. The city is

62.5 square miles and is not allowed to annex any further land, therefore nearly all new growth will come from redevelopment. Richmond has recently released a new comprehensive plan, "Richmond 300," outlining its vision and goals through 2037. The plan acknowledges that while the City's population has grown remarkably in recent years, its growth has not benefitted everyone and the city must change its approach to make sure that future growth is equitable, sustainable, and beautiful.

Six "Big Moves" were identified in the plan that will guide the City as it moves forward. Richmond will:

- Re-Write the Zoning Ordinance: Direct growth to appropriate areas while maintaining existing neighborhoods as well as creating new authentic neighborhoods adjacent to enhanced transit.
- Re-Imagine Priority Growth Nodes: Target growth in jobs and population to Downtown, Greater Scott's Addition, Route 1 Corridor, Southside Plaza, and Stony Point Fashion Park.
- Expand Housing Opportunities: Encourage the development of housing options throughout the city to expand the geography of opportunity by de-concentrating poverty.
- Provide Greenways & Parks for All: Develop parks and greenways so that by 2037 100% of Richmonders live within a 10-minute walk of a park.
- Reconnect the City: Cap highways to reknit neighborhoods destroyed by interstates, build/improve bridges, introduce street grids, and make the city easier to access by foot, bike, and transit.
- Realign City Facilities: Improve City buildings (schools, libraries, fire stations, police stations, etc.) to provide better services in efficient, shared-use, accessible facilities to better match and serve the growing city.

4.5.16 Surry County and the Town of Surry

Surry County is a rural county characterized by a rolling topography that gradually becomes more level in the eastern portions of the county. Seventy-five percent of the county is forested. Traditionally, forestry and agricultural land uses have supported the majority of employment but have experienced recent decline. Surry County is the location of the Surry Power Station, a nuclear power plant built in 1972 which is the County's main employer.

The Town of Surry is the only community in Surry County participating in this planning effort. The town was originally established in 1652 and was incorporated in 1928. It is the county seat and a hub for businesses serving the surrounding county. The town has a total land area of 0.8 square miles, and is located at the intersection of Virginia Routes 10 and 31, about 4 miles from the Jamestown-Scotland Ferry dock on the south side of the James River. The town's total population as reported in the 2020 Census was 357, a 7% decline since the 2010 Census population of 383.

The county's comprehensive plan calls for improved county and town cooperation, in order to build momentum in ensuring that future development is concentrated in and around the historic towns and crossroads that already exist in the county. The plan calls for "residential investment areas" and commercial areas around the Town of Surry, in particular, to counteract the population decline forecast by the Weldon Cooper Center for the county, and to preserve the rural character of the rest of the county. Zoned commercial areas would provide strategic growth to sustain commercial uses that are expected to diversify and bolster the county's tax base. In 2016, the Hampton Roads Sanitation District (HRSD) added Surry County to their service territory and in 2017, the county and town reached agreements for HRSD to assume ownership and operate their wastewater systems. HRSD is planning a series of system improvements in the long-term.

4.5.17 Sussex County

Sussex County encompasses 496 square miles in southeastern Virginia, about 45 miles southeast of Richmond and 70 miles west of Hampton Roads. The county is bordered by Dinwiddie and Prince George Counties to the north, Surry County and the Blackwater River to the northeast, Southampton County to the southeast, and Greensville County to the southwest. The county lies in the Coastal Plain, so the topography ranges from slightly rolling to relatively level with some marsh areas. Water in the county drains into Stony Creek and the Nottoway and Blackwater Rivers.

Sussex County is primarily rural with agriculture and agricultural-related manufacturing forming the basis of the local economy. Approximately 80% of the land is commercial forestry, the remaining agricultural land is devoted to peanuts, cotton, corn, flue-cured tobacco, small grains, and soybeans.

The towns of Jarratt, Stony Creek, Wakefield, and Waverly are located in Sussex County. Jarratt is split between Sussex and Greensville County, with the western half in Greensville County and the eastern half in Sussex County. The population in 2020 was 10,829, marking a drop of more than 10% from the 12,087 recorded in 2010. The majority of housing is comprised of single-family detached homes. The number of manufactured homes has risen dramatically since 1990, accounting for 58% of building permits issued between 1990 and 1996. In 1990, manufactured homes accounted for only 24% of the housing stock; by 1996, that percentage had risen to 40%. Most residential development is in subdivisions or as strips along the highway. This pattern preserves land for agricultural and forestry uses.

The Future Land Use Map shows a large portion of the county, including the floodplains, classified for conservation uses. Large-lot, residential development is allowed in this area as is agricultural, forestry, and passive recreation. In addition, the plan calls for development to be concentrated in existing community hubs instead of scattered throughout the county.

4.6 Population

The total population of the jurisdictions included in the Richmond-Crater region was 1,302,101 as of the 2020 U.S. Census. Between 2010 and 2020, New Kent County saw the greatest increase in population with a growth rate of 24.5%. Conversely, Sussex County saw a 10.4% population drop, according to the 2020 Census. **Table 4.1** shows population by jurisdiction, the associated change rate, and population projections for each jurisdiction to the year 2040. The region's growth rate is not projected to be evenly distributed across all jurisdictions. New Kent County is expected to continue its rapid growth by an astonishing 36% by 2040. Dinwiddie County's population is projected to grow by 22%. On the other hand, the City of Petersburg is expected to lose almost 14.5% of population and the City of Colonial Heights may lose 6.7%. Rural Sussex, Prince George, and Greensville Counties are also expected to lose population over the next two decades. New Kent and Dinwiddie Counties are growing because the regions of those counties that lie closest to Richmond are developing into exurbs.

Table 4.1: Population by Jurisdiction

Jurisdiction	2020 Population	Percentage Change in Population, 2010 – 2020	2040 Projected Population	Percentage Change in Population, 2020 – 2040
Charles City County	6,773	-6.65%	7,710	13.83%
Chesterfield County	364,548	15.27%	435,294	19.40%
City of Colonial Heights	18,170	4.35%	16,955	-6.68%
Dinwiddie County (inc. Town of McKenney)	27,947	0.19%	34,080	21.94%
City of Emporia	5,766	-2.71%	6,586	14.22%
Goochland County	24,727	0.12%	29,174	18.03%
Greensville County (inc. Town of Jarratt*)	11,391	-6.95%	11,404	-0.11%
Hanover County (inc. Town of Ashland)	109,979	10.12%	127,780	16.18%
Henrico County	334,389	8.94%	399,966	19.61%
City of Hopewell	23,033	1.95%	23,482	1.94%
New Kent County	22,945	24.50%	30,964	35.94%
City of Petersburg	33,458	3.20%	28,613	-14.48%
Powhatan County	30,333	8.15%	35,854	18.20%
Prince George County	43,010	20.39%	42,640	-0.86%
City of Richmond	226,610	10.96%	250,600	10.58%
Surry County (inc. Town of Surry)	6,561	-7.04%	5,992	-8.67%
Sussex County (inc. Towns of Stony Creek, Wakefield, Waverly)	10,829	-10.40%	10,563	-2.45%

* Although Jarratt is located in both Greensville and Sussex Counties, for the purposes of this plan, the Town is included under Greensville County in tables.
Sources: U.S. Census Bureau Decennial Census, 2010 and 2020, and University of Virginia Weldon Cooper Center, Demographics Research Group. (2020). Virginia Population Estimates. Retrieved from https://demographics.coopercenter.org/virginia-population-estimates

4.6.1 Race and Sex

Virginia has become more racially diverse in recent years. According to 2015 U.S. Census Bureau data, the majority of the population in the Richmond-Crater region was reported to be of a single race (98.1%). In American Community Survey (ACS) 2019 data, that percentage had dropped to 97.2. Of the total population reporting one race, 57.9% were white, 35.9% were Black, and 5.0% were Hispanic. In Virginia as a whole, 69.4% were white, 19.9% were Black, and 9.8% were Hispanic/Latino. In both Virginia and the United States as a whole, 50.8% of the population is female. In the Richmond-Crater study area, the percentage is 49.9.

4.6.2 Language

About 4.4% of the Richmond-Crater region's residents are foreign-born, which is a drop from 7.6% reported in 2015. An estimated 6.8% of the population speaks a language other than English at home. The recent influx of refugees from Afghanistan is currently centered in or near Fort Lee in Prince George County. As these refugees resettle, some will likely choose to stay in the area, particularly in the counties close to Richmond.

4.6.3 Age

Another segment of the population that may require accommodations related to hazard events is characterized by age. The 2019 ACS from the U.S. Census Bureau shows that 5.3% of the Richmond-Crater region's population is under the age of 5 and a total of 20.5% is under age 18. At the other end of the scale, 17.7% of the population is 65 or older, a jump of more than 5% in the last five years. Compared to the rest of Virginia, the Richmond-Crater area has slightly fewer small children and young people, but 1.8% more senior residents.

4.6.4 Education

In Virginia, 38.8% of adults have college degrees. This is 6.7% higher than the United States, reflecting the high number of jobs connected to the federal and state governments as well as defense, tech, and business. Within the Richmond-Crater region, Henrico County has the highest percent of college graduates (43.7%), followed by Goochland (41.8%), Chesterfield (41%), Hanover (39.8%), and the City of Richmond (39.6%).

The areas with the fewest college graduates are: Greensville County (9.2%), Sussex County (12.7%), the City of Emporia (13.8%), Charles City County (14.7%), and the City of Hopewell (14.8%). These areas also have the lowest percentages of high school graduates. These numbers, coupled with the age-related demographics described in the previous paragraph and the percentage of non-English speakers, are important to keep in mind when developing public outreach programs. The content and delivery of public outreach

programs should be consistent with the audiences' needs and ability to understand complex information.

4.6.5 Income

Within the study area, the American Community Survey data for 2015-2019 indicate Goochland County had the highest household median income of $93,994, followed by Hanover County at $89,390, Powhatan at $89,090, and New Kent County at $87,904 (see **Table 4.2**). The average household income in the region in 2020 was $63,069, slightly above the American average of $62,843, but significantly below the Virginia average of $74,222.

Household median income was lowest in the City of Petersburg at $38,679, followed closely by the City of Hopewell at $39,030. The next closest was Sussex County at $47,250 in median household income.

The percentage of people in the region who lived in poverty in 2019 was 13.5%. Poverty in the region is concentrated in cities, with the most impoverished localities being the City of Emporia with 27.0% of the total population living in poverty, the City of Petersburg (24.1%), the City of Hopewell (23.6%), and the City of Richmond (23.2%). In rural areas, Greensville County (21.5%), and Sussex County (18.9%) had the highest levels of poverty. In the Commonwealth, 9.2% of the population lived in poverty, compared to 11.4% in the nation. The area's relatively high levels of poverty indicate that the Richmond-Crater region has some significant hurdles to overcome in terms of households being able to afford hazard mitigation projects reliant on self-funding.

Income levels between the jurisdictions included in the Richmond-Crater region vary greatly. Table 4.2 shows the breakdown by jurisdiction.

Table 4.2: Income Characteristics by Jurisdiction

Jurisdiction	Median Household Income, 2015-2019	Persons Living in Poverty (percent),
Charles City County	$57,198	9.9%
Chesterfield County	$82,599	6.6%
City of Colonial Heights	$54,550	12.1%
Dinwiddie County (inc. Town of McKenney)	$60,346	11.1%
City of Emporia	$27,063	27.0%
Goochland County	$93,994	5.8%
Greensville County (inc. Town of Jarratt)	$50,300	21.5%
Hanover County (inc. Town of Ashland)	$89,390	5.0%
Henrico County	$70,307	8.3%
City of Hopewell	$39,030	23.6%
New Kent County	$87,904	4.6%

Table 4.2: Income Characteristics by Jurisdiction		
Jurisdiction	**Median Household Income, 2015-2019**	**Persons Living in Poverty (percent),**
City of Petersburg	$38,679	24.1%
Powhatan County	$89,090	5.3%
Prince George County	$71,912	8.2%
City of Richmond	$47,250	23.2%
Surry County (inc. Town of Surry)	$57,.962	11.6%
Sussex County (inc. Towns of Stony Creek, Wakefield, Waverly)	$49,487	18.9%

Source: U.S. Census Bureau, American Community Survey 2015-2019

4.6.6 Broadband Access

In recent years, access to broadband internet service has become vital to the population's ability to receive information and services. The percentage of people in the Richmond-Crater region who have access to broadband reflects both income and availability. While broadband is widely available in heavily-populated areas, it is less widely available in rural ones and is also relatively more expensive. Regardless, broadband access is quickly becoming as vital a utility as electricity or phone service, as witnessed beginning in 2020 during the COVID-19 pandemic, when so many people had to work and attend school from home for long periods.

Table 4.3 shows the percentage of households with a broadband internet subscription between 2015 and 2019 in each locality. An average of 76.7% of residents in the region had access, trailing the Virginia average of 83.9% and the nationwide average of 82.7%.

Table 4.3: Broadband Availability	
Locality	**Households With Broadband Internet Access**
Charles City County	61.5%
Chesterfield County	90.1%
City of Colonial Heights	78.1%
Dinwiddie County	74.5%
City of Emporia	65.2%
Goochland County	83.2%
Greensville County	63.2%
Hanover County	86.0%
Henrico County	86.2%
City of Hopewell	75.7%

Table 4.3: Broadband Availability	
Locality	**Households With Broadband Internet Access**
New Kent County	79.1%
City of Petersburg	69.0%
Powhatan County	89.5%
Prince George County	83.3%
City of Richmond	75.4%
Surry County	64.8%
Sussex County	66.4%

Source: U.S. Census Bureau, American Community Survey, 2015-2019

4.7 Housing

As of 2019, there were 373,595 housing units in the study area according to the U.S. Census. The highest number of housing units were located in Henrico and Chesterfield Counties. About 67.8% of residents in the study area own their own homes, a drop from 70.1% in 2015. However, the district's percentage is higher than the national average of 64.0% or the state average of 66.3%. The average, however, is skewed by the significantly lower rate of homeownership in the cities of Emporia, Hopewell, Petersburg and Richmond. **Table 4.4** illustrates the housing characteristics of each jurisdiction in the Richmond-Crater region. When considering mitigation options, special attention should be given to the difference in capabilities between owners and renters.

Table 4.4: Housing Characteristics by Jurisdiction				
Jurisdiction	**Housing Units 2019**	**Owner-Occupied Housing Units 2015-2019**	**Median Value of Owner-Occupied Housing Units 2015-2019**	**Median Gross Rent 2015-2019**
Charles City County	3,391	83.9%	$167,900	$813
Chesterfield County	134,267	75.8%	$241,200	$1,251
City of Colonial Heights	N/A	62.9%	$171,700	$1,038
Dinwiddie County (inc. Town of McKenney)	11,856	77.2%	$168,300	$1,005
City of Emporia	N/A	40.1%	$116,800	$694
Goochland County	9,613	84.9%	$375,200	$1,208
Greensville County (inc. Town of Jarratt)	4,205	73.3%	$117.700	$854
Hanover County (inc. Town of Ashland)	42,264	82.5%	$282,900	$1,159
Henrico County	139,274	62.7%	$242,600	$$1,170
City of Hopewell	N/A	46.7%	$122,900	$886
New Kent County	8,956	86.5%	$281,100	$1,010
City of Petersburg	N/A	38.8%	$108,100	$947
Powhatan County	11,274	90.1%	$279,200	$980
Prince George County	12,605	67.6%	$213,300	$1338
City of Richmond	N/A	42.6%	$230,500	$1,025
Surry County (inc. Town of Surry)	3,611	74.3%	$197,800	$903
Sussex County (inc. Towns of Stony Creek, Wakefield, Waverly)	4,837	69.2%	$125,800	$807

Source U.S. Census Bureau, ACS 2015 – 2019

4.8 Business and Labor

The diversity of the region is strongly reflected within the business sector. While the Richmond-Crater region is home to seven Fortune 500 companies in 2020, the outlying area is primarily rural with limited commercial development. The Fortune 500 companies located in the region are shown in **Table 4.5.**

Table 4.5: Richmond-Crater Region Fortune 500 Companies		
Fortune 500 Company	**2020 Rank**	**Locality**
Altria Group	167	Henrico County
Performance Food Group	168	Henrico County
CarMax	173	Goochland County
Dominion Energy	197	Richmond
Owens & Minor	332	Hanover County
Markel	335	Henrico County
Genworth Financial	360	Richmond

Source: Fortune Magazine, accessed online March 2021

The sectors with the most employees in the Richmond-Crater region are:

- Health care and social assistance
- Retail trade
- Finance and insurance
- Accommodation and food services
- Manufacturing
- Construction
- Professional, scientific, and technical services
- Other services (except public administration)
- Administrative and Support and Waste Management
- Remediation Services
- Wholesale trade

Sectors with the largest annual payrolls are:

- Finance and insurance
- Health care and social assistance
- Professional, scientific, and technical services Manufacturing
- Retail trade
- Wholesale trade
- Construction
- Administrative and Support and Waste Management and Remediation Services
- Other services (except public administration)
- Accommodation and food services

Listed below are the largest 15 employers of the Richmond and Crater regions. Following is a list of the top 5 employers in each locality. Unless otherwise identified, all data comes from the Virginia Labor Market Information of the Virginia Department of Education posted in February, 2014, or the Virginia Economic Development Partnership, the most recent data available during the planning process.

Top Employers in the Richmond Region	**Top Employers in the Crater Region**
Capital One Bank	U. S. Department of Defense
Virginia Commonwealth University	Walmart
Henrico County School Board	Southside Regional Medical Center
Chesterfield County School Board	County of Prince George
MCV Hospital	Dominion Energy
Bon Secours Richmond Health System	Food Lion
HCA Virginia Health System	Greensville Correctional Center
Richmond City Public Schools	Central State Hospital
County of Henrico	City of Petersburg School Board
City of Richmond	Boars Head Provisions Company
Walmart	Honeywell International, Inc.
County of Chesterfield	Hopewell City School Board
Kroger	City of Petersburg
Hanover County School Board	Amazon
U.S. Department of Defense	Dinwiddie County School Board

Charles City County:

Charles City County School Board

U.S. Remodelers Inc.

County of Charles City

Atlantic Bulk Carrier Corporation

Charles City Timber & Mat

Chesterfield County:

Chesterfield County School Board

County of Chesterfield

U.S. Department of Defense

Amazon Fulfillment Services

HCA Virginia Health System

Dinwiddie County:

Walmart Distribution Center

Central State Hospital

Amazon Fulfillment Center

Dinwiddie County School Board

Southside Virginia Training Center

Goochland County:

Capital One Bank

CarMax Auto Superstores

Goochland County School Board

Luck Stone Corporation

Performance Food Group, Inc.

Greensville County and City of Emporia:

Greensville Correctional Center

Boars Head Provisions Company

Greensville County Schools

Western Express, Inc.

Beach Mold & Tool, Inc.

Hanover County:

Hanover County School Board

Bon Secours Health Systems Inc.

Kings Dominion

County of Hanover

Tyson Farms

Henrico County:

Henrico County School Board

County of Henrico

Bon Secours Richmond Health System

Capital One Bank

HCA Virginia Health System

City of Hopewell:

Honeywell International

Hopewell City School Board

HCA Virginia Health System

City of Hopewell

E.I. DuPont De Nemours & Co.

New Kent County:

New Kent County School Board

County of New Kent

AHS Cumberland Hospital

Curtis Contracting Company

Food Lion

City of Petersburg:

Southside Regional Medical Center

City of Petersburg School Board

City of Petersburg

Amsted Rail Company, Inc.

Powhatan County:

Anthem

Powhatan County School Board

Virginia Department of Juvenile Justice

Powhatan Correctional Center

Deep Meadow Correctional Center

Prince George County:

U.S. Department of Defense

County of Prince George

Food Lion

U.S. Department of Justice

U.S. Army Non-Appropriated Funds Division

City of Richmond:

Virginia Commonwealth University

MCV Hospital

Richmond City Public Schools

City of Richmond

U.S. Department of Veterans Affairs

Surry County:

Dominion Energy (Surry)

S. Wallace Edwards and Sons (Surry)

Seward Lumber Company (Claremont)

Windsor Mill Company (Dendron)

(Source: www.surrycountyva.gov)

Sussex County:

Sussex I Correctional Center

Sussex II Correctional Center

Sussex County School Board

Personal Touch Home Care

County of Sussex

4.9 Transportation

The Richmond-Crater region is located at a crossroads of transportation within the Commonwealth of Virginia. Rail lines radiate outward from Richmond in all directions, with both passenger (Amtrak) and freight (CSX, Norfolk Southern) services available. It should be noted that due to the Transforming Rail in Virginia program, rail service – both passenger and freight – will be expanding in the Commonwealth. The $3.7 billion program was established to build a 21st-century rail network across Virginia. As part of the program, former Governor Northam finalized an agreement with Norfolk Southern to expand passenger service to the New River Valley, for example.

In addition to rail, the region is served by the Richmond International Airport and numerous general aviation facilities, including the Emporia/Greensville Regional Airport, Chesterfield County Airport, Dinwiddie County Airport, Hanover County Municipal Airport, New Kent Airport, Petersburg Municipal Airport, and the Wakefield Municipal Airport. The Richmond International Airport normally attracts over 3 million travelers each year, although volume has been substantially reduced since spring 2020 as a result of COVID 19. The airport has 3 asphalt-grooved runways and handles about 150,000 operations annually (landings/takeoffs), including both passenger and freight operations. As of March 2021, the airport had 7 airlines operating passenger service, including: United, American Airlines, Delta, JetBlue Airways, Southwest Airlines, Spirit, and Allegiant.

The James River is navigable by large ships up to the eastern portion of the City of Richmond at the Fall Line. The region is served by the Richmond Marine Terminal, Central Virginia's domestic and international multi-modal freight and distribution hub. The port serves waterborne, rail and truck shippers throughout the mid-Atlantic states, and is owned by the City of Richmond and leased to the Virginia Port Authority. The port handles containers, temperature-controlled containers, breakbulk, bulk, and neo-bulk cargo. James River Barge Service, a thrice-weekly Container-on-Barge service from Hampton Roads to Richmond, provides a maritime alternative to I-95 by transporting goods on the James River via barges, removing container traffic off local roads and highways. Major export/import cargoes include chemicals, pharmaceuticals, forest products, paper, machinery, consumer goods, frozen seafood, produce, campers, steel, steel products, stone, tobacco leaf, aluminum, project cargo, vehicles, boats, wire coils, wire rods, pipe, and aplite. The port is the westernmost commercial maritime port on the North Atlantic coast.

Several interstates intersect the Richmond-Crater region. Interstate 64 is an east-west route extending from Norfolk to Staunton, Virginia. Interstates 95 and 85 are north-south routes, with I-95 being the primary route along the East Coast, extending from Maine to Florida, and I-85 serving as the main route between Richmond and Atlanta, Georgia. In addition, Richmond is encircled by I-195, I-895 (a toll road), and I-295 which begins north of Richmond in Henrico County, passing through Charles City County, extending through the

City of Hopewell to the City of Petersburg, providing an alternative to I-95 through the heart of Richmond. Interstate I-95 continues to be upgraded, including bridge improvements and other minor paving and shoulder improvements/repairs. A number of large U.S. highways also service the region, including: U.S.460, U.S.58, U.S.250, U.S. 522, U.S. 33, U.S. 1, U.S. 301/SR 2, U.S. 360, and U.S. 60. The state road network is extensive throughout the region. Some of the major routes include SR-6, SR-10, SR-54, SR-156, SR-288, SR-249, SR-155, and SR-5. U.S. 460 connects the City of Petersburg area with Norfolk and the ports of Hampton Roads, and U.S. 58 passes through the City of Emporia along Virginia's southern border. Henrico County is the only county in the region that maintains its own roads. The City of Richmond maintains its own road network.

4.10 Infrastructure

4.10.1 Electric

The Richmond-Crater region has five electricity suppliers: investor-owned Dominion Energy and three electric cooperatives – Prince George, Southside, and Mecklenburg

The western portions of New Kent County are on a "looped" scheme for electricity. If one portion of this area were to lose power, it could regain power rather easily because it is tied into the system. Dominion Energy has not found it to be cost-effective to institute a similar system in the eastern portion of the county and therefore this area is prone to electrical outages.

Two power substations provide electricity to Charles City County. Efforts are underway to ensure that the courthouse and municipal complex are on both grids. In addition, Ingenco, located at the landfill, provides electricity to the power grid.

Powhatan County is served by Dominion Energy (61% of the county) and Southside Electric Cooperative (39% of the county). Power outages primarily occur here because of ice or wind storms. Most of the Southside Electric grid is powered by one substation in the county, and the majority of the Dominion Energy feeds that serve the county enter on two distribution lines from substation(s) in Chesterfield.

4.10.2 Natural Gas

Natural gas is provided to the region by: the City of Richmond (City of Richmond and Henrico County); Virginia Natural Gas (Hanover, New Kent, and Charles City Counties); and Columbia Gas of Virginia (all remaining localities).

4.10.3 Telephone

Local telephone service is provided throughout Greater Richmond by Verizon Communications Inc. AT&T and Cavalier Telephone are the largest competitive providers. An extensive fiber optic network with digital switching capability and Synchronous Optical Network self-healing fiber optic rings insures uninterrupted service. Special Access

Services (DS1, DS3, OC-12 and OC-48) are available throughout the area. Verizon can provide dual capacity. Major long-distance carriers include AT&T, Verizon, and Sprint.

Telephone service providers are declining in importance as the percentage of homes in Virginia with land line service is now below 40% and dropping. Cell service providers are numerous and varied, but the providers with the most pervasive coverage in Virginia are the four major cell phone networks: AT&T, Verizon, Sprint, and T-Mobile. Verizon's 3G and 4G LTE cover the greatest percentage of the state at 93%, but AT&T is close behind at 90%. T-Mobile and Sprint also provide service coverage.

4.10.4 Public Water and Wastewater

In the region, public water and wastewater treatment is available in the City of Richmond and Hanover (including the Town of Ashland), Henrico, New Kent, and Powhatan Counties. Public water is also provided by the Appomattox River Water Authority, Chesterfield County, Dinwiddie County Water Authority, City of Emporia, Greensville County Water and Sewer Authority, Town of Jarratt, Town of McKenney, Petersburg and Dinwiddie Water Authority, City of Petersburg, Prince George County, City of Richmond, Town of Stony Creek, Surry County, Sussex Service Authority, and Virginia American Water Company. Private well and septic systems serve Charles City and Goochland Counties. Portions of Hanover, Henrico, and New Kent Counties are also served by private systems.

In Powhatan County, a public waterline runs from the Chesterfield County line to the eastern end of Route 60. Other providers are Aqua-Virginia, which serves the Courthouse area and portions of the Route 60 corridor, and Founder's Bridge Utility Company, which provides water to a few specific areas.

4.10.5 Cable Television, Broadband and Internet Providers

Cable television and internet service are almost always provided by the same companies. In the Richmond-Crater region, the primary providers are: Xfinity, Verizon FIOS, Verizon, Viasat, HughesNet, Comcast, and Cox Communication. Other providers are DISH, DIRECTV, Frontier FiberOptic, Spectrum, and Sparklight (CableONE).

The most common wired broadband internet connections in the greater Richmond area are provided via cable (97.38% coverage) and fiber (81.71% coverage), according to BroadbandNOW. Regular cable TV providers (using pre-existing TV wires) are the primary source for cable-based home internet service. Fiber technology, which uses fiber-optic lines, can be faster but because not all fiber connections can reach all subscriber addresses, some switch to copper cables nearby and thus do not necessarily offer true gigabit speeds.

The most commonly available internet option for Richmond-area residents is Viasat Internet. HughesNet is close behind, offering mostly satellite-based service. There are 18 internet service providers in Richmond, 8 of which offer residential service.

Outside of the Richmond area, there are usually 2 to 3 providers of internet service in any given area, but the more rural the area, the less likely it is to have access to broadband service. The Virginia Telecommunications Initiative, a $29.6 million initiative to extend broadband to lesser-served communities in Virginia, will begin accepting applications in June 2022, with announcement of the awards in December 2022. Counties in the Richmond-Crater region that are currently listed as applying for assistance are: Charles City County, Chesterfield County, Dinwiddie County, Greensville County, Hanover County, Henrico County, New Kent County, Sussex County, Goochland County, and Powhatan County,

5.0 Hazard Identification, Risk Assessment (HIRA) and Vulnerability Analysis

5.1 Updates for 2022

The 2022 update to the HIRA includes information on the most recent hazard occurrences, and updates regarding the frequency analysis and annualized damages to reflect recent history. Exposure data from Hazus and updated vulnerability data for flood, earthquake and wind from Hazus were included.

Each hazard was assessed for three new components of risk: 1) social vulnerability; 2) impacts of climate change; and 3) mass evacuation impacts. Following committee discussion, "Thunderstorms and Lightning" were removed from the plan due to the low risk and vulnerability associated with that hazard. The PDCs and Committee considered Radon Exposure and Infectious Diseases worthy of inclusion in the updated plan. A revised system of ranking the hazards was added as well. The tables at the end of the section regarding Conclusions on Hazard Risk were all updated. All figures were updated to reflect current conditions.

5.2 Introduction

The purpose of the HIRA is to identify the hazards that could affect the planning regions. The hazards are individually profiled to describe historical hazard events and determine what areas and community assets are the most vulnerable to damage from these hazards. The vulnerability analysis includes estimated losses for each hazard and a summary prioritization of hazards in terms of potential risks to the community.

The hazards discussed in this section are as follows:

Flooding

Flooding due to Impoundment Failure

Severe Wind Events

Tornadoes

Wildfires

Severe Winter Weather

Thunderstorms (including Hail & Lightning)

Droughts and Extreme Heat

Earthquakes

Landslides

Shoreline Erosion

Sinkholes

Radon Exposure

Infectious Diseases

5.2.1 Methodologies Used

Data from the National Centers for Environmental Information (NCEI) Storm Events Database were used to inform the weather-related hazard identification. The NCEI receives storm data from the National Weather Service (NWS), which in turn receives it from a variety of sources, which include but are not limited to: county, state, and federal emergency management officials, local law enforcement officials, Skywarn spotters, NWS damage surveys, newspaper clipping services, the insurance industry, and the general public. Information on hazard events not recorded in this database is provided in narrative format for each hazard subsection to supplement the NCEI data and to provide a more accurate depiction of historical hazard events in the region.

Two distinct risk assessment methodologies were used in the formation of the vulnerability assessment. The first consists of a quantitative analysis that relies upon best available data and technology, while the second approach consists of a somewhat qualitative analysis that relies on the local knowledge and rational decision making skills of local officials. Upon completion, the methods are combined to create a "hybrid" approach for assessing hazard vulnerability for the region that allows for some degree of quality control and assurance. The methodologies are briefly described and introduced here and are further illustrated throughout this section.

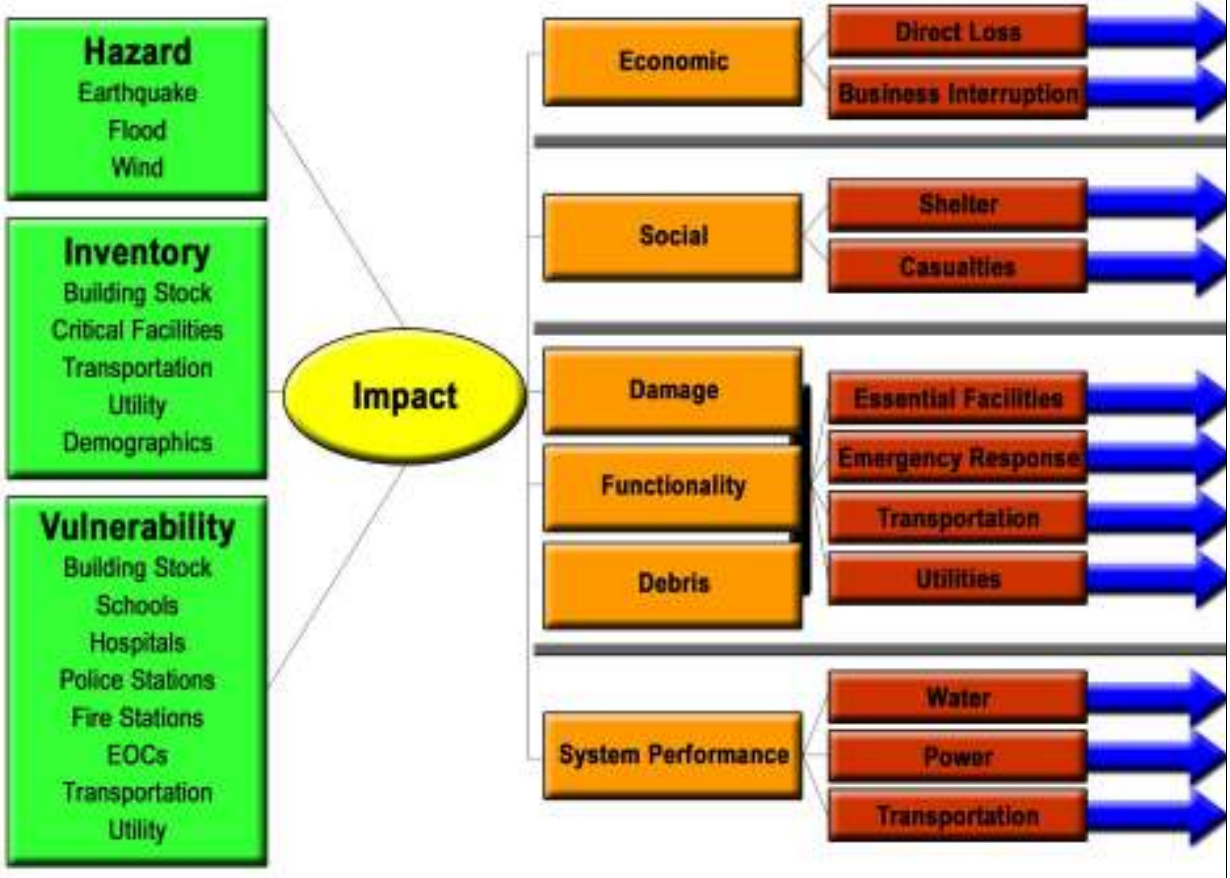
The quantitative assessment involved the use of the most recent version of Hazards U.S. Multi-Hazard software (Hazus), a geographic information system (GIS)-based loss estimation tool available from FEMA, along with a statistical risk assessment methodology for hazards outside the scope of Hazus. For the flood hazard, the quantitative assessment incorporates a detailed GIS-based approach. When combined, the results of these vulnerability studies are used to form an assessment of potential hazard losses (in dollars) along with the identification of specific community assets that are deemed at-risk.

Hazus is FEMA's standardized loss estimation software package, built on an integrated GIS platform using a national inventory of baseline geographic data (including information on the region's general building stock and dollar exposure). Originally designed for the analysis of earthquake risks, FEMA expanded the program in 2003 to allow for the analysis of multiple hazards: namely the flood and wind (hurricane wind) hazards. By providing estimates on potential losses, Hazus facilitates quantitative comparisons between hazards and assists in the prioritization of hazard mitigation activities.

Hazus uses a statistical approach and mathematical modeling of risk to predict a hazard's frequency of occurrence and estimated impacts based on recorded or historic damage information (see **Figure 5.1**). The Hazus risk assessment methodology is parametric, in that distinct hazard and inventory parameters—such as wind speed and building type—were modeled using the Hazus software to determine the impact on the built environment.

Figure 5.1 shows a conceptual model of Hazus methodology. More information on Hazus loss estimation methodology is available through FEMA at www.fema.gov/hazus.

Figure 5.1: Conceptual Model of Hazus Methodology



Source: FEMA

This risk assessment used Hazus to produce regional profiles and estimated losses for three of the hazards addressed in this section: flooding, tropical storm winds, and earthquake. For each of these hazards, Hazus was used to generate probabilistic "worst case scenario" events to show the extent of potential damages. Both earthquake and wind were modeled using Hazus Level 1 and flood was modeled using Hazus Level 2.

For hazards outside the scope of Hazus, a statistical risk assessment methodology was designed and in previous plans, this method was applied to generate potential loss estimates. The approach was based on the same principles as Hazus, but did not rely on readily available automated software. In recent years, the historical data from which hazard assessment conclusions were made have become less reliable. For example, damages for wildfire were not reported for the two most recent reporting periods, and the communities reviewing the historical damage data from the NCEI expressed concern that

the damages were severely underestimated. Until more reliable historical damage data can be provided, planners determined that a qualitative methodology for examining historical losses and making conclusions about future risk was needed as shown below to supplement the quantitative analysis.

Despite the shortcomings of certain historical data, this analysis included collection of and updates to relevant GIS data from local, state and national sources. These sources include each community's GIS department, FEMA, VDOF, and NOAA. Once all data were acquired, GIS was used to demonstrate and spatially analyze risks to people, public buildings and infrastructure. Primary data layers included geo-referenced point locations for public buildings, critical facilities, and infrastructure elements. Using these data layers, risk was assessed and described by determining the parcels and/or point locations that intersected with the delineated hazard areas.

The qualitative assessment relies less on technology and more on historical and anecdotal data, community input, and professional judgment regarding expected hazard impacts. The qualitative assessment completed for the Richmond-Crater region is based on committee member dot voting to indicate their priorities for mitigation spending. The members present at the first planning workshop on June 21, 2021, were awarded hypothetical "mitigation grants" in the following amounts: 1 - $1,000,000 grant; 2 - $250,000 grants; and 4 - $25,000 grants.

Each participant was then tasked with determining how they would spend their mitigation dollars. The groups were reminded that projects must be cost-beneficial and that FEMA urges communities to "prioritize mitigation actions based on level of risk a hazard poses to lives and property." Each participant voted in the online forum for the hazards they considered a priority for spending. Results are shown in a series of tables at the end of this section. Communities were reminded of a full range of hazards, including the hazards in the previous hazard mitigation plan as well as Infectious Disease and Radon Exposure. Although the list was not a comprehensive list of all hazards that may ever impact the region, the resultant hazards summarized in this section were determined by committee members to be the necessary hazards for the purposes of determining mitigation actions.

While the quantitative assessment focuses on using best available data, computer models and GIS technology, this qualitative ranking system relies more on historical data, local knowledge, and the general consensus of the planning committee. The results allow identified hazards to be ranked against one another.

Using both the qualitative and quantitative analyses to evaluate the hazards that impact the region provided planning committee members with a dual-faceted review of the hazards. This allowed officials to recognize those hazards that may potentially be costly, but also to plan and prepare for hazards that may not cause much monetary damage but could put a strain on the local resources needed to recover.

All conclusions of the vulnerability assessment completed for the region are presented in "Conclusions on Hazard Risk" at the end of this section. Qualitative findings for each hazard are detailed in the hazard-by-hazard vulnerability assessment that follows,

beginning with an overview of general asset inventory and exposure data for each jurisdiction.

5.2.2 National Risk Index

The National Risk Index (NRI) is a relatively new dataset and online application from FEMA that identifies communities most at risk to various natural hazards. For each of the 18 natural hazards explored, risk is calculated by multiplying each hazard's expected annual losses by social vulnerability (a consequence enhancing component of risk that measures the susceptibility of social groups to the adverse impacts of natural hazards) and dividing by community resilience (a consequence reduction component of risk that measures the ability of a community to plan for, absorb, recover from and adapt to the impacts of hazards). In other words:

$$Risk = Expected\ Annual\ Loss \times Social\ Vulnerability \times (1/Community\ Resilience)$$

In the risk equation, each component is represented by a unitless index score that depicts a community's score relative to all other communities at the same level. The Risk Index score is a unitless index and represents a community's relative risk in comparison to all other communities at the same level. All calculations are performed separately at two levels—County and Census tract—so scores are relative only within their level. It must be stressed that scores are relative, representing a community's relative position among all other communities for a given component and level. Scores are not absolute measurements and should be expected to change over time either by their own changing measurements or changes in other communities.

For every score, there is also a qualitative rating that describes the nature of a community's score in comparison to all other communities at the same level, ranging from "Very Low" to "Very High." Because all ratings are relative, there are no specific numeric values that determine the rating. For example, a community's Risk Index score for a single hazard could be 8.9 with a rating of "Relatively Low," but its Social Vulnerability score may be 11.3 with a rating of "Very Low." The rating is intended to classify a community for a specific component in relation to all other communities at the same level.

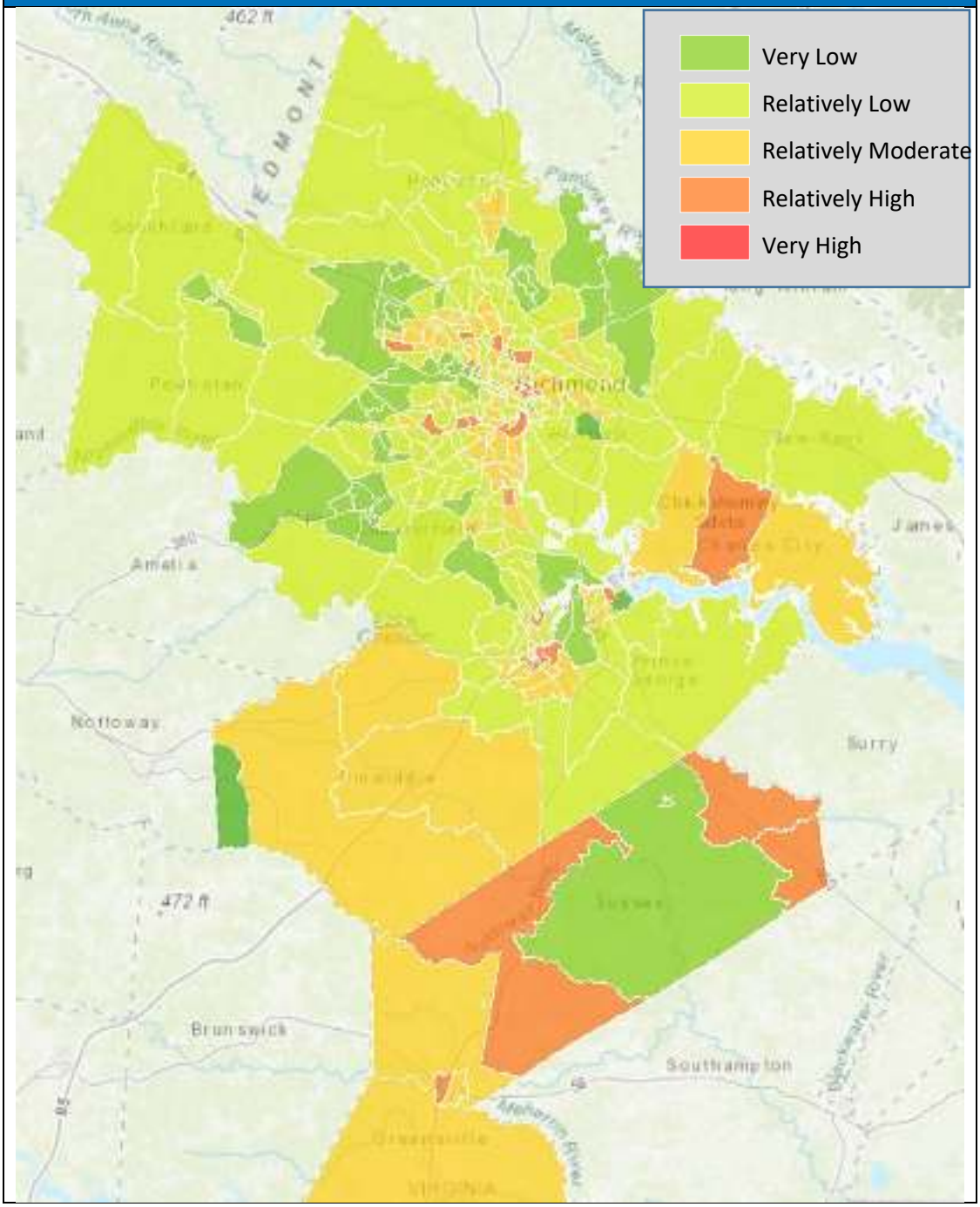
Source data for the social vulnerability component is derived from University of South Carolina's Hazards and Vulnerability Research Institute (HVRI) Social Vulnerability Index (SoVI). SoVI is a location-specific assessment of social vulnerability that utilizes 29 socioeconomic variables that contribute to a community's reduced ability to prepare for, respond to, and recover from hazards:

Median gross rent for renter-occupied housing units
Median age
Median dollar value of owner-occupied housing units
Per capita income
Average number of people per household
% population under 5 years or age 65 and over
% civilian labor force unemployed
% population over 25 with <12 years of education
% children living in married couple families
% female
% female participation in the labor force
% households receiving Social Security benefits

% unoccupied housing units
% families with female-headed households with no spouse present
% population speaking English as second language (with limited English proficiency)
% Asian population
% African American (Black) population
% Hispanic population
% population living in mobile homes
% Native American population
% housing units with no car available
% population living in nursing facilities
% persons living in poverty
% renter-occupied housing units
% families earning more than $200,000 income per year
% employment in service occupations
% employment in extractive industries (e.g., farming)
% population without health insurance (County SoVI only)
Community hospitals per capita (County SoVI only)

Figure 5.2 shows the foundational social vulnerability for the study area using the factors above, without analysis of resilience or loss data for a particular hazard. This map is used to interpret social vulnerability for hazards not specifically addressed in the NRI such as sinkholes. The map data are also used to rate mitigation actions for those hazards. This plan uses the full NRI dataset to produce maps of relative social vulnerability to several of the prominent natural hazards, including: flooding, severe wind events, and tornadoes.

Figure 5.2: NRI Social Vulnerability of the Study Area



Source: National Risk Index for Natural Hazards, FEMA 2021

Note: The Town of Surry is mapped in the *2022 Hampton Roads Hazard Mitigation Plan Update*; social vulnerability rating for the town is relatively moderate north of Route 10, and relatively low south of Route 10.

5.2.3 General Asset Inventory

The total dollar exposure of buildings within the study area is estimated to be $166 billion. This figure is based on the total number of buildings located throughout the region based on the Hazus default inventory (**Table 5.1**). The data provide an estimate of the aggregated replacement value for the region's assets and indicate that at least 61-percent of the structures are of wood construction.

Table 5.1: Exposure of the Built Environment

Community	Building Inventory by Type of Construction			
	Wood	Manufactured Homes	Masonry, Concrete, Steel	Total
Goochland County	$2,351,402,000	$26,620,000	$1,194,603,000	$3,572,625,000
Hanover County, inc. Ashland	$10,323,535,000	$41,239,000	$6,111,963,000	$16,476,737,000
Henrico County	$27,935,064,000	$24,559,000	$17,284,140,000	$45,243,763,000
New Kent County	$1,828,641,000	$23,172,000	$831,277,000	$2,683,090,000
Powhatan County	$2,518,231,000	$23,597,000	$1,200,380,000	$3,742,208,000
Richmond	$15,310,205,000	$38,719,000	$13,797,923,000	$29,146,847,000
Charles City	$523,409,000	$27,482,000	$271,230,000	$822,121,000
Chesterfield County	$29,732,123,000	$126,389,000	$15,045,912,000	$44,904,424,000
Colonial Heights	$1,484,948,000	$510,000	$1,079,487,000	$2,564,945,000
Dinwiddie County	$1,832,966,000	$89,731,000	$974,490,000	$2,897,187,000
Emporia	$356,446,000	$5,176,000	$389,636,000	$751,258,000
Greensville County, inc. Jarratt	$491,746,000	$51,033,000	$366,232,000	$909,011,000
Hopewell	$1,532,553,000	$6,872,000	$1,016,928,000	$2,556,353,000
Petersburg	$2,242,405,000	$21,342,000	$2,209,937,000	$4,473,684,000
Prince George County	$2,359,394,000	$53,205,000	$1,283,049,000	$3,695,648,000
Surry County	$509,304,000	$26,917,000	$259,858,000	$796,079,000
Sussex County, inc. Stony Creek, Wakefield, Waverly	$541,312,000	$58,292,000	$423,059,000	$1,022,663,000
Totals	**$101,873,684,000**	**$644,855,000**	**$63,740,104,000**	**$166,258,643,000**

Source: Hazus

5.3.3 Essential Facilities

There is no universally accepted definition of what constitutes essential or critical facilities and infrastructure, nor is one associated with FEMA and DMA 2000 planning requirements. However, for purposes of this Plan, essential facilities and infrastructure are identified as "*those facilities or systems whose incapacity or destruction would present an immediate threat to life, public health, and safety or have a debilitating effect on the economic security of the region.*" This typically includes facilities and systems based on

their high relative importance for the delivery of vital services, the protection of special populations, and other important functions in the region; however, for this risk analysis, the default Hazus list of essential facilities was used and includes: Emergency Operations Centers (EOC); hospitals; police stations; fire stations; schools; hazardous materials facilities; water and wastewater facilities; energy facilities (electric, oil and natural gas); and communication facilities.

Table 5.2 shows the results of a simple overlay analysis of the number of essential facilities that are located in the 100-year floodplain, 500-year floodplain, and a Storm Surge Zone for a Category 1,2,3 or 4 hurricane.

Table 5.2: Critical Facility Vulnerability Analysis

Community	100-Year Floodplain	500-Year Floodplain	Storm Surge Zone
Goochland Co	1	0	0
Hanover Co	2	1	0
Henrico Co	32 in FEMA SFHA; 8 in County floodplain*	0	0
New Kent Co	0	0	1
Powhatan Co	1	0	0
Richmond	8, inc. 2 in floodway	4	4
Charles City	0	0	3
Chesterfield Co	2, inc. 1 in floodway	1	9
Colonial Heights	2	0	1
Dinwiddie Co	2	0	0
Emporia	1, inc. 1 in floodway	2	0
Greensville Co	1	0	0
Hopewell	0	0	2
Petersburg	3	1	2
Prince George Co	0	0	0
Sussex Co	2, inc. 1 in floodway	0	0
Totals	26, inc. 5 in floodway	9	22

** Henrico County used an internally-produced list of facilities for this analysis.*

5.3 Major Disasters

Twenty-two major disasters have been declared which included at least one county or city within the planning region since 1965. Numerous "emergency declarations have also been declared supporting federal reimbursement for emergency categories of the Public Assistance Program. One third of the events were hurricane disasters, one quarter were

associated with severe storms, one fifth were snow and ice related, a few drought and flood disasters, and several unique events were included like a West Nile Virus disaster declared on May 30, 2000, support for Hurricane Katrina evacuees and the Louisa Earthquake which impacted Goochland County. Flooding is often included in severe storm, hurricane, and coastal storm disasters.

A summary of the total events declared is shown in Appendix F – HIRA. Appendix F-1 lists the presidentially declared disasters that have occurred in the Richmond-Crater region planning districts since disaster and emergency records supplemented with federal disaster declarations up to and including 2020.

5.4 Flooding

Hazard Profile

A flood occurs when an area that is normally dry becomes inundated with water. Floods may result from the overflow of surface waters, overflow of inland and tidal waters, or mudflows. Flooding can occur at any time of the year, with peak hazards in the late winter and early spring. Snowmelt and ice jam breakaway contribute to winter flooding, and seasonal rain patterns contribute to spring flooding. Torrential rains from hurricanes and tropical systems are more likely to occur in late summer. Development of flood-prone areas tends to increase the frequency and degree of flooding. The duration of flood events vary depending on the specific characteristics of the rain event. Floodwaters generally recede rapidly after the rain event has ended, but can last from a few hours to a few days.

Flooding can occur along all waterways in the region. Localized riverine flooding can occur in areas not adjacent to a major body of water. Some areas of the region are subject to tidal flooding during tropical storms and nor'easters. Flood duration is typically shorter for hurricanes and tropical storms than for riverine floods or nor'easters because the storms tend to move faster and affect only 1 to 2 tidal cycles. The main impacts from flooding include:

- Inundation of low-lying residential neighborhoods and subsequent damage to structures, contents, garages, and landscaping;
- Impassable road crossings and consequential risk for people and cars attempting to traverse flooded crossings;
- Damage to public and private infrastructure, possibly including but not limited to water and sewer lines, bridge embankments, and both small and large drainageways;
- Damage to hazardous materials facilities in the floodplain, resulting in leaching or spilling of toxic chemicals into the flooded waterways of the region;
- In coastal areas, wave action responsible for shoreline damage, and damage to boats and facilities;
- Inundation of critical facilities, possibly including some fire stations, police facilities, public shelters, EOCs, and several publicly-owned buildings. Public shelter

availability is limited by the expected severity of flooding. (See Table 5.2 for number of critical facilities in flood hazard areas.)

- Recovery time needed to bring critical infrastructure, schools and employers back online. Of particular concern in the region are transportation routes, including school bus routes, housing for displaced residents and debris management.

Communities in the study area have outlined specific plans for activating their EOC, protecting critical facilities and taking specific drainage system actions when faced with an impending flood. Since power outages and threats to the water supply can result from both the wind and flood hazard (which may occur simultaneously in the region), residents are advised of appropriate precautions and specific low-lying areas are evacuated to protect the safety of residents and responders, and to minimize loss of life.

When severe floods occur, the regional economy is severely impacted by the inability of flooded homeowners to get back to work quickly, the slow rebound of closed or debris-strewn transportation routes, the closing of schools and businesses, and the general state of emergency. Power outages and boil-water advisories are common and can affect many thousands of residents and businesses in the region for several days or even weeks if the damage is severe. Severely-flooded homes and neighborhoods result in displaced residents, including schoolchildren. Loss of life due to people traversing flooded roads, remaining in or becoming trapped in flooded structures, and curiosity-seekers watching the flooding is possible. Flooded businesses that decide to close, move or cease operations in the region have an impact on land values and the labor force, as does flood damage to the facilities of large employers in the region. Time spent repairing flood damage versus productive value-added labor is costly to employers.

Many roadways in the region are particularly vulnerable to inundation and damage from floodwaters. As a result, flooding can limit access to certain vulnerable areas, cutting off some residents from emergency services, schools and other economic foundations.

Flood damage to property and populations can be devastating, both emotionally and financially. Flood damage to businesses may result in loss of income, wages, and tax revenues. Buildings, including homes and critical facilities, are susceptible to damage and severe foundation damage or collapse as a result of a severe flood. Debris from vegetation and man-made structures is hazardous to drivers and pedestrians. In addition, floods may threaten water supplies and water quality, initiate power outages and create mold in flooded buildings. Left untreated, mold can cause respiratory illness and other maladies in a building's occupants. Other possible secondary effects of flooding include outbreaks of disease, widespread animal illnesses, disrupted utilities, water pollution especially from hazardous materials facilities in the flooded area, fires, washed out roads and culverts, and formation of sinkholes.

Location and Spatial Extent

Much of the land in the region's floodplains is designated for agricultural uses. Some localities, however, allow residential uses within agriculture areas. Agriculture is the

dominant land use in Charles City, Dinwiddie, Goochland, Greensville, Hanover, New Kent, Powhatan Counties, Prince George, Surry and Sussex Counties. Henrico and Chesterfield Counties floodplain land use is primarily parks or buffered residential. Similarly, the floodplains in the Cities of Richmond and Petersburg are primarily industrial or park land.

Areas identified as vulnerable to flooding are depicted on FEMA's Flood Insurance Rate Maps (FIRMs). These maps were developed through the NFIP and show the existing potential flood hazard areas throughout the region based on the estimated 100-year floodplain (**Figure 5.3**). In addition to flood hazard areas identified on the FIRMs, Henrico County has also created Community-Identified flood hazard areas that represent the 100-year and 500-year floodplains in areas not captured by FEMA. The 100-year floodplain represents the areas susceptible to the 1% annual flood. The maps also show the 0.2% annual flood, or 500-year floodplain. The 100-year flood, or base flood, has at least a 26% chance of occurring over the life of a typical 30-year mortgage. FIRM data is available through several sources for more detailed viewing at the parcel level:

- Paper FIRMs are required to be available for viewing in each jurisdiction that participates in the NFIP;

- The Virginia Flood Risk Information System at https://consapps.dcr.virginia.gov/VFRIS/ allows online search and downloads of statewide flood hazard zone information and other pertinent water resources data;

- The FEMA Map Service Center at https://msc.fema.gov/portal/ is the official public source for digital flood hazard information produced in support of the NFIP (although the paper FIRMs mentioned above remain the legal tool for regulating floodplains); and,

- Several localities in the study area have property information viewer tools with a flood data layer, including the following:

  Chesterfield County - https://www.arcgis.com/apps/webappviewer/index.html?id=cd20724aa8c941a093b0df70f0c558ba

  Goochland County - https://gis.co.goochland.va.us/GoochlandPV/

  Greensville County and Emporia - https://www.webgis.net/va/greensville/

  Hanover County and Ashland - https://parcelmap.hanovercounty.gov/

  Henrico County - https://henrico.maps.arcgis.com/apps/webappviewer/index.html?id=e940e72a32244bf3ae9a8098766f2bdd

  City of Hopewell - https://qpublic.schneidercorp.com/Application.aspx?App=CityofHopewellVA&PageType=Search

  New Kent County - https://parcelviewer.geodecisions.com/NewKent/

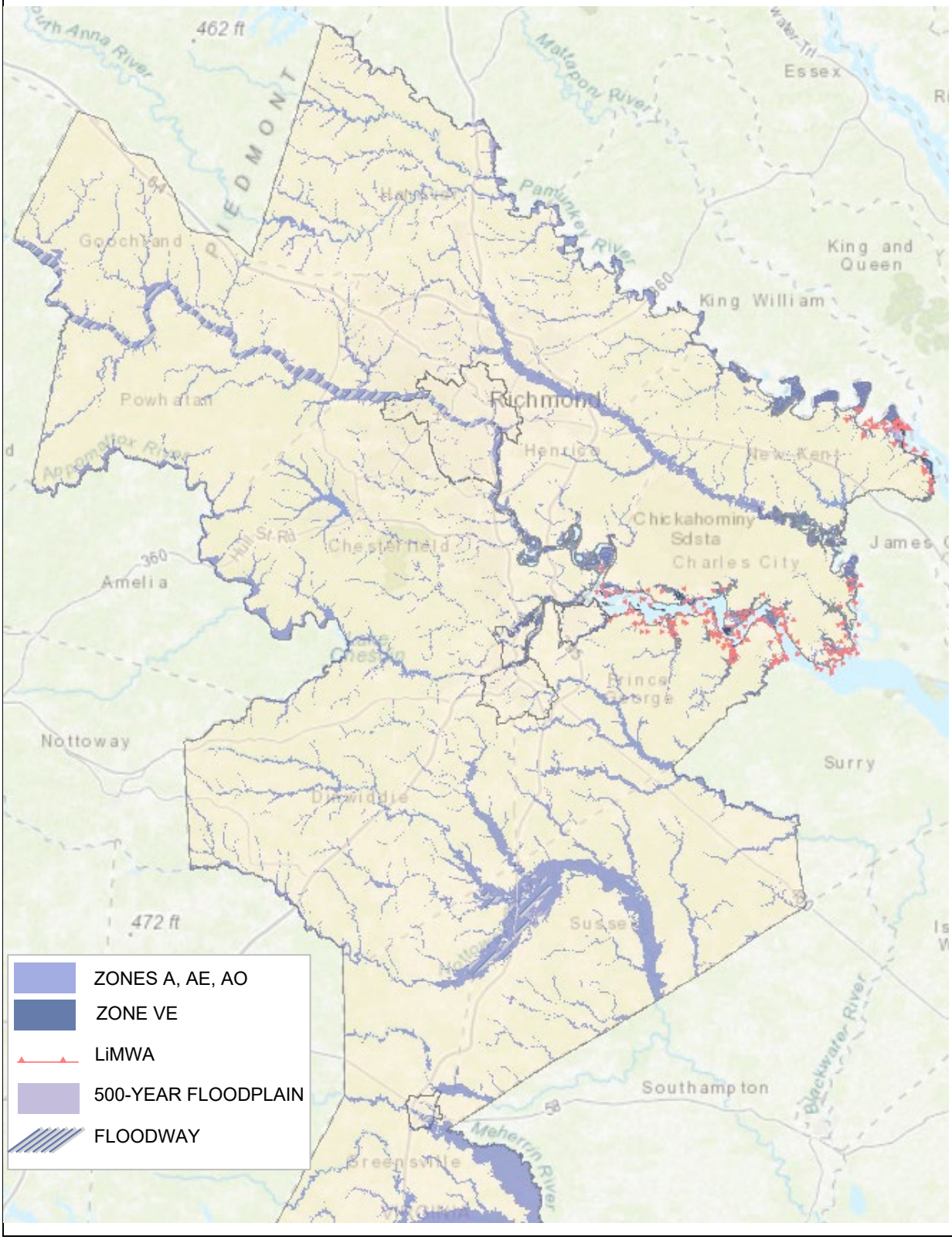
Powhatan County - https://powhatanvarealestate.org/ParcelViewer/

Prince George County - https://www.princegeorgecountyva.gov/business/gis_information/online_interactive_maps.php

City of Richmond - http://cor.maps.arcgis.com/home/webmap/viewer.html?webmap=d039492bec5346c8a75de1b6340da1c8&extent=-77.4795,37.5149,-77.4346,37.5348

Sussex County - https://parcelviewer.geodecisions.com/Sussex/

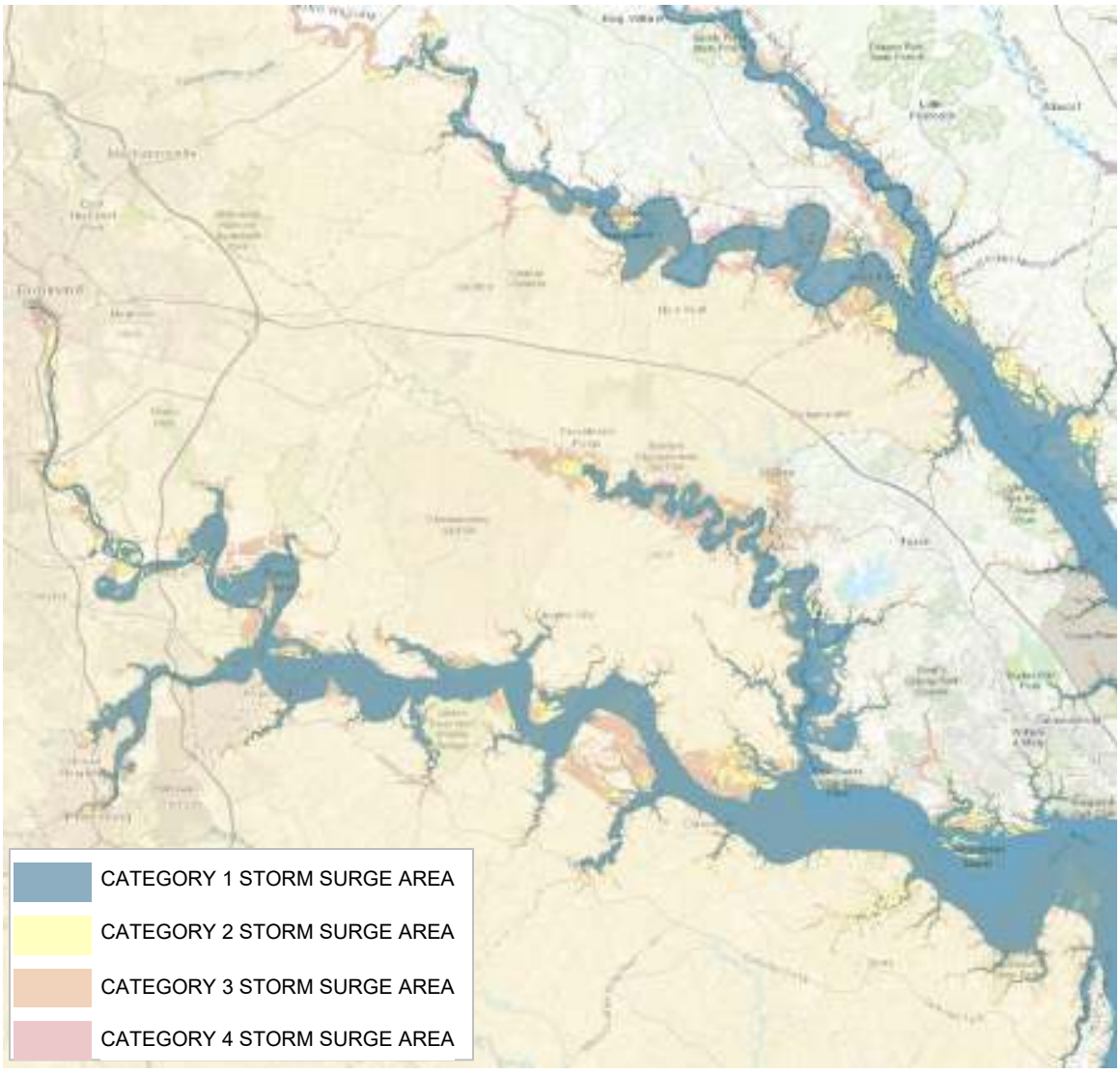
Figure 5.3: FEMA Flood Zones



Source: FEMA Flood Map Service Center, 2021

Figure 5.4a shows the most recent storm surge hazard areas that can be expected as the result of Category 1, 2, 3, and 4 hurricanes, based on the Sea, Lake and Overland Surge from Hurricanes (SLOSH) model. SLOSH is a computerized model run, conducted in this case by the U.S. Army Corps of Engineers, Norfolk District, to estimate storm surge heights resulting from hypothetical hurricanes by taking into account the maximum of various category hurricanes as determined by pressure, size, forward speed, and sustained winds. The regional analysis represents the composite maximum water inundation levels for a series of parallel tracks making landfall at various points along the coast. The SLOSH model, therefore, is best used for defining the "worst case scenario" of potential maximum surge for particular locations as opposed to the regional impact of one singular storm surge event.

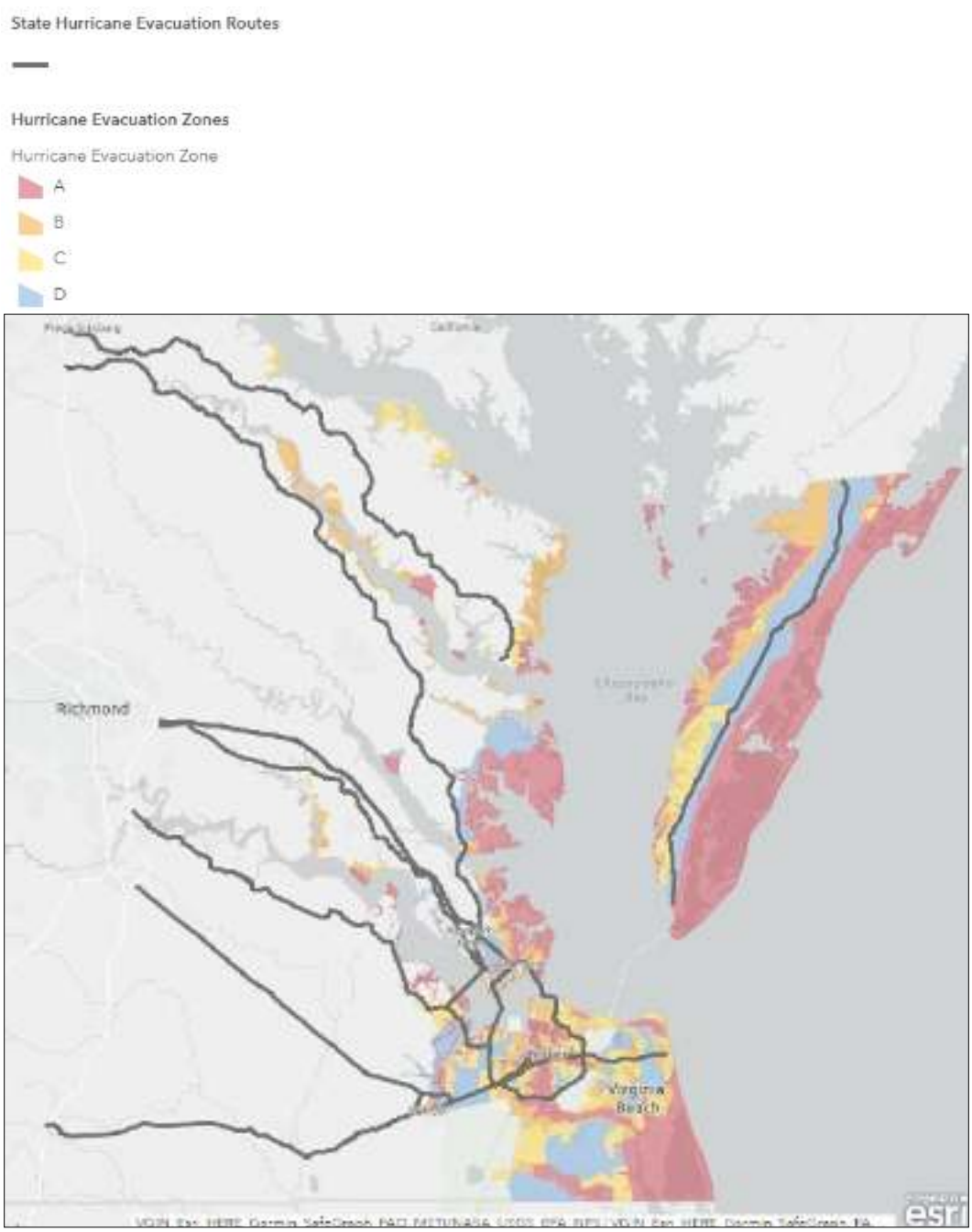
Figure 5.4a: Richmond-Crater Storm Surge Zones



Source: U.S. Army Corps of Engineers, Norfolk District, 2021

Figure 5.4b shows the Virginia Hurricane Evacuation Routes for Virginia, primarily from coastal regions inland. Termed the "Know Your Zone" initiative, this map and the effort to get the information engrained into residents' minds prior to impending hurricane-related flooding or high winds, emphasizes the importance of warning and evacuating residents and visitors well before weather conditions deteriorate. When a storm is approaching, emergency managers will determine which zones are most at risk considering the intensity, path, speed, tides and other meteorological factors. Emergency managers at the state and local level will work with local media and use social media and other tools to notify residents of impacted zones and what they should do to stay safe. Depending on the emergency, being safe might mean staying at home, a short trip to higher ground, or traveling to a different region of the state. Given the geography of the region and the reliance of the transportation system on tunnels and bridges, early evacuation is a crucial element in public safety.

Figure 5.4b: Virginia Hurricane Evacuation Routes



Source: VDEM, 2021

In addition to floodplains, tidal and non-tidal wetlands within all of the Richmond-Crater watersheds help store floodwaters, reduce erosion and filter pollutants. Wetlands are the transition area between aquatic and terrestrial habitats. A primarily low, marshy area, a wetland is saturated or even submerged all or part of the year, with soils that support unique plant and animal life. Wetlands work as a natural measure to help slow down the rising water from storms that may cause flooding, which is accomplished by acting as a giant sponge, absorbing and holding water during storms. Fast moving water is slowed by vegetation and temporarily stored in wetlands. Wetlands also filter pollutants carried by stormwater, which can be trapped by wetland vegetation. These excess nutrients are then used by the plants to promote growth.

Wetlands are resting, nesting, breeding, and spawning areas for many species of fish, shellfish, as well as other plant and animal life. More than one half of all threatened and endangered species depend on wetlands at one point of their life cycle. The study region spans a diverse range of habitats, including sandy beaches, salt marshes of the Chesapeake Bay, tidal fresh marshes, dry sandhills, seasonally wet ponds and blackwater swamps. These habitats support many rare and significant plant communities and rare species, including:

Mabee's Salamander	Ambystoma mabeei	State Threatened
Tiger Salamander	Ambystoma tigrinum	State Endangered
Henslow's Sparrow	Centronyx henslowii	State Threatened
Red-cockaded Woodpecker	Dryobates borealis	State and Federal Endangered
Peregrine Falcon	Falco peregrinus	State Threatened
Loggerhead Shrike	Lanius ludovicianus	State Threatened
Bachman's Sparrow	Peucaea aestivalis	State Threatened
Dwarf Wedgemussel	Alasmidonta heterodon	State and Federal Endangered
Yellow Lance	Elliptio lanceolata	State and Federal Threatened
Atlantic Pigtoe	Fusconaia masoni	State and Federal Threatened
Green Floater	Lasmigona subviridis	State Threatened
James Spinymussel	Parvaspina collina	State and Federal Endangered
Atlantic Sturgeon	Acipenser oxyrinchus	State and Federal Endangered
Blackbanded Sunfish	Enneacanthus chaetodon	State Endangered
Roanoke Logperch	Percina rex	State and Federal Endangered
Eastern Big-eared Bat	Corynorhinus rafinesquii macrotis	State Endangered
Tricolored bat (=Eastern pipistrelle)	Perimyotis subflavus	State Endangered
Sensitive Joint-vetch	Aeschynomene virginica	State and Federal Threatened
Virginia Quillwort	Isoetes virginica	State Endangered
Small Whorled Pogonia	Isotria medeoloides	State Endangered
New Jersey Rush	Juncus caesariensis	State Threatened
Michaux's Sumac	Rhus michauxii	Federal Endangered, State Threatened
Chaffseed	Schwalbea americana	Federal Endangered
Reclining Bulrush	Scirpus flaccidifolius	State Threatened

American Burying Beetle	Nicrophorus americanus	Federal Threatened
Virginia Piedmont Water Boatman	Sigara depressa	State Endangered
Swamp-pink	Helonias bullata	Federal Threatened, State Endangered
Narrow-leaved Spatterdock	Nuphar sagittifolia	State Threatened

Source: Virginia Natural Heritage Database Search, April 2022, online at: https://vanhde.org/species-search

Coastal wetlands absorb the erosive energy of waves, thus reducing further erosion. The vegetation provides a buffer to the shoreline from the wave action while the root systems provide support to help hold the soil together. Once plant material is removed or destroyed, the erosion potential increases dramatically. When any type of wetlands are filled in or drained, the areas designed by nature to control floodwaters from damaging storms, extreme high tides, and extreme precipitation are lost. In order to protect valuable natural communities and habitats for the rarest of plants and animals, Virginia through DCR has established natural area preserves. Existing natural area preserves in the region include: Cumberland Marsh in New Kent County; and Chub Sandhill in Sussex County.

Hazard History

Table 5.3 includes descriptions of major, recent flood events in the region. Events have been broken down by the date of occurrence and, when available, by individual community descriptions. Historical events pre-dating the 2011 version of this plan update can be found in Appendix F-2. The NCEI history reports minimal damages, no loss of life, and no injuries recorded in the 2016-2020 time period under examination; however, there were at least four water rescues during the period recorded in the database and others mentioned in news reports.

Table 5.3: History of Flood Events and Damages, 2011 – 2020*

Date	Damages
August 27, 2011	Hurricane Irene impacted the area with heavy rainfall and gusty winds which knocked power out to millions of people in the area. It took electrical crews several days to fully restore power in the planning area. Irene originated east of the Lesser Antilles and tracked north and northwest into the western Atlantic. The hurricane reached Category 3 intensity with maximum sustained winds of near 120 mph at its strongest point. The hurricane made an initial U.S. landfall in the eastern portions of the North Carolina Outer Banks on August 27, 2011, as a Category 1 hurricane. The storm then tracked north/northeast along the coast slowly weakening before making its final landfall in Brooklyn, New York on August 28 as a high-end tropical storm. Rainfall totals with the hurricane ranged from around two inches in western sections of the planning region to 5 to 9 inches in eastern sections closest to the coast. At its closest pass, Irene brought sustained winds of 30 to 45 mph with gusts of 60 to nearly 70 mph to the planning area. The winds downed power lines and trees throughout the area. A man was killed when a tree fell on his home near Colonial Heights. (Source: National Weather Service/Wakefield Office)
September 4, 2011	Tropical Storm Lee moved inland along the Mississippi/Louisiana Gulf Coast on September 4, 2011. The remnants of the weakening storm tracked northeast, producing rainfall over a wide swath extending from the Gulf Coast to New England.

Table 5.3: History of Flood Events and Damages, 2011 – 2020*	
Date	**Damages**
	Rainfall totals generally ranged from 4 to 8 inches in the planning area with the heaviest totals falling just east of Interstate 95. The rain fell on soils saturated only days earlier with Hurricane Irene's passage. The result was widespread flooding, particularly over the eastern sections of the planning region. Gusty winds in thunderstorms knocked down trees that had already been weakened from the hurricane resulting in thousands of power outages. (Source: National Weather Service/Wakefield Office)
May 18-19, 2018	Showers and thunderstorms associated with areas of low pressure along a frontal boundary produced heavy rain which caused lingering flooding across portions of central, south central, and eastern Virginia. Flooding occurred along the Chickahominy River, North Anna River, South Anna River, and Pamunkey River over a couple of days, with roads and low-lying areas near the river impacted the most. Numerous road closures in Charles City County, Chesterfield County (Otterdale Rd, Enon Church Rd off Rte 10), Dinwiddie County, Goochland County (Riddles Bridge Rd washed out), Hanover County (Horseshoe Bridge Rd, Greenwood Rd), Ashland, Henrico County (water rescue on Gayton Rd at Cedarbluff Dr, Patterson Ave, Old Springfield Rd, Laurel area, lanes of I-195 North near Broad St, Raintree area), New Kent County, Petersburg, Powhatan County, Prince George County, Richmond, Charles City County, and Hanover County. Canterbury Dam, a high hazard dam, overtopped in Henrico County causing significant impacts, including Pump Road being shut down. The county had to spend roughly $1M to fix the dam and provide overtopping protection.
June 2-3, 2018	Scattered showers and thunderstorms in advance of and along a frontal boundary produced heavy rain which caused flash flooding across portions of central Virginia. Flash flooding and many inundated roads reported in Henrico County with vehicle stuck in water on Cox Road, New Kent County with water on road at I-64, exit 220, Hanover County with a sinkhole reported near Huguenot Trail and Rte 288, Charles City County, and Hanover County with sinkhole at Crown Hill Road ($2000 damage) and Cross Corner Road washed out ($1000 damage).
June 7, 2019	Slow moving thunderstorms produced intense rainfall of 4 to 6 inches resulting in flash flooding on June 7th, causing flash flooding in Charles City County (portion of Rte 5 closed), Chesterfield County (portion of Turner Rd closed), Ashland (home flooded with $2000 damage), Hanover County (portions of East Patrick Henry Rd), Henrico County (flooding of roads in Glen Allen) and Wakefield (Hwy 460 closed at Main and Hwy 31, impacts to Virginia Diner and James River Equipment with $100,000 damage).
August 15, 2020	Scattered showers and thunderstorms associated with low pressure and a frontal boundary produced heavy rain which caused flash flooding across portions of central and southeast Virginia. Flooding reported in Chesterfield County (Old Hundred Rd, Mt Hermon Rd, water rescue at Otterdale Rd, Rte 10 in Chesterfield), Colonial Heights (2 water rescues), Hopewell, Petersburg, and northwest Prince George County.

**Flood history from 1950-2010 can be found in Appendix F-2.*
Source: NCEI, 2021

Table 5.4 provides the number of events and damage caused by recorded flood events for each jurisdiction. These results represent only events recorded by the NCEI storm events database for flood. Some of the events listed in the table may be regional in nature, impacting multiple jurisdictions. Significant tropical storm or hurricane events resulting in

flooding have been included although minor tropical storms may have resulted in flooding but may not have been recorded in the NCEI as flood events. See the tropical storm section for additional information. Chesterfield (41) and Henrico (30) Counties have the highest number of flood events, and Greensville County had over $1M in property damages during this time period.

Table 5.4: Flood Damage to Property and Crops, 1993 – October 2020

Jurisdiction	Flood Events	Property Damages	Crop Damages
Charles City County	14	-	-
Chesterfield County	41	$287,458	$2,986
City of Colonial Heights	8	$71,663	-
Dinwiddie County (inc. Town of McKenney)	11	$12,223	$3,285
City of Emporia	3	-	-
Goochland County	7	$38,818	$11,944
Greensville County (inc. Town of Jarratt)	13	$1,065,175	-
Hanover County (inc. Town of Ashland)	23	$163,993	$25,082
Henrico County	30	-	-
City of Hopewell	9	$71,663	
New Kent County	21	$109,340	-
City of Petersburg	17	$141,487	-
Powhatan County	13	$38,966	-
Prince George County	15	-	-
City of Richmond	16	$94,711	-
Surry County (inc. Towns of Claremont, Dendron, Surry)	22	$1,460,000	$750,000
Sussex County (inc. Towns of Stony Creek, Wakefield, Waverly)	18	$365,726	$62,187
Totals	**259**	**$2,461,223**	**$105,484**

Source: NCEI, February 3, 2021.

The most significant event in the past five years occurred June 7, 2019, in Sussex County. Slow moving thunderstorms produced intense rainfall of 4 to 6 inches resulting in flash flooding. Highway 460 was closed in both directions at Main Street and Highway 31 due to flooding. Flooding also impacted the Virginia Diner and James River Equipment. Property damages from this storm totaled $100,000.

Vulnerability Analysis

The vulnerability assessment for the flood hazard includes the findings of the qualitative assessment conducted, an overview of NFIP statistics, repetitive loss properties (as defined and identified by the NFIP), estimates of potential losses, future vulnerability, social

vulnerability, expected impacts from climate change and discussion on impacts related to mass evacuations.

As shown in **Table 5.5**, communities in the Richmond-Crater region joined the NFIP throughout the 1970s, 1980s and into the 1990s. In order to join the NFIP, each participating jurisdiction is required to adopt and enforce its own floodplain management ordinance. As a result, structures built after joining the NFIP are assumed to be less vulnerable to flood hazards than those built prior to joining, assuming other environmental conditions remain constant.

Table 5.5: Communities Participating in the NFIP as of March 15, 2021

Community	NFIP Entry Date	Current FIRM Effective Date
Charles City County	09/05/90	07/06/15
Chesterfield County	03/16/83	12/18/12
City of Colonial Heights	09/02/81	08/02/12
Dinwiddie County	01/17/79	10/21/21
Town of McKenney	11/20/81	No Special Flood Hazard Area identified
City of Emporia	09/30/77	07/07/09
Goochland County	03/01/79	12/02/08
Greensville County	09/29/78	07/07/09
*Town of Jarratt**	10/08/82	07/07/09
Hanover County	09/02/81	12/02/08
Town of Ashland	05/26/78	12/02/08
Henrico County	02/04/81	12/18/07
City of Hopewell	09/05/79	07/16/15
New Kent County	12/05/90	08/03/15
City of Petersburg	03/16/81	02/04/11
Powhatan County	09/15/78	02/06/08
Prince George County	05/01/80	06/02/15
City of Richmond	06/15/79	07/16/14
Sussex County	03/02/83	07/07/09
Town of Stony Creek	09/16/82	07/07/09
Town of Wakefield	03/12/14	07/07/09

*Jarratt is included in Greensville County for purposes of the NFIP.

Source: National Flood Insurance Program Community Status List, 2021

Table 5.6 provides data regarding the number of flood insurance policies and the value of those policies for NFIP-participating communities in the study area. As of April 8, 2021, there were 3,438 flood insurance policies-in-force in the region, an increase of 56 policies since June 2016. These policies amounted to more than $983 million in total insurance

coverage, an increase of 7-percent since 2016. With just over 1,400 claims filed, the NFIP has paid out $21.6 million in payments since 1978 in the Richmond-Crater region.

Just three communities in the study area have absorbed almost 84% of the NFIP claims: Richmond 52%; Henrico County 17% and Chesterfield County 15%. The Town of Surry is 0.4 miles from mapped SFHA, which is approximate Zone A of Green Swamp. The town has decided not to participate in the NFIP. In the course of investigating why Waverly is not in the NFIP, planners discovered that the boundaries of the town on the FIRM do not match State records. The FIRM town boundary is incorrect and should include SFHA of Spring Branch. A mitigation action to address this issue is included in this plan.

Table 5.6: NFIP Claim Statistics by Participating Jurisdiction												
Jurisdiction Name	**Policy Statistics**		**Claim Statistics**		**Policy Statistics**		**Claims Statistics**		**Policy Delta**		**Claims Delta**	
	2016		**1978-2016**		**2021**		**1978-2021**		**2016-2021**		**2016-2021**	
	Policies -In-Force	**Insurance In-Force**	**Total Claims**	**Total Payment**	**Policies-In-Force**	**Insurance In-Force**	**Total Claims**	**Total Payment**	**Policies -In-Force**	**Insurance In-Force**	**Total Claims**	**Total Payment**
Charles City County	20	$6,320,700	7	$42,606	21	$6,731,500	8	$51,299	1	$410,800	1	$8,693
Chesterfield County	864	$231,463,100	175	$2,580,112	903	$258,952,800	219	$3,265,460	39	$27,489,700	44	$685,348
Colonial Heights	112	$27,581,600	79	$1,061,117	93	$25,331,500	85	$1,201,552	-19	-$2,250,100	6	$140,435
Dinwiddie County	39	$10,729,600	2	$11,979	36	$10,374,600	2	$11,979	-3	-$355,000	0	$0
Town of McKenney	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Emporia	38	$5,400,900	10	$6,060	30	$5,403,500	13	$21,020	-8	$2,600	3	$14,960
Goochland County	47	$14,506,100	12	$137,267	56	$17,890,100	11	$126,623	9	$3,384,000	-1	-$10,644
Greensville County	17	$3,630,900	4	$26,145	14	$3,489,100	6	$28,061	-3	-$141,800	2	$1,916
Town of Jarratt	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Hanover County	177	$51,675,300	23	$253,608	207	$63,928,100	27	$359,874	30	$12,252,800	4	$106,266
Town of Ashland	44	$13,629,600	3	$4,655	50	$16,290,200	8	$22,009	6	$2,660,600	5	$17,354
Henrico County	986	$246,491,700	240	$2,978,970	1032	$274,960,700	303	$3,585,760	46	$28,469,000	63	$606,790
Hopewell	26	$7,607,000	11	$101,018	29	$9,569,900	17	$145,880	3	$1,962,900	6	$44,862
New Kent County	119	$34,367,100	29	$488,862	113	$33,582,000	31	$517,274	-6	-$785,100	2	$28,412
Petersburg	137	$38,183,500	76	$481,948	98	$30,180,900	88	$727,738	-39	-$8,002,600	12	$245,790
Powhatan County	30	$8,480,000	1	$4,867	38	$12,595,000	1	$4,867	8	$4,115,000	0	$0
Prince George County	94	$25,420,500	27	$223,737	92	$26,886,600	31	$248,986	-2	$1,466,100	4	$25,249
Richmond	586	$183,772,500	515	$10,666,886	582	$176,882,300	537	$11,133,693	-4	-$6,890,200	22	$466,807

Table 5.6: NFIP Claim Statistics by Participating Jurisdiction												
Jurisdiction Name	**Policy Statistics**		**Claim Statistics**		**Policy Statistics**		**Claims Statistics**		**Policy Delta**		**Claims Delta**	
	2016		**1978-2016**		**2021**		**1978-2021**		**2016-2021**		**2016-2021**	
	Policies -In-Force	**Insurance In-Force**	**Total Claims**	**Total Payment**	**Policies-In-Force**	**Insurance In-Force**	**Total Claims**	**Total Payment**	**Policies -In-Force**	**Insurance In-Force**	**Total Claims**	**Total Payment**
Sussex County	24	$5,016,700	12	$47,630	26	$6,565,700	12	$46,657	2	$1,549,000	0	-$973
Town of Stony Creek	22	$3,653,500	23	$96,039	15	$2,637,300	22	$96,039	-7	-$1,016,200	-1	$0
Town of Wakefield	0	$0	0	$0	3	$1,020,000	0	$0	3	$1,020,000	0	$0
Totals	**3,382**	**$917,930,300**	**1,249**	**$19,213,506**	**3,438**	**$983,271,800**	**1,421**	**$21,594,771**	**56**	**$65,341,500**	**172**	**$2,381,265**

Source: NFIP data, dated 6/30/2016 and 4/8/2021.

FEMA Repetitive Loss and Severe Repetitive Loss Properties

Nationwide, repetitive loss (RL) properties constitute 2% of all NFIP insured properties but are responsible for 40% of all NFIP claims. Mitigation for RL properties is a high priority for FEMA, and the areas in which these properties are located typically represent the most floodprone areas of a community.

The identification of RL properties is an important element in assessing local flood risk because the inherent characteristics of properties with multiple flood losses strongly suggest that they will be threatened by continual losses. RL properties are also important to the NFIP, since structures that flood frequently put a strain on NFIP funds. The NFIP defines an RL as any insurable building for which two or more claims of more than $1,000 were paid by the NFIP within any rolling 10-year period, since 1978.[7] A primary goal of FEMA is to reduce the numbers of structures that meet these criteria, whether through elevation, acquisition, relocation, or a flood control project that lessens the potential for continual losses.

According to FEMA, there are currently 158 RL properties within the Richmond-Crater region accounting for 468 losses. The specific addresses of the properties are maintained by FEMA, VDEM, and local jurisdictions, but are deliberately not included in this plan in accordance with the Privacy Act of 1974. More than $13.8 million has been paid in total repetitive losses, with an average claim of $30,000. **Table 5.7** shows the total number of properties, total number of losses experienced, and losses paid for all of the communities within the planning region. Historically, the majority of the RL properties are residential; however, a breakdown by property type was not provided by FEMA for this plan update.

A severe repetitive loss (SRL) property has: a) at least four NFIP claims payments of more than $5,000 each, with the cumulative amount of such claims payments exceeding $20,000; or b) at least two separate claims payments with the cumulative amount exceeding the market value of the building. As shown in Table 5.7, Chesterfield and Henrico Counties have the most SRL properties in the study area.

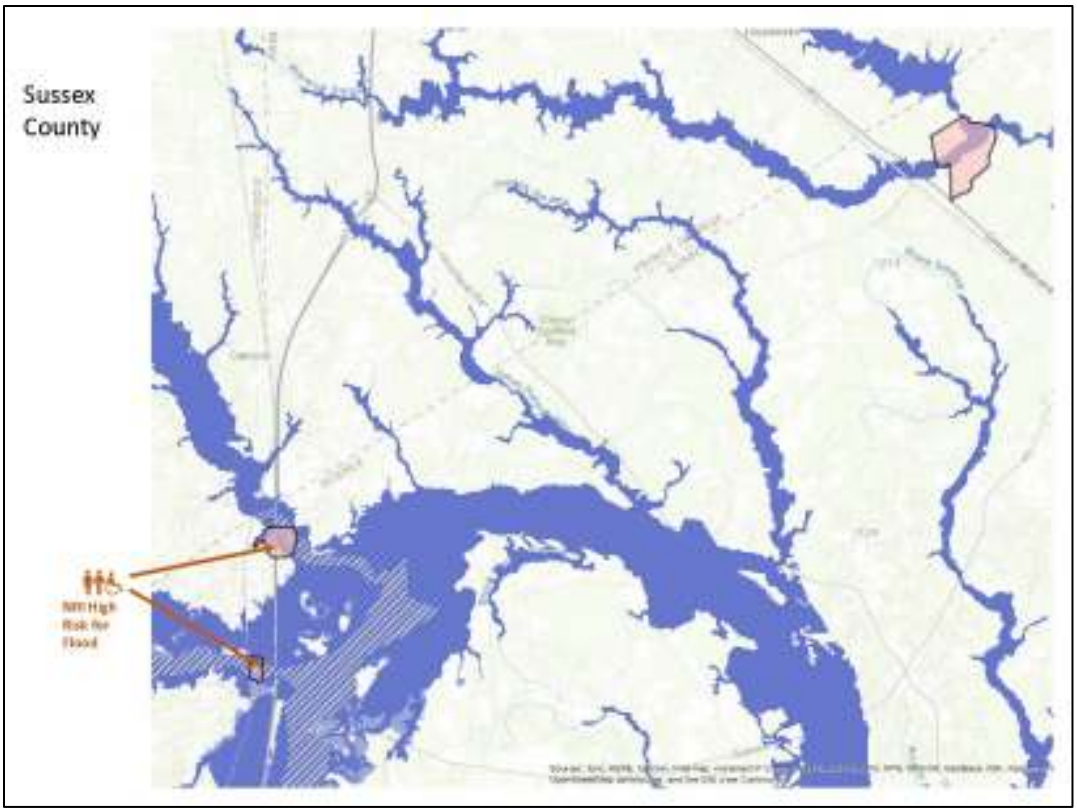
[7] The FEMA Hazard Mitigation Assistance Program defines RL as having incurred flood-related damage on 2 occasions, in which the cost of the repair, on the average, equaled or exceeded 25 percent of the market value of the structure at the time of each such flood event; and, at the time of the second incidence of flood-related damage, the contract for flood insurance contains increased cost of compliance coverage.

Table 5.7 Repetitive Flood Losses and Severe Repetitive Flood Losses				
Community	**Repetitive Flood Loss Detailed Data**			
Chesterfield County	Repetitive Flood Losses			
	Number of Properties	Value of Losses	Number of Losses	Avg Payment Per Claim
	25	$1,359,017.04	77	$17,649.57
	Severe Repetitive Losses			
	Number of Properties	Value of Losses	Number of Losses	Avg Payment Per Claim
	7	$691,300.59	33	$20,948.50
Claremont Town	Repetitive Flood Losses			
	Number of Properties	Value of Losses	Number of Losses	Avg Payment Per Claim
	4	$400,805.50	14	$28,628.97
	Severe Repetitive Losses			
	Number of Properties	Value of Losses	Number of Losses	Avg Payment Per Claim
	3	$374,116.60	12	$31,176.38
Colonial Heights City	Repetitive Flood Losses			
	Number of Properties	Value of Losses	Number of Losses	Avg Payment Per Claim
	12	$912,220.30	37	$24,654.60
	Severe Repetitive Losses			
	Number of Properties	Value of Losses	Number of Losses	Avg Payment Per Claim
	3	$324,780.80	14	$23,198.63
Dinwiddie County	Repetitive Flood Losses			
	Number of Properties	Value of Losses	Number of Losses	Avg Payment Per Claim
	1	$67,506.04	4	$16,876.51
	Severe Repetitive Losses			
	Number of Properties	Value of Losses	Number of Losses	Avg Payment Per Claim
	1	$67,506.04	4	$16,876.51
Emporia City	Repetitive Flood Losses			
	Number of Properties	Value of Losses	Number of Losses	Avg Payment Per Claim
	1	$15,358.28	3	$5,119.43
Goochland County	Repetitive Flood Losses			
	Number of Properties	Value of Losses	Number of Losses	Avg Payment Per Claim
	1	$94,689.86	3	$31,563.29
Hanover County	Repetitive Flood Losses			
	Number of Properties	Value of Losses	Number of Losses	Avg Payment Per Claim
	1	$134,119.83	2	$67,059.92

Table 5.7 Repetitive Flood Losses and Severe Repetitive Flood Losses				
Community	**Repetitive Flood Loss Detailed Data**			
Henrico County	Repetitive Flood Losses			
	Number of Properties	Value of Losses	Number of Losses	Avg Payment Per Claim
	25	$1,765,976.35	99	$17,838.14
	Severe Repetitive Losses			
	Number of Properties	Value of Losses	Number of Losses	Avg Payment Per Claim
	5	$717,634.39	40	$17,940.86
Hopewell City	Repetitive Flood Losses			
	Number of Properties	Value of Losses	Number of Losses	Avg Payment Per Claim
	1	$38,658.56	2	$19,329.28
New Kent County	Repetitive Flood Losses			
	Number of Properties	Value of Losses	Number of Losses	Avg Payment Per Claim
	3	$272,374.43	10	$27,237.44
Petersburg City	Repetitive Flood Losses			
	Number of Properties	Value of Losses	Number of Losses	Avg Payment Per Claim
	11	$530,383.70	31	$17,109.15
	Severe Repetitive Losses			
	Number of Properties	Value of Losses	Number of Losses	Avg Payment Per Claim
	2	$101,438.10	9	$11,270.89
Prince George County	Repetitive Flood Losses			
	Number of Properties	Value of Losses	Number of Losses	Avg Payment Per Claim
	3	$179,261.10	10	$17,926.11
	Severe Repetitive Losses			
	Number of Properties	Value of Losses	Number of Losses	Avg Payment Per Claim
	2	$144,808.10	8	$18,101.02
Richmond City	Repetitive Flood Losses			
	Number of Properties	Value of Losses	Number of Losses	Avg Payment Per Claim
	63	$8,019,552.70	162	$49,503.41
	Severe Repetitive Losses			
	Number of Properties	Value of Losses	Number of Losses	Avg Payment Per Claim
	1	$1,386,405.53	13	$106,646.58
Stony Creek Town	Repetitive Flood Losses			
	Number of Properties	Value of Losses	Number of Losses	Avg Payment Per Claim
	4	$47,479.36	8	$5,934.92
Sussex County	Repetitive Flood Losses			
	Number of Properties	Value of Losses	Number of Losses	Avg Payment Per Claim
	3	$31,120.50	6	$5,186.75

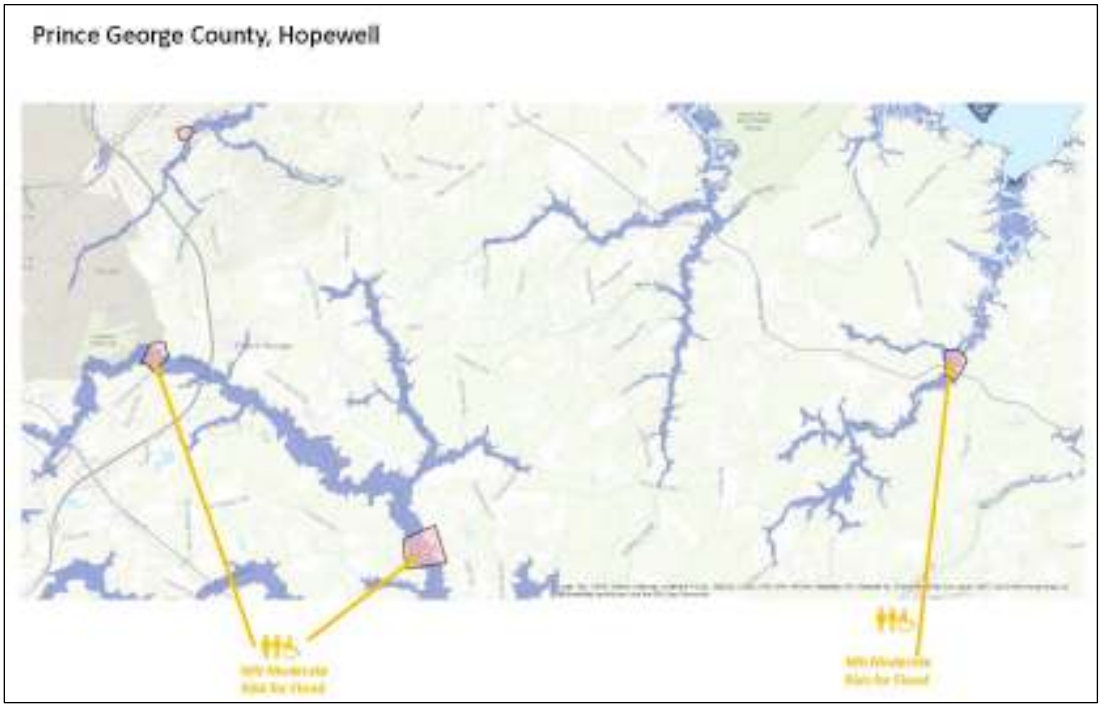
Figures 5.5a through 5.5j contain maps of the region's 59 repetitive loss areas. Each designated area shown in pink was identified by referencing maps of all historical NFIP flood claims, NFIP RL lists, the SRL list and, in some cases, Hazus results regarding predicted flood damages from a 100-year flood for individual structures. As shown in **Table 5.8**, there are 158 properties on FEMA's repetitive loss list and an additional 6,097 parcels identified as being within those repetitive loss areas. Other structures near the ones listed by the NFIP may have been uninsured during the floods, may have had single flood insurance claims, may be privately insured against flood, or may have had multiple claims under different policies that the claims system did not recognize as being the same repetitively flooded address. The NRI category for social vulnerability is noted for RL areas designated as "Relatively High" or "Relatively Moderate." There were no tracts in the Richmond-Crater region designated as "Very High" for social vulnerability to flood.

Figure 5.5a. Repetitive Loss Areas and National Risk Index Ratings of High or Moderate Risk



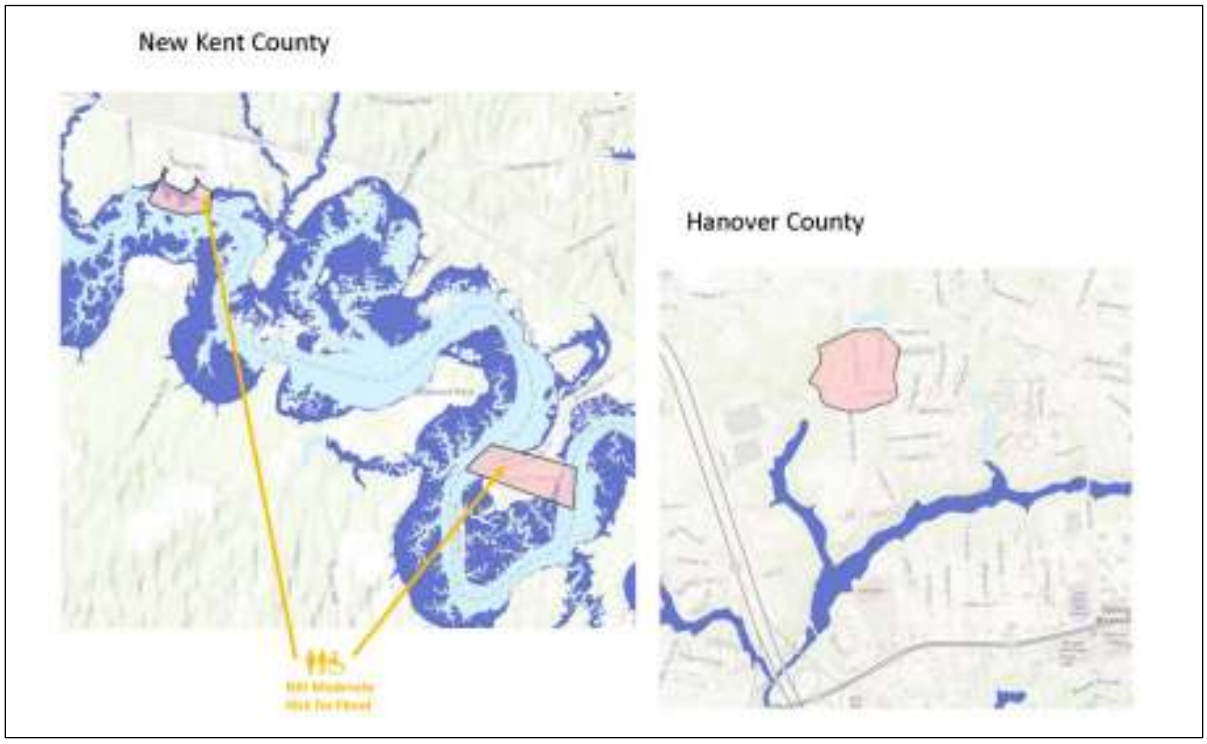
2021

Figure 5.5b. Repetitive Loss Areas and National Risk Index Ratings of High or Moderate Risk



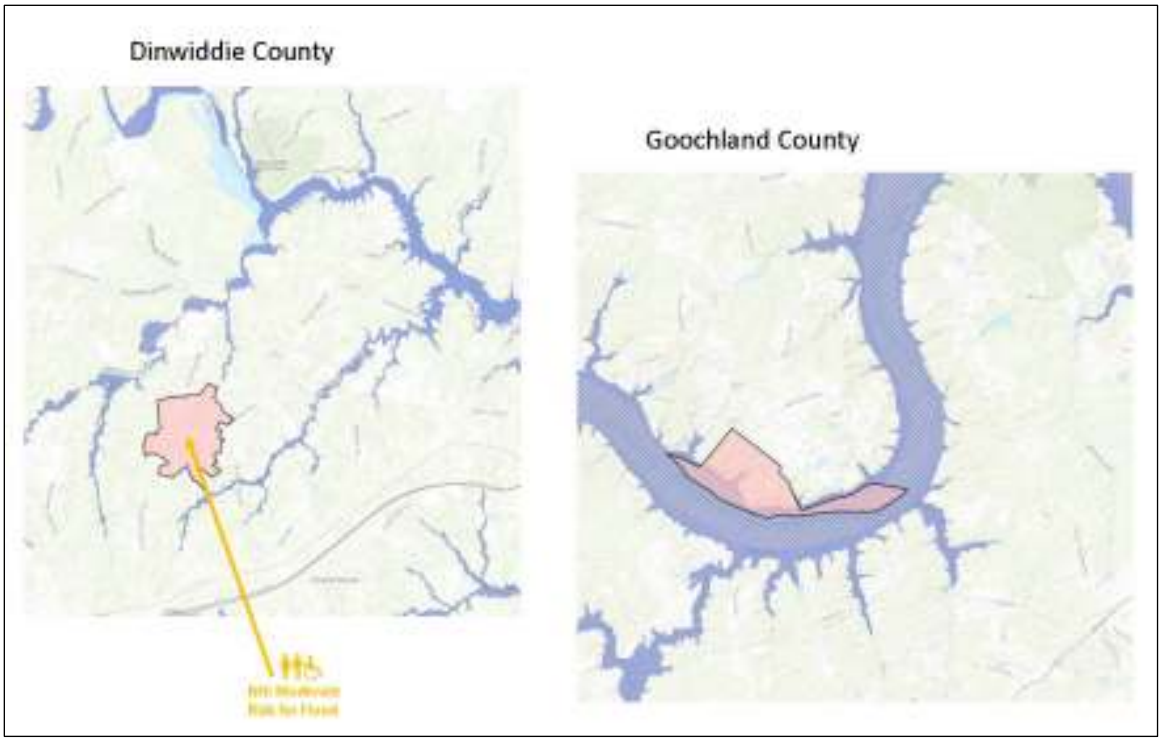
2021

Figure 5.5c. Repetitive Loss Areas and National Risk Index Ratings of High or Moderate Risk



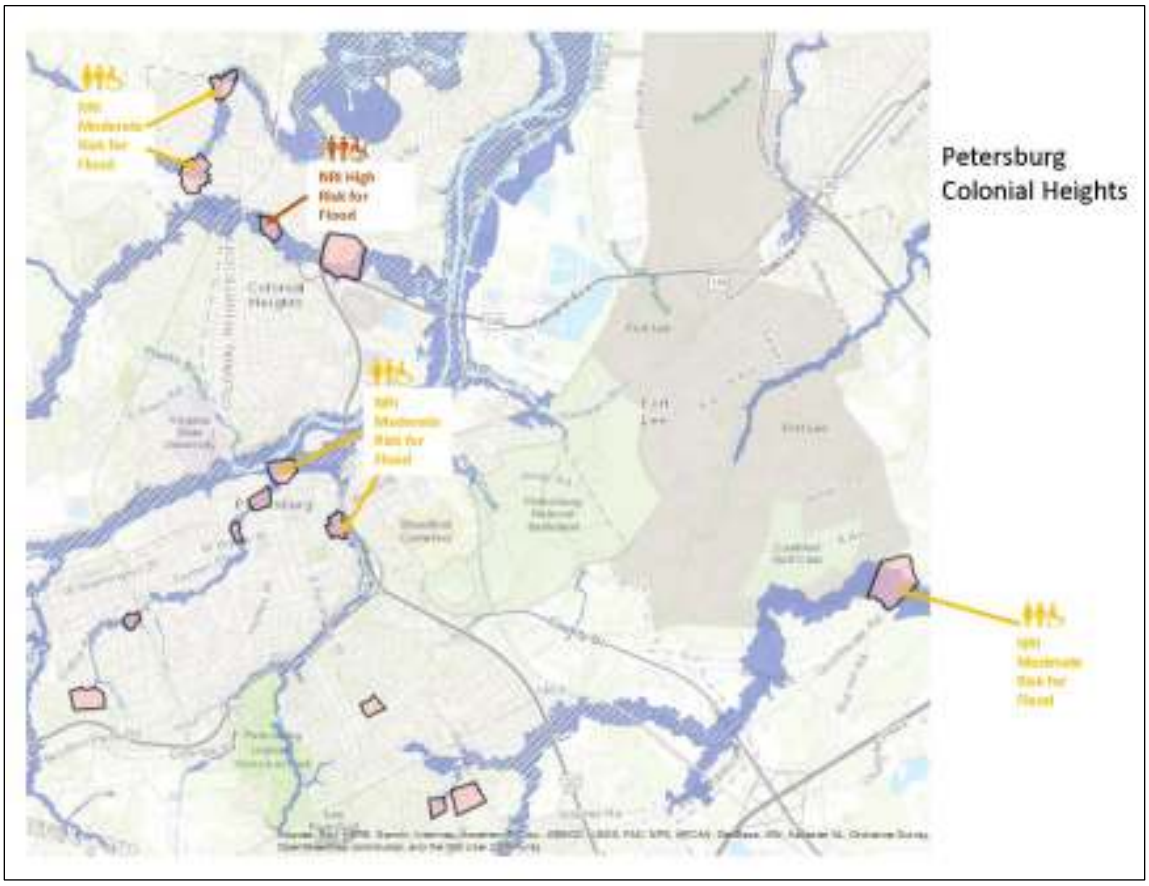
2021

Figure 5.5d. Repetitive Loss Areas and National Risk Index Ratings of High or Moderate Risk



2021

Figure 5.5e. Repetitive Loss Areas and National Risk Index Ratings of High or Moderate Risk



2021

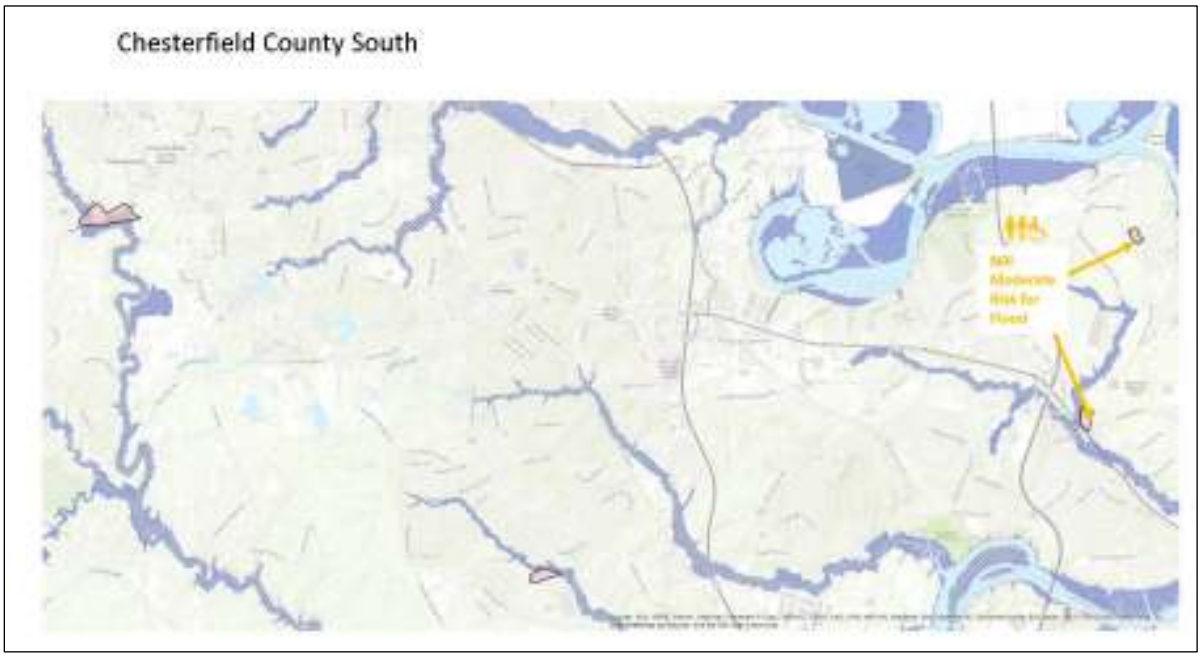
Figure 5.5f. Repetitive Loss Areas and National Risk Index Ratings of High or Moderate Risk

2021

Figure 5.5g. Repetitive Loss Areas and National Risk Index Ratings of High or Moderate Risk

2021

Figure 5.5h. Repetitive Loss Areas and National Risk Index Ratings of High or Moderate Risk

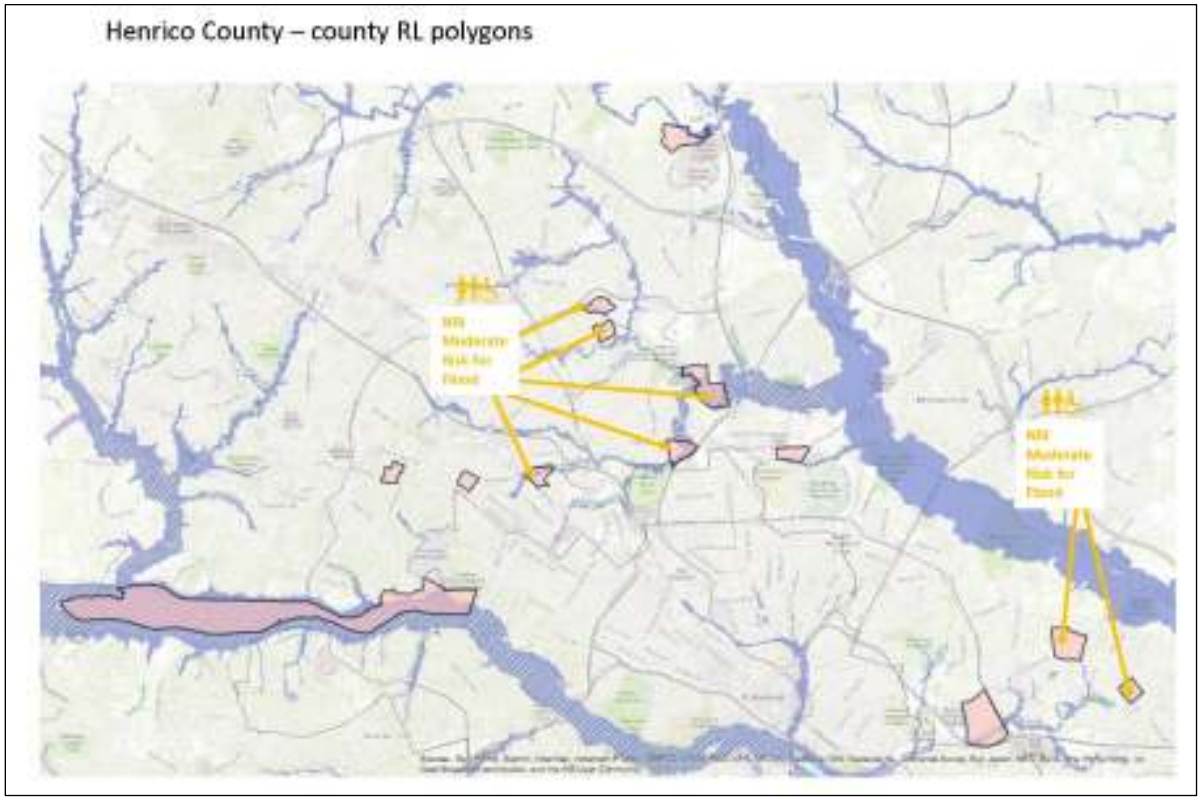


2021

Figure 5.5i. Repetitive Loss Areas and National Risk Index Ratings of High or Moderate Risk

2021

Figure 5.5j. Repetitive Loss Areas and National Risk Index Ratings of High or Moderate Risk



2021

Table 5.8: Repetitive Flood Loss Area Descriptions				
Community	Total Number of RL Areas	Number of High or Moderate Risk RL Areas	Estimated Number of Structures	Sources of Flooding
Goochland County	1	0	4	Overland flow of the James River in a large meander bend with broad floodplain on the north bank.
Hanover County	1	0	66	Area is outside the 100-year floodplain but lies between two tributaries to Beaverdam Creek.
Henrico County – from County RL polygons	13	7 Moderate	4,189	The northernmost RL area contains the 100-year floodplain of the Chickahominy River. In the western part of the county, a RL area lies outside the 100-year floodplain, near the headwaters of Little Westham Creek. One area is within the 100-year floodplain along Horespen Branch, with another area near the headwaters of Horsepen Branch. A large RL area lies along the northern bank of the James River, with the majority of the polygon within the 100-year floodplain. In the central part of the county, there are five areas with 100-year floodplain in the North Run and Upham Brook watersheds, with two along North Run Tributary 2, one at the confluence of North Run and Upham Brook, and one near the confluence of Upham Brook and Jordans Branch. Another nearby area is located in the upper portion of the Horse Swamp Creek 100-year floodplain. There are three eastern RL areas: one within the Gillies Creek 100-year floodplain, along Gillies Creek Tributary 9, near the confluence of Gillies Creek Tributary 2 and Gillies Creek Tributary 8; one area is outside of the floodplain but upstream of Tributary A to Gillies Creek Tributary 1; and one area is outside of the floodplain but upstream to Chickahominy River Tributary 17.
New Kent County	2	2 Moderate	175	Both areas are low-lying groups of residential structures in the meander bends of the Chickahominy River. The Chickahominy Shores neighborhood is on an oxbow named Turner Neck, with houses outside the 100-year floodplain, but within the storm surge zones for most hurricane categories.
Richmond	9	6 Moderate	774	The largest RL area is South Richmond, on the south side of the James River, across from Downtown. Two other areas are in the 100-year floodplain of Cannon Branch that flows between Downtown Richmond and Church Hill before entering the James River. An RL area exists along the Reedy Creek floodplain and floodway, south of Forest Hill Park, while another is in the 100-year floodplain of the James River, east of downtown near Chippenham Parkway. The remaining four areas are outside the 100-year floodplain and have stormwater-related causes.
Chesterfield County	11	4 Moderate	377	Four RL areas are along Falling Creek, or an unnamed tributary of Falling Creek near Chippenham Mall. Structures in the northernmost RL area are primarily in the 100-year floodplain of the James River, near the intersection of Old Gun Road and Cherokee Road. There are 41 structures in an RL area downstream of the Swift

Table 5.8: Repetitive Flood Loss Area Descriptions				
Community	Total Number of RL Areas	Number of High or Moderate Risk RL Areas	Estimated Number of Structures	Sources of Flooding
				Creek Lake Dam, while two other RL areas are on Timsbury Creek and an unnamed tributary of Johnson Creek. Three of the RL areas are outside the 100-year floodplain.
Colonial Heights	4	1 High, 2 Moderate	102	All four RL areas contain 100-year flood and designated floodway segments. The waterway sources are: Swift Creek (2 areas); and Oldtown Creek. The flooding to 2 apartment buildings in one area was due creek flooding during Hurricane Isabel in 2003. The flood waters rose above the 1st floor onto the 2nd floor. In 2004 the City did debris cleanup in the creek to remediate the problem. Since that time there has been little to no flooding.
Dinwiddie County	1	1 Moderate	32	Area is outside the 100-year floodplain but lies between Whipponock Creek to the south and Georges Branch to the west. Georges Branch is a tributary to Namozine Creek.
Emporia	1	1 Moderate	12	Suspected backwater flow from the Rt 58 bridge over a tributary to Metcalf Branch. Part of the RL area is designated Zone A, but no detailed study appears to have been done.
Hopewell	1	0	51	Structures are in an area outside the detailed-study 100-year floodplain and floodway of Bailey Creek, a tributary of the James River. Bailey Creek, in general, has a relatively flat watershed; the lower reaches are swampy, and flow is very sluggish.
Petersburg	9	3 Moderate	295	Five of the RL areas are along Brickhouse Run, a tributary to the Appomattox River with its headwaters in southern Petersburg. Lieutenant Run has a large backwater floodplain with designated floodway south of Washington Street that has repetitive flood losses. Poor drainage near Blackwater Swamp in the southeastern region of the City has resulted in 2 RL areas, and another RL area is not associated with any water bodies near Walnut Hill at Weyanoke Street and Arch Street.
Prince George County	2	2 Moderate	36	A low-lying part of Blackwater Swamp just north of the confluence with Dicks Branch contains over half the structures and lies within the 100-year floodplain of Blackwater Swamp. The remaining structures appear to be flooded by Wards Creek, downstream of the Rt 10 crossing and within the 100-year floodplain
Claremont	1	0	45	The single RL area is outside the 100-year floodplain as mapped by FEMA. Source of flooding suspected to be stormwater-related.
Stony Creek	1	1 High	69	The RL area is part of the floodway and 100-year floodplain of Stony Creek, east of Main Street, south of Crowder Lane toward Lee Ave on the south.
Sussex County	2	1 High	28	The westernmost area is within the 100-year floodplain of the tributaries that feed the Nottoway River near Stony Creek. The eastern RL area is along Warwick Swamp at its confluence with the Blackwater Swamp.

Estimates of Potential Losses

For the updated flood vulnerability analysis, participating communities were asked to share as much information as possible about individual structures in their communities, including:

- address;
- year built;
- number of stories;
- building cost;
- content cost;
- building type;
- square footage;
- construction class;
- foundation type;
- occupancy/use code; and/or
- Elevation Certificate data or lowest floor elevation.

As part of the flood hazard vulnerability assessments, analysts used the datasets provided by each community to construct the necessary base datasets required by Hazus to conduct a detailed, Level 2 hazard assessment wherever there are detailed FEMA flood studies. The following highlights the data source and processing methodology for each of the input datasets required by Hazus:

Flood Hazard Data and Depth Rasters

Geospatial analysts obtained the most recent effective Digital Flood Insurance Rate Map databases from the FEMA Map Service Center for the region. The 100-year floodplain boundary and associated Base Flood Elevations (BFE) were used as the flooding source input to Hazus for calculating the loss estimations.

User Defined Facilities (Building Data)

Communities provided building data in the form of either parcels, building footprints or address points. The datasets were inconsistent across the communities, but from each dataset, analysts were able to determine the basic structural attributes (i.e., value, foundation type, occupancy class, etc.) required by Hazus to perform a loss estimation. In some cases, Hazus appears to have counted structures as impacted or flooded when the parcel intersected the 100-year floodplain, but not necessarily the structure footprint, which may have artificially inflated some of the impacts.

Because of either a lack of structure-specific data or a lack of FEMA-determined BFEs in the community, the following communities were studied using a Level 1 analysis only: Charles City County, Colonial Heights, Greensville County, New Kent County, Prince George County and Sussex County. The Level 2 studies for Dinwiddie County and Powhatan County were supplemented with Level 1 analyses in areas where detailed BFEs were not available.

First Floor Elevations (FFE)

Each structure was assigned a relative FFE according to the guidelines listed in the Hazus Flood Model Technical Manual. These values were neither surveyed nor field verified but were instead algorithmic estimates provided by Hazus and subsequently adjusted for the region. This data input is identified as a potential area for increasing the accuracy of the model output in future updates to the plan. By collecting and using real-world data on FFEs, the model will provide more accurate results for individual structures.

Using the depth rasters and building data listed above, a building level 100-year flood vulnerability analysis was conducted. Hazus uses the associated 100-year depth at each structure and compares that to the assigned FFE to determine the predicted depth of flooding at each structure. Then, using depth damage curves, Hazus determines the building and content damage percentage for each structure, which corresponds to a dollar figure based on the assessed value of each structure.

Table 5.9 provides a detailed listing of the number of structures expected to be damaged, and the dollar losses predicted. In the previous regional hazard mitigation plan, the flood vulnerability results were run using a vastly different methodology, thus comparing the results and outcomes is not meaningful.

Table 5.9: Hazus 100-Year Flood Damage Vulnerability Results						
Analysis Type	**Community**	**Number of Buildings Moderately Damaged (41-50% of Value)**	**Number of Buildings Substantially Damaged (>50% of Value)**	**Building Losses**	**Content Losses**	**Inventory Losses**
Hazus Level 1	**Charles City County -** Residential	0	0	$820,000	$410,000	$0
	Commercial	0	0	$50,000	$130,000	$0
	Industrial	0	0	$10,000	$10,000	$0
	Other	0	0	$60,000	$290,000	$20,000
	Total	0	0	$940,000	$840,000	$20,000
	Colonial Heights – Residential	10	9	$21,290,000	$12,270,000	$0
	Commercial	0	0	$3,790,000	$9,130,000	$150,000
	Industrial	0	0	$270,000	$440,000	$70,000
	Other	0	0	$380,000	$1,710,000	$10,000
	Total	10	9	$25,730,000	$23,560,000	$23,0000
	Greensville County - Residential	0	0	$1,420,000	$690,000	$0
	Commercial	0	0	$100,000	$360,000	$0
	Industrial	0	0	$80,000	$180,000	$20,000
	Other	0	0	$20,000	$140,000	$0
	Total	0	0	$1,630,000	$1,360,000	$20,000
	New Kent County – Residential	1	2	$4,980,000	$257,000	$0
	Commercial	0	0	$170,000	$470,000	$20,000
	Industrial	0	0	$70,000	$100,000	$10,000
	Other	0	0	$20,000	$150,000	$0
	Total	1	2	$5,240,000	$3,290,000	$30,000
	Prince George County - Residential	2	2	$7,090,000	$370,000	$0

Table 5.9: Hazus 100-Year Flood Damage Vulnerability Results						
Analysis Type	**Community**	**Number of Buildings Moderately Damaged (41-50% of Value)**	**Number of Buildings Substantially Damaged (>50% of Value)**	**Building Losses**	**Content Losses**	**Inventory Losses**
	Commercial	0	0	$660,000	$1,470,000	$30,000
	Industrial	0	0	$190,000	$420,000	$70,000
	Other	0	0	$40,000	$3,320,000	$0
	Total	2	2	$7,980,000	$5,910,000	$90,000
	Sussex County – Residential	0	0	$1,710,000	$810,000	$0
	Commercial	0	0	$530,000	$1,730,000	$50,000
	Industrial	0	0	$80,000	$130,000	$30,000
	Other	0	0	$150,000	$780,000	$40,000
	Total	0	0	$2,470,000	$3,440,000	$110,000
Hazus Level 2	**Chesterfield County –** Residential	302	898	$419,240,000	$177,100,000	$0
	Commercial	10	4	$54,300,000	$99,560,000	$8,000,000
	Industrial	2	4	$17,250,000	$40,510,000	$5,190,000
	Other	0	7	$79,260,000	$411,960,000	$630,000
	Total	314	913	$570,061,000	$729,134,000	$13,820,000
	Dinwiddie County – Residential	1	6	$835,000	$285,000	<$500
	Commercial	0	0	$0	$0	$0
	Industrial	0	0	$0	$0	$0
	Other	0	0	$0	$0	$0
	Total	1	6	$835,000	$285,000	<$500
	Emporia – Residential	15	26	$8,930,000	$4,520,000	$0
	Commercial	0	0	$410,000	$800,000	$330,000
	Industrial	0	0	$0	$0	$0

Table 5.9: Hazus 100-Year Flood Damage Vulnerability Results						
Analysis Type	**Community**	**Number of Buildings Moderately Damaged (41-50% of Value)**	**Number of Buildings Substantially Damaged (>50% of Value)**	**Building Losses**	**Content Losses**	**Inventory Losses**
	Other	0	0	$0	$0	$0
	Total	15	26	$9,339,000	$5,326,000	$333,000
	Goochland County – Residential	10	61	$59,094,000	$23,816,000	$0
	Commercial	0	1	$1,180,000	$4,390,000	$18,000
	Industrial	1	0	$984,000	$1,918,000	$214,000
	Other	0	0	$490,000	$2,130,000	$0
	Total	11	62	$61,751,000	$32,256,000	$231,000
	Hanover County – Residential	72	215	$140,154,000	$58,688,000	$0
	Commercial	0	0	$3,610,000	$12,918,000	$4,455,000
	Industrial	0	0	$8,066,000	$23,534,000	$3,669,000
	Other	90	164	$126,577,000	$221,005,000	$170,576,000
	Total	162	379	$278,407,431	$316,143,853	$178,700,249
	Henrico County – FEMA SFHA only – Residential	197	383	$196,010,000	$109,085,000	$0
	Commercial	4	5	$78,984,000	$132,874,000	$193,000
	Industrial	2	0	$14,976,000	$36,655,000	$756,000
	Other	2	2	$30,138,000	$109,468,000	$0
	Total	205	390	$320,109,000	$388,081,000	$949,000
	Hopewell – Residential	16	15	$83,036,000	$39,785,000	$0
	Commercial	0	0	$5,765,000	$18,917,000	<$500
	Industrial	0	0	$29,104,862	$93,067,919	<$500
	Other	0	0	$0	$0	$0
	Total	16	16	$117,906,000	$151,770,000	<$500

Table 5.9: Hazus 100-Year Flood Damage Vulnerability Results						
Analysis Type	**Community**	**Number of Buildings Moderately Damaged (41-50% of Value)**	**Number of Buildings Substantially Damaged (>50% of Value)**	**Building Losses**	**Content Losses**	**Inventory Losses**
	Petersburg – Residential	7	23	$20,988,000	$11,738,000	$0
	Commercial	2	1	$2,267,000	$7,500,000	<$500
	Industrial	1	1	$5,826,000	$17,724,000	<$500
	Other	0	0	$0	$0	$0
	Total	10	25	$29,080,810	$36,961,004	<$500
	Powhatan County – Residential	3	62	$21,462,000	$7,014,000	<$500
	Commercial	0	0	$0	$0	$0
	Industrial	0	0	$0	$0	$0
	Other	0	0	$0	$0	$0
	Total	3	62	$21,462,000	$7,014,000	<$500
	Richmond – Residential	49	92	$79,071,000	$41,606,000	$0
	Commercial	2	6	$57,905,000	$82,338,000	<$500
	Industrial	7	12	$64,014,789	$146,556,947	<$500
	Other	0	3	$9,123,051	$19,266,061	$0
	Total	58	113	$210,114,000	$289,767,000	<$500
Supplementary Level 1 Analysis of Zone A areas	**Dinwiddie County –** Residential	0	0	$4,830,000	$3,580,000	$0
	Commercial	0	0	$120,000	$410,000	$0
	Industrial	0	0	$20,000	$40,000	$0
	Other	0	0	$50,000	$260,000	$0
	Total	0	0	$5,010,000	$4,290,000	<$500
	Powhatan County – Residential	0	0	$8,890,000	$4,770,000	$0

Table 5.9: Hazus 100-Year Flood Damage Vulnerability Results						
Analysis Type	**Community**	**Number of Buildings Moderately Damaged (41-50% of Value)**	**Number of Buildings Substantially Damaged (>50% of Value)**	**Building Losses**	**Content Losses**	**Inventory Losses**
	Commercial	0	0	$200,000	$610,000	$0
	Industrial	0	0	$100,000	$150,000	$10000
	Other	0	0	$120,000	$730,000	$10000
	Total	0	0	$9,310,000	$6,260,000	$30,000
Totals		**827**	**1987**	**$1,677,375,241**	**$2,005,687,857**	**$194,565,249**

Source: Hazus

Clearly, much of the Richmond-Crater region is susceptible to costly damage resulting from flood events and Figures 5.5a through 5.5j indicate where the flood risk is highest. The densely developed areas of the region (Chesterfield County, Hanover County, Henrico County and Richmond) have the highest numbers of repetitive losses and highest predicted number of structures expected to be damaged in a 100-year flood event based on the Hazus data.

The repetitive flood loss areas shown in Figures 5.5a through 5.5j indicate where within each community the flood damage has historically been highest and can be expected to continue into the future without large-scale mitigation measures to reduce flood vulnerability.

Vulnerability to stormwater flooding caused by precipitation and/or stormwater management infrastructure issues was not directly evaluated due to insufficient and inconsistent data across the study area. Although some municipalities have made progress in evaluating this specific type of flooding and have started collecting data to reflect historic occurrences and future vulnerabilities, data are not available to express quantitative risk in a meaningful way for the whole region.

Annualized NCEI Events and Damages

The NCEI flood events have been annualized and summarized in **Table 5.10**. Recurrence intervals can be estimated using the number of flood occurrences over a period of time. According to the NCEI database, there have been 259 recorded flood events for the region that have caused notable floods in the past 27 years, for a flood recurrence interval of approximately 9.6 events per year, with each event averaging about $91,000 in property and around $3,900 in crop damages, for a total of about $95,000 in average annual losses.

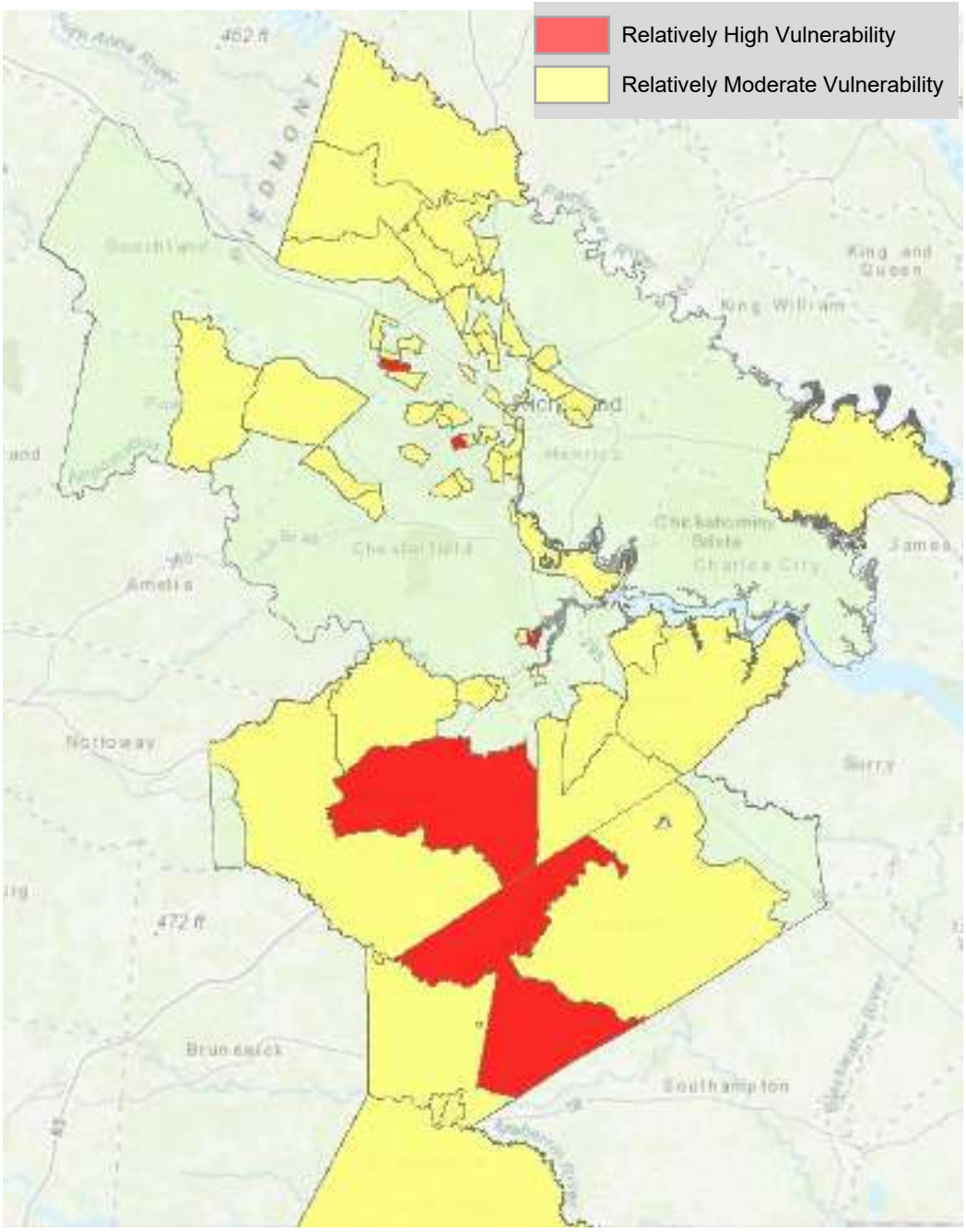
Table 5.10: Annualized Flood Events and Losses, 1993 - 2020				
Jurisdiction	**Annualized Number of Events**	**Annualized Property Losses**	**Annualized Crop Losses**	**Annualized Total Losses**
Charles City County	0.52	$0	$0	$0
Chesterfield County	1.52	$10,647	$111	$10,757
City of Colonial Heights	0.30	$2,654	$0	$2,654
Dinwiddie County (inc. Town of McKenney)	0.41	$453	$122	$574
City of Emporia	0.11	$0	$0	$0
Goochland County	0.26	$1,438	$442	$1,880
Greensville County (inc. Town of Jarratt)	0.48	$39,451	$0	$39,451
Hanover County (inc. Town of Ashland)	0.85	$6,074	$929	$7,003
Henrico County	1.11	$0	$0	$0
City of Hopewell	0.33	$2,654	$0	$2,654
New Kent County	0.78	$4,050	$0	$4,050
City of Petersburg	0.63	$5,240	$0	$5,240
Powhatan County	0.48	$1,443	$0	$1,443
Prince George County	0.56	$0	$0	$0
City of Richmond	0.59	$3,508	$0	$3,508
Surry County (inc. Towns of Claremont, Dendron, Surry)	0.81	$54,074	$27,778	$81,852
Sussex County (inc. Towns of Stony Creek, Wakefield, Waverly)	0.67	$13,545	$2,303	$15,849
Totals	**9.59**	**$91,156**	**$3,907**	**$95,063**

Source: NCEI

Social Vulnerability

Social vulnerability to flood hazard for the Richmond Crater region is shown in **Figure 5.6**, categorized by Census tract. For legibility and simplicity, only areas designated "Relatively High" or "Relatively Moderate" are shown. There were no areas of "Very High" social vulnerability to flood in the Richmond-Crater region. The map shows two large tracts of relatively high social vulnerability to flood at the boundary between Dinwiddie and Sussex Counties, as well as another tract on the south shore of Swift Creek in Colonial Heights rated as relatively high. The tract at the northeast corner of the intersection of Chippenham Parkway and Midlothian Turnpike in Richmond is rated relatively high, as is another tract just north of Patterson Avenue in Henrico County, at the boundary with Goochland County.

Figure 5.6: Social Vulnerability to Flood Hazards



Source: National Risk Index, FEMA 2021

Note: The Town of Surry has relatively moderate social vulnerability for flooding.

Future Vulnerability, Land Use and Climate Change Impacts

Future vulnerability will be determined, in part, by local officials. Flood hazard and SLOSH maps are available to indicate what areas of the region are most vulnerable to flood and flood-related hazards. These planning tools are currently used to help guide development away from hazardous areas. Local officials are responsible for enforcing local floodplain management regulations, flood damage prevention ordinances, and other forms of development policies that restrict new development in flood hazard areas. Additional discussion of actions these communities have taken to guide land use and reduce future flood vulnerability is provided in Section 6, the Capability Assessment.

An unusual component of future flood vulnerability in the study area is the likelihood of mass evacuation (due to flooding and tropical storms from nearby coastal areas) *into* the Richmond-Crater region. Mass evacuations from urban areas can strain a community's resources and cause gridlock on major transportation routes, overcrowding of hospitals and shelters, and increased load on local utilities' infrastructures leading to potential failure.

A mass evacuation of significant proportions has not impacted the area in the past two decades. In anticipation of Hurricane Floyd in September 1999, more than three million people were evacuated from Florida to the North Carolina coastline, and to a lesser extent from the Virginia coast. Although the majority of these evacuations were from North and South Carolina coasts to inland areas of those states, some limited impact was experienced in the planning region.

The probability of a mass evacuation impacting the planning region includes factors such as the probability and location of the hazard that would make such an evacuation necessary, as well as sociological considerations. An influx of evacuees as a result of a mass evacuation has the potential to overload infrastructure and support systems. Impacted segments might include transportation, public safety, medical facilities and shelters, utilities, and depending on the duration of the evacuation, potentially the education sector. Jurisdictions located along major evacuation routes are more likely to be impacted.

In its June 2021 report entitled *The Impact of Climate Change on Virginia's Coastal Areas*, the Virginia Academy of Science, Engineering, and Medicine (VASEM), laid out the consequences of climate change for Virginians.[8] VASEM is a nonprofit organization consisting of members of the National Academies of Science, Engineering, and Medicine who reside or work in Virginia as well as other Virginians who are leaders in these fields. The most immediate consequence of climate change is sea level rise, caused primarily by melting ice and glaciers and thermal expansion. Additional consequences related to flooding include more recurrent flooding (higher frequency of occurrence for damaging floods), extreme rainfall and inundation of septic systems. The report projects that, particularly in urban areas, recurrent flooding will have a disproportional impact on racial and ethnic minorities, the poor, the elderly, renters, non-native English speakers, and those with mobility challenges. Exposure to a growing number of flood-prone facilities regulated

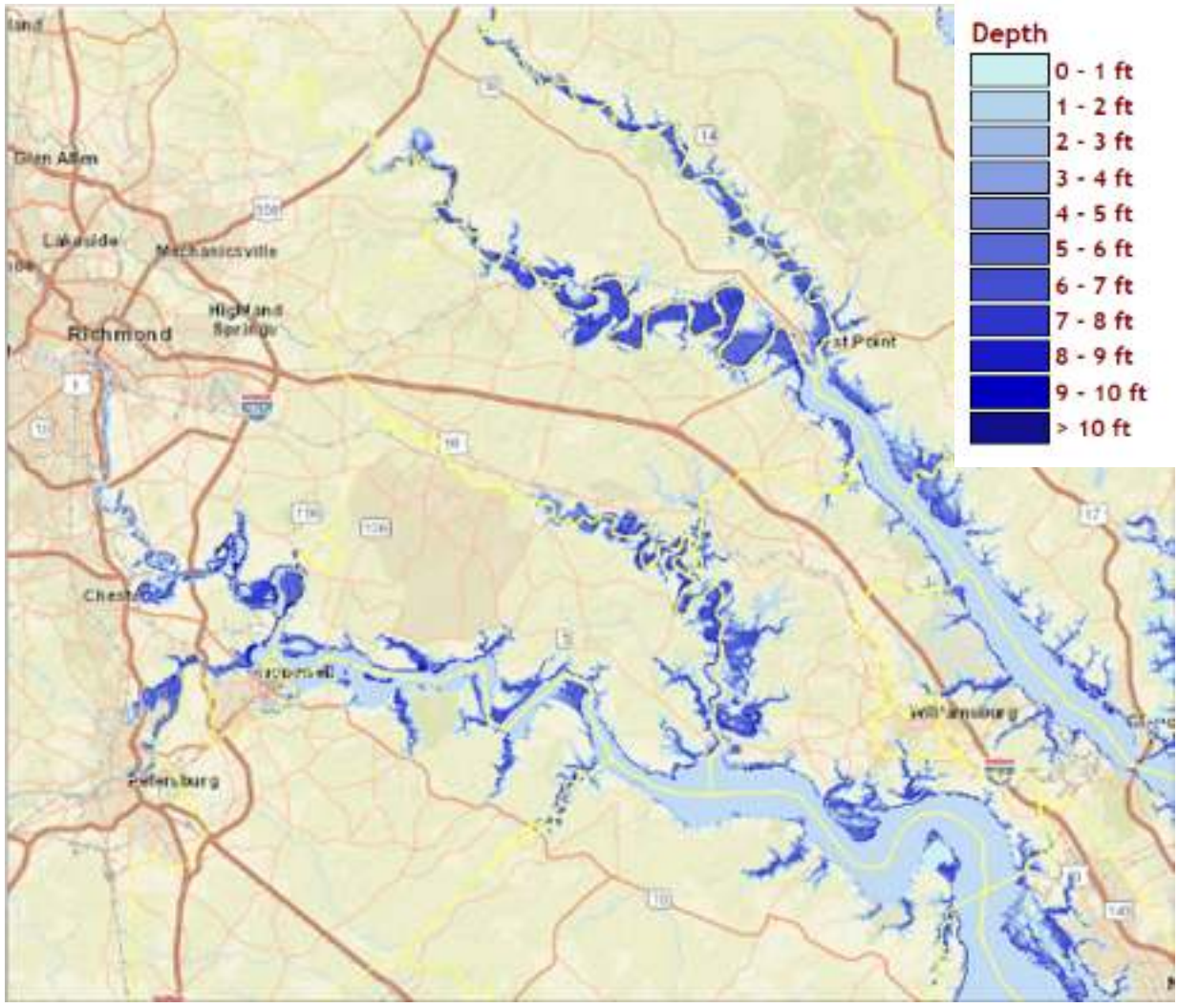
[8] http://www.vasem.org/wp-content/uploads/2021/08/VASEM_VirginiasCoastalAreasReport_FINAL.pdf

for toxic and hazardous substances as sea levels rise is another concern, particularly on the James River, between Richmond and Hampton Roads. Impacts in rural areas are more likely to be centered around soil quality, such as water-logged soils in flood-prone areas, increased salinity due to saltwater intrusion and septic system failures that affect public health.

The sea level rise curve chosen by the Commonwealth for planning purposes (NOAA's "intermediate-high" projection) is shown for each of the affected communities in the study area in **Figure 5.7**. This map is from the Virginia Institute of Marine Science (VIMS) Sea Level Rise Projection tool available online at: http://cmap2.vims.edu/SeaLevelRise_Depth/SLRDepth_revised4.html.

Using this same projection for sea level rise, Old Dominion University and the Commonwealth Center for Recurrent Flooding Resiliency researchers have quantified their projections for impacts from sea level rise, categorized by the Commonwealth's planning districts. PlanRVA and Crater PDC combined are expected to see almost 5,000 parcels, 600 structures, and 14 miles of roadway flooded or otherwise impacted by sea level rise by 2080.

Figure 5.7: Sea Level Rise Projection for year 2100, Intermediate High Scenario



Source: VIMS Sea Level Rise Projection tool accessed online 2021 at:
http://cmap2.vims.edu/SeaLevelRise_Depth/SLRDepth_revised4.html

Increased levels of precipitation from storm events sometimes overwhelm existing municipal stormwater management systems in the region, which can result in roadway flooding, safety and access concerns, and issues with water quality and treatment capacity. As precipitation events become more intense and flashy, the ability of the existing stormwater management systems to collect, convey, treat, and discharge flow will be further reduced. In some parts of the study area, increased high tide levels due to sea level rise may impact or block the discharge points, creating further cause for storm flooding.

The average annual number of days with heavy precipitation is expected to increase in the future as a result of climate change. This increased precipitation will have an impact on the frequency of regional flooding, especially riverine flooding, but may also impact coastal

flooding. Heavy precipitation events can easily overwhelm existing infrastructure, causing failure of stormwater culverts, bridge scour, and overland flooding affecting areas and structures that do not normally flood. Increased heavy precipitation can impact dams and, over time, influence flood frequency curves that are used for a variety of insurance, building safety and planning purposes.

According to 2022 data from the Mid-Atlantic Regional Integrated Sciences and Assessments (MARISA)[9] , under a moderate emissions scenario, Glen Allen can expect that for the period 2066 to 2095, the average number of days per year with rainfall greater than 1 inch will be 7.8 days, which is 27% more than in the period between 1976 and 2005. Approximately the same percentage increase is expected across the PlanRVA portion of the region; the Crater PDC portion of the study area was not studied. On the other hand, the number of days with rainfall greater than 3 inches is 0.2, 63% more than in 1976-2005 for Glen Allen. The predictions for days with this severe rainfall are not uniform across the Plan RVA region and range from a low of 30-percent increase in parts of Prince George County, to an 83-percent increase in Richmond.

5.5 Flooding Due to Impoundment Failure

Hazard Profile

Flooding due to impoundment failure refers to a collapse, overtopping, breaching, or other failure that causes an uncontrolled release of water or sludge from an impoundment, resulting in downstream flooding. Dam or levee failures can occur with little warning. Intense storms may produce a flood in a few hours or even minutes from upstream locations. Flash floods can occur within six hours of the beginning of heavy rainfall, and impoundment failure may occur within hours of the first signs of breaching. Other failures and breeches can take much longer to occur, from days to weeks, because of debris jams or the accumulation of melting snow.

Dam risk can be categorized as either incremental, non-breach, or residual. Incremental risk is the risk (both likelihood and consequences) to the pool area and downstream floodplain occupants that can be attributed to the presence of the dam should the dam breach prior or subsequent to overtopping, or undergo component malfunction or misoperation, where the consequences considered are over and above those that would occur without dam breach. The consequences typically are due to downstream inundation, but loss of the pool can result in significant consequences in the pool area upstream of the dam. Non-breach risk refers to risk in the reservoir pool area and affected downstream floodplain due to 'normal' dam operation of the dam (e.g., large spillway flows within the design capacity that exceed channel capacity) or 'overtopping of the dam without breaching' scenarios. Residual risk is the risk that remains after all mitigation actions and risk reduction actions have been completed. With respect to dams, FEMA defines residual risk

[9] Mid-Atlantic Regional Integrated Sciences and Assessments: https://public.tableau.com/views/Climate_summary_rainfall_20181112_PUBS/3b?:embed=y&:toolbar=n&:embed_code_version=3&:loadOrderID=0&:display_count=y&:origin=viz_share_link

as “risk remaining at any time”. It is the risk that remains after decisions related to a specific dam safety issue are made and prudent actions have been taken to address the risk. It is the remote risk associated with a condition that was judged to not be a credible dam safety issue.[10]

Hazard Profile: Dam Failure

Failure of dams may result in catastrophic localized damages. Vulnerability to dam failure is dependent on dam operations planning and the nature of downstream development. Depending on the elevation and storage volume of the impoundment, the impact of flooding due to dam failure may include loss of human life, economic losses such as property damage and infrastructure disruption, and environmental impacts such as destruction of habitat. Flooding following a dam failure may occur due to any one or a combination of the following causes:

- Prolonged periods of rainfall and flooding;
- Inadequate spillway capacity;
- Internal erosion caused by embankment or foundation leakage or piping, or earth movement resulting from an earthquake;
- Improper maintenance, including failure to remove trees, repair internal seepage problems, replace lost material from the cross section of the dam and abutments, or maintain gates, valves, or other operational components;
- Improper design, including the use of improper construction materials and construction practices;
- Negligent operation, including failure to remove or open gates or valves during high flow periods;
- Failure of upstream dams on the same waterway;
- High winds, which can cause significant wave action and result in substantial erosion; or
- Intentional criminal acts.

Dams are classified in Virginia by the DCR, with a hazard potential depending on the downstream losses estimated in event of failure. Hazard potential is not related to the structural integrity of a dam but strictly to the potential for adverse downstream effects if the dam were to fail. State regulatory requirements administered by DCR, such as the frequency of dam inspection, the standards for spillway design, and the extent of emergency operations plans, are dependent upon the dam classification. **Table 5.11** provides additional information on these classes and the possible effects on downstream areas if failure were to occur.

[10] FEMA, *Rehabilitation of High Hazard Potential Dams Grant Program Guidance*, June 2020.

Table 5.11: Virginia Dam Classification System		
Hazard Potential	**Description**	**Inspection**
High (Class I)	Failure will cause probable loss of life or serious economic damage (to buildings, facilities, major roadways, etc.)	Annual, with inspection by a professional engineer every 2 years.
Significant (Class II)	Failure may cause loss of human life or appreciable economic damage (to buildings, secondary roadways, etc.)	Annual, with inspection by a professional engineer every 3 years.
Low (Class III)	Failure would result in no expected loss of human life, and cause no more than minimal economic damage	Annual, with inspection by a professional engineer every 6 years.

Source: 2018 Commonwealth of Virginia Hazard Mitigation Plan

The owner of each regulated high, significant, or low hazard dam is required to apply to DCR for an Operation and Maintenance Certificate. The application must include an assessment of the dam by a licensed professional, an Emergency Action Plan, and the appropriate fee(s), submitted separately. An executed copy of the Emergency Action Plan or Emergency Preparedness Plan must be filed with the appropriate local emergency official and the Virginia Department of Emergency Management. The Virginia Soil and Water Conservation Board (VSWCB), a division of DCR, issues Regular Operation and Maintenance Certificates to the dam owner for a period of six years. If a dam has a deficiency but does not pose imminent danger, the board may issue a Conditional Operation and Maintenance Certificate, during which time the dam owner is to correct the deficiency. After a dam is certified by the board, annual inspections are required either by a professional engineer or the dam owner, and the Annual Inspection Report is submitted to the regional dam safety engineer.

Dam risk can be classified as incremental, non-breach or residual risk. Incremental risk is the risk (likelihood and consequences) to the pool area and downstream floodplain occupants that can be attributed to the presence of the dam should the dam breach prior or subsequent to overtopping, or undergo component malfunction or misoperation, where the consequences considered are over and above those that would occur without dam breach. The consequences typically are due to downstream inundation, but loss of the pool can result in significant consequences in the pool area upstream of the dam. Non-breach risk is the risk in the reservoir pool area and affected downstream floodplain due to 'normal' dam operation of the dam (e.g., large spillway flows within the design capacity that exceed channel capacity) or 'overtopping of the dam without breaching' scenarios. Residual risk is the risk that remains after all mitigation actions and risk reduction actions have been completed. With respect to dams, FEMA defines residual risk as "risk remaining at any time" (FEMA, 2015, p A-2). It is the risk that remains after decisions related to a specific dam safety issue are made and prudent actions have been taken to address the risk. It is

the remote risk associated with a condition that was judged to not be a credible dam safety issue.[11]

At this time, limited information is available to conduct an analysis of incremental, non-breach and residual risk relative to the high hazard potential dams in the region. Please refer to Section 3.11: Flooding Due to Impoundment Failure of the *2018 Commonwealth of Virginia Hazard Mitigation Plan*, as amended, for additional information regarding the statewide approach to dam risk. That section of the state's plan is hereby incorporated by reference.

The Commonwealth of Virginia relies upon FEMA's definition of risk: "Risk is the product of the likelihood of a structure being loaded, adverse structural performance, and the magnitude of the resulting consequences." Risk data are compiled in the state's Dam Safety Inventory System (DSIS) for each high hazard dam. DCR, VDEM and local emergency and planning staff are given copies of emergency action plans and plans include detailed information on risk to the following:

- Dwellings
- Schools
- Hospitals
- Businesses
- Railroads:
- Utilities:
- Parks:
- Golf Course
- Public Trails
- Emergency Infrastructure.

The summary impacts shown in **Table 5.12** are drawn from the information in DSIS and the Emergency Action Plans (EAPs) for the high hazard potential dams, These data represent how Virginia summarizes significant economic, environmental and social impacts from a dam incident. Factors considered in risk assessment include the population at risk, land use, inspection condition assessment and any missing studies such as stability analyses under normal and extreme loading conditions (seismic and hydrologic), and any measures underway that affect the operational status, such as drawdowns or temporary pumps and siphons, when dams are compromised.

Owners of impounding structures are required to have dam break inundation zone maps that meet the standards of the Virginia Impounding Structure Regulations. The properties that are identified within the dam break zone are recorded in the dam safety emergency

[11] FEMA, Rehabilitation of High Hazard Potential Dams Grant Program Guidance, June 2020

action plan for that impoundment. DCR is pursuing efforts to make this information available in a digital form, but it is not currently available for all dams. The 2018 *Commonwealth of Virginia Hazard Mitigation Plan* indicates that such data would greatly improve ability to identify impact and vulnerability due to dam inundation.

Table 5.12 lists the high hazard dams in the study area from DCR's database and includes key details regarding each dam's basic characteristics, EAP status and a summary of expected impacts resulting from dam failure. The impacts are based on modeling requirements for high hazard dams that include two scenarios: 1) sunny day breach (incremental risk); and 2) probable maximum flood (non-breach risk). Appendix I provides a list of all dams in the study area from the DCR database, as well as the EAPs for each of the high hazard dams. The high hazard dams that have latitude and longitude characteristics identified in the U.S. Army Corps of Engineers' National Inventory of Dams are shown in Figure 5.8.

In addition to dams located within the study area, there are several high hazard dams upstream of the study area that could impact the region if the dam(s) were to fail or overtop, including:

Louisa County – Lake Anna Dam and Reservoir, Gordonsville Dam, South Anna Dam #22, South Anna Dam #6b, South Anna Dam #3, South Anna Dam #4, South Anna Dam #5;

Fluvanna County – Bremo Power Station Dam, Lake Monticello Dam, Fluvanna Ruritan Da, Bremo Power Station East Ash Pond Dam, Lake Monticello Settlement Pond Dam;

Cumberland County – Willis River Dam #6, Cobbs Creek Regional Water Supply Dam, Cobbs Creek Regional Water Supply Reservoir Saddle Dam, Cobbs Creek Regional Water Supply Reservoir Dam Perimeter Dam;

Amelia County – Bridgeforth Mill Dam;

Nottaway County – Nottoway Lake Dam.

Information on these dams is available through the State's DSIS program and the USACE NID.

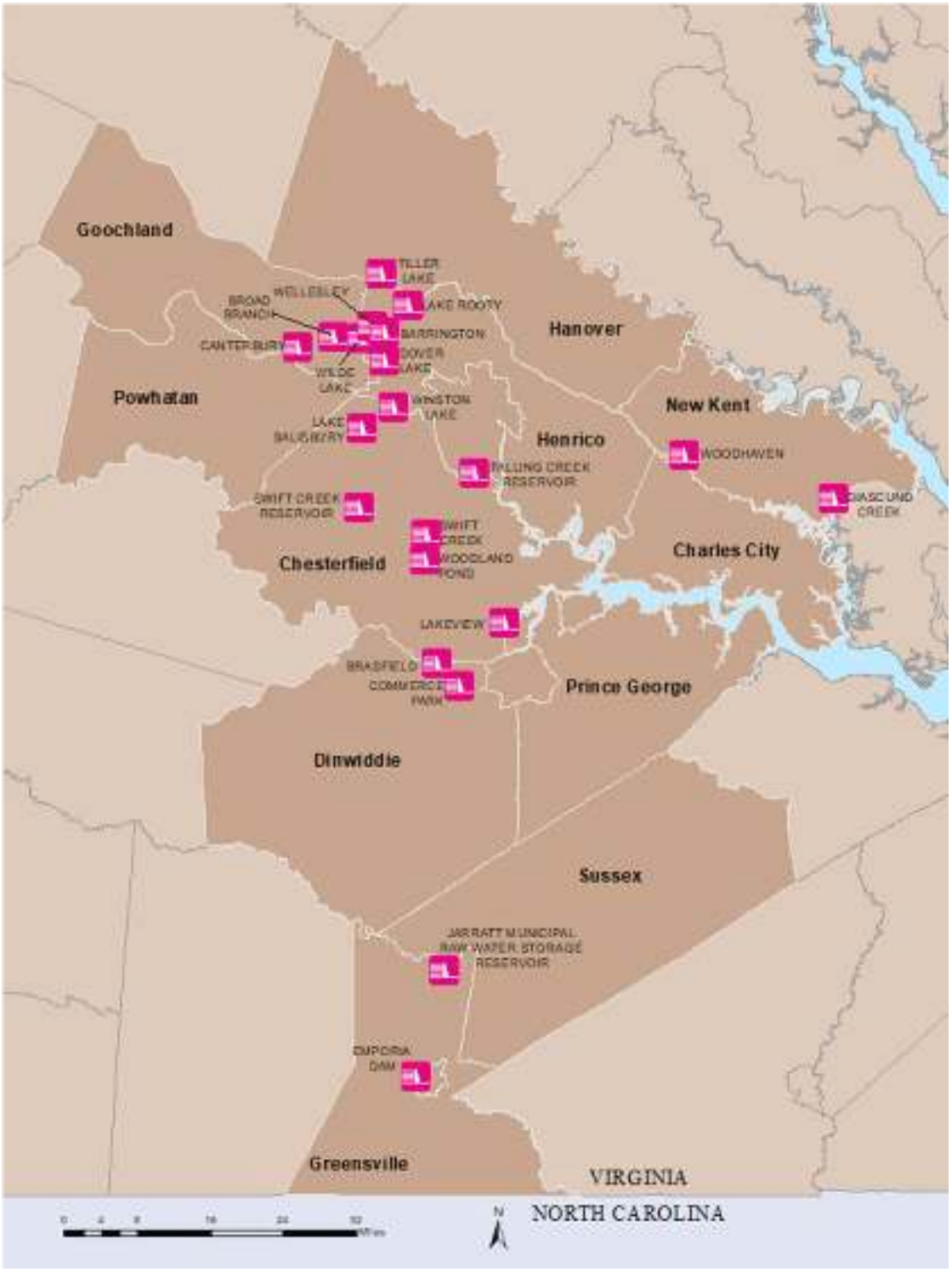
Table 5.12: High Hazard Dams in the Richmond-Crater Region								
Jurisdiction	**Dam Name**	**Dam Type**	**Year Built**	**Reservoir Purpose**	**Top Height (Feet)**	**Top Capacity (Acre-Feet)**	**EAP Status (Last Approval)**	**Downstream Impacts**
Chesterfield County	Cosby Dam	Gravity	1956	Recreation	17	85	Expired (11/15/2014)	Not provided
	Lake Crystal Dam				18	64		Not provided
	Lake Salisbury Dam	Earth	1973	Recreation	38	990	Expired (11/30/2010)	1,870 homes, 6 roads, 2 dams downstream
	Margaret Dam	Buttress	1961	Water Supply & Recreation	35	410	Expired (3/9/2007)	25 roadways, 208 homes
	Swift Creek Dam	Gravity	1936	Recreation	30.5	7,564	Current (1/3/2018)	32 homes, 1 business, 1 road
	Swift Creek Reservoir Dam	Earth	1965	Water Supply & Recreation	44	50,590	Current (4/8/2019)	2,000 homes, 400 businesses, 1 road
	Wake Lake Dam	Earth	2019	Recreation	15.5	88.71	Current (10/21/2019)	24 houses, 4 businesses, 1 golf course, 8 roads
	Woodland Pond	Earth	1970	Recreation	35	1,870	Current (8/23/2019)	9 homes, 1 golf course, 3 roads
Chesterfield County, City of Richmond	Falling Creek Reservoir Dam	Buttress	1952	Recreation	34	1,511	Current (3/31/2018)	Not provided
Chesterfield & Dinwiddie County	Brasfield Dam	Gravity	1968	Water Supply & Hydro-electric	55	79,500		Not provided
Dinwiddie County	Commerce Park Dam	Earth	1900	Recreation & Flood Control	12	149.4	Expired (1/9/2013)	52 homes, 1 business, 3 roads
Richmond	Winston Lake Dam	Earth	2008	Recreation	28	39	Current (12/15/2017)	2 homes, 2 roads
Goochland County	Broad Branch Dam	Earth	1992	Recreation	29	1,188	Current (5/26/2015)	5 homes, 4 roads
	Dover Lake Dam	Earth	1958	Irrigation & Recreation	41	4,198	Expired (6/1/2012)	3 homes, 1 railroad, 1 road

Table 5.12: High Hazard Dams in the Richmond-Crater Region								
Jurisdiction	**Dam Name**	**Dam Type**	**Year Built**	**Reservoir Purpose**	**Top Height (Feet)**	**Top Capacity (Acre-Feet)**	**EAP Status (Last Approval)**	**Downstream Impacts**
Hanover County, Henrico County	Tiller Lake Dam	Earth	2000	Irrigation	13	87.33	Expired (1/1/2010)	8 homes
Henrico County	Barrington Dam	Earth		Fire Protection & Recreation	16.5	100	Current (11/4/2014)	13 homes, 2 downstream dams
	Canterbury Dam	Earth	1965	Recreation	13	162	Current (5/18/2021)	200 homes, 5 businesses, 1 road
	Echo Dam	Earth	1900	Recreation	19	139	Current (5/5/2021)	73 homes, 1 park, 3 roads including I-295
	Lake Overton Dam	Earth	1970	Recreation	18	106	Expired (9/8/2005)	Not provided
	Lake Rooty Dam	Earth			22	142	Expired (5/15/2014)	8 homes
	Wellesley Dam	Earth	1987	Recreation	29	131.3	Expired (5/17/2021)	19 homes, 1 downstream dam
Petersburg	Wilcox Dam	Earth	1900	Recreation	18	200.29	Current (10/30/2020)	113 homes, 2 businesses, 1 hospital, 1 railroad, 10 roads, 1 downstream dam
Powhatan County	Mill Quarter Lake Dam	Earth	1974	Recreation	36	2,159	Expired (7/15/2012)	44 homes, 1 business, 1 road
	Upper Powhatan Dam	Earth	1810	Recreation	26.75	750	Expired (5/9/2008)	2 roads, 1 dam downstream
Colonial Heights	Lakeview Dam	Gravity	1920	Hydro-electric & Recreation	38.6	610	Current (1/1/2018)	Not provided
Emporia, Greensville County	Emporia Dam	Gravity	1908	Hydro-electric & Water Supply	42.5	9,500	Expired (1/31/2012)	Not provided
Greensville County	Jarratt Municipal Raw Water Storage Reservoir Dam	Earth	2018	Water Supply	51	3,682	Current (6/2/2020)	5 homes, 2 roads, 1 dam downstream

Table 5.12: High Hazard Dams in the Richmond-Crater Region								
Jurisdiction	**Dam Name**	**Dam Type**	**Year Built**	**Reservoir Purpose**	**Top Height (Feet)**	**Top Capacity (Acre-Feet)**	**EAP Status (Last Approval)**	**Downstream Impacts**
James City County, New Kent County	Diascund Creek Dam	Earth	1961	Water Supply & Recreation	35	29,093	Current (8/18/2016)	208 homes, 25 roads
New Kent County	Woodhaven Dam	Rockfill	1961	Recreation	23	1297	Current (8/7/2020)	10 homes, 1 railroad, 2 roads

Source: DCR, Dam Safety Inventory System, accessed April 2021

Figure 5.8: High Hazard Dams in the Richmond-Crater Region



Source: USACE National Inventory of Dams, 2021

Hazard Profile: Levee/Floodwall Failure

FEMA defines a levee as 'a man-made structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water to reduce the risk from temporary flooding.' Much like dams, levees and floodwalls require regular maintenance and inspection. Many of the causes and effects of levee failure are similar to dam failure. Though levees can reduce some flood risks, they do not eliminate risks. By creating a false sense of safety, communities may invest in development in levee-impacted areas and thus increase the flood risk. Flood risks associated with levees can change over time: if levees are not properly maintained, the risk of failure may increase, resulting in catastrophic flooding. Similarly, if flood hazards change or exceed design protection levels, overtopping of levels can be disastrous.

A levee designed to provide flood protection from at least the 1% annual chance flood is eligible for accreditation by FEMA. When accredited, the area protected by the levee will be mapped as a moderate risk zone instead of a high-risk zone on the FIRM.

The James River Levee System in Richmond secured FEMA levee accreditation in 2012. Other levees in Virginia have never been recognized as providing 100- year protection or have been de-accredited. De-accreditation does not necessarily mean the levee no longer can provide 100-year flood protection but may mean that the community or levee owner did not provide the necessary documentation to prove protection.

The James River Levee System (**Figure 5.9**) is a local system of flood protection with a total length of 17,327 feet (3.28 miles) and protects 750 acres valued at approximately $153 million. The line of protection extends across the mouth of Shockoe Valley to 12th Street. The wall is designed to protect those areas located behind it against a flood with an average recurrence interval of 280 years. The project was dedicated on October 21, 1994, at a cost of $143 million.

The line of protection extends from just west of the Manchester bridge, continues along the river's edge to the west side of Interstate 95, turns south, then west, crossing the CSX Railway mainline tracks, and tying into high ground at Goodes Street. The entire system consists of multiple components in addition to the levees and floodwall:

- A partially rip-rapped earthen levee;
- A concrete floodwall;
- Three overlooks (9th & Semmes, Hull & Mayo Bridge, and 12th & Byrd);
- Six roadway closures;
- Six railroad closures;
- Four personnel closure locations;
- Two combined roadway/railroad closures;
- Three pump stations; and
- Three designated ponding areas.

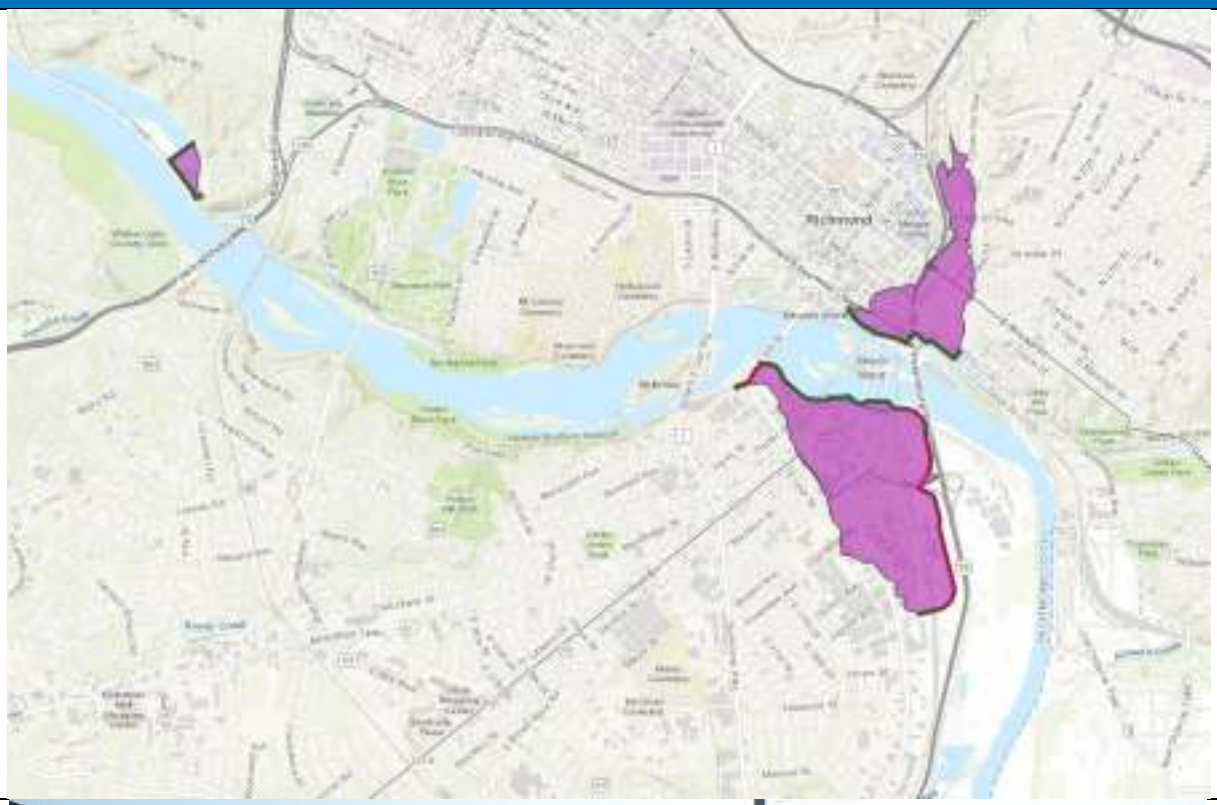
The northern alignment is comprised of one component – a concrete floodwall that is approximately 4,500 feet long with height variations from five to 29 feet. The southside alignment has three components:

- One earthen levee, approximately 9,000 feet long;
- A combination bin wall/levee, approximately 2,000 feet long; and
- A concrete floodwall, approximately 2,000 feet long.

Interior runoff from the watershed in excess of the capacity of the pump station during high river stages will be collected or backed up into the ponding areas. After the river recedes, all ponding areas will drain by gravity through their respective outlets.

Risk for the levee system is considered low. The south portion of the project protects a population of 1,271 people, 146 structures, and property valued at $397 million. The estimated population protected by the levee is 2,578 people, with 296 structures, and property valued at $501 million.

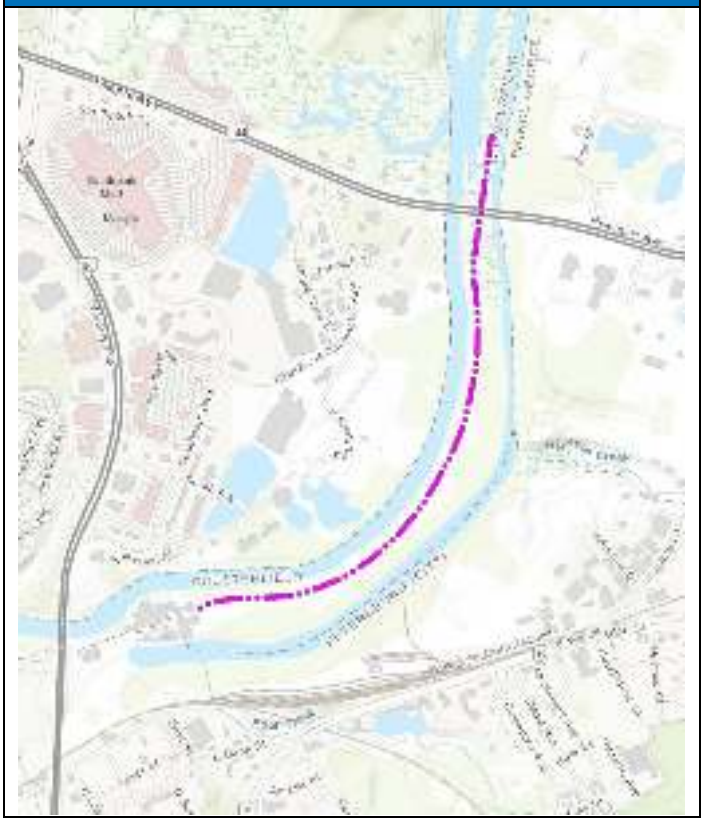
Figure 5.9: James River Levee System, Richmond



Source: U.S. Army Corps of Engineers, National Levee Database and the City of Richmond Department of Public Utilities, 2021

The Appomattox River Levee in Colonial Heights is not accredited by FEMA as providing 100-year flood protection. The embankment is 1.44 miles long, lying on a bend in the river as it exits the Petersburg area and turns north toward Back Creek and Gilliams Island (**Figure 5.10)**.

Figure 5.10: Appomattox River Levee, Colonial Heights



Source: U.S. Army Corps of Engineers, National Levee Database, *2021*

Hazard History

There are no comprehensive databases of historical dam failures or flooding following a dam failure or levee failure in Virginia. Most failures occur due to lack of maintenance of dams in combination with major precipitation events, such as hurricanes and thunderstorms. The 2018 *Commonwealth of Virginia Hazard Mitigation Plan* lists two notable events in the study area.

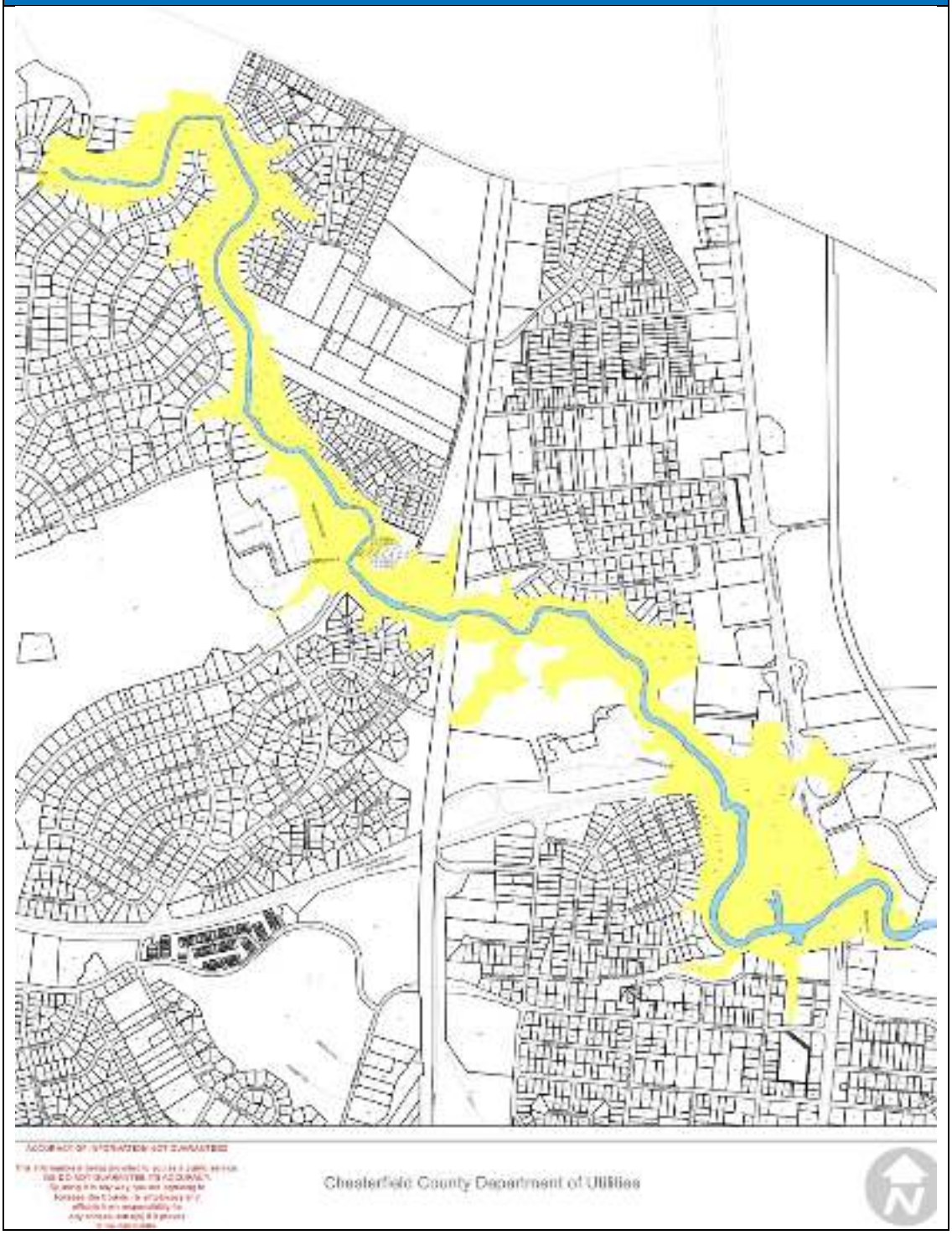
- The Powhatan Lakes Dam failed due to a heavy storm during June 2004 and caused over one million dollars in damage. The eventual breaching of the upper dam led to the subsequent chain-reaction breaching of the lower dam. According to the Virginia Department of Wildlife Resources, local news sources indicated that as much as five inches of rain may have fallen within a two-hour period.

- Falling Creek Dam in Chesterfield County was overtopped during Tropical Storm Gaston flooding in late summer 2004 with evacuations ordered for hundreds of families. Also, on the evening of August 15, 2020, officials issued an evacuation order for more than 150 residences in several neighborhoods near Falling Creek Dam and opened a shelter for evacuees. At 5:45pm that day, the dam was at a stage three flood advisory with a water level over 100 feet. By the next morning, the water levels had decreased, and the evacuation order was lifted. See **Figure 5.11** below that shows the dam inundation areas for this dam.
- Several dams in Virginia failed or were overtopped following Tropical Depression Ernesto in 2006.

In May 2018, Canterbury Dam in Henrico County overtopped after a rainfall event triggered severe flooding. The dam is an earthen dam along Deep Run Creek and impounds an approximately 12-acre recreational lake in the Short Pump neighborhood. The incident caused significant impacts, including Pump Road being shut down and damage to the downstream section of the dam. To prevent future damage from rainfall events, the county prioritized renovations to the dam. A detailed dam failure analysis to determine the downstream inundation area was conducted, as well as an alternatives analysis to determine renovation options. The county decided to spend roughly $1M to fix the dam and provide overtopping protection to protect the impoundment from failure during passage of the required spillway design storm event.

Installation of improvements to Canterbury Dam
Source: Timmons Group

Figure 5.11: Falling Creek Dam Inundation Areas, in Chesterfield County and Colonial Heights



Source: Chesterfield County Department of Utilities, undated

Social Vulnerability

The location of the study area high hazard dams was overlaid on the foundational social vulnerability map from the NRI. The analysis indicates that 5 dams are located in areas of relatively moderate or relatively high social vulnerability (no dams were in areas of Very High social vulnerability):

Emporia Dam – Relatively High;

Jarratt Municipal Raw Water Storage Reservoir, Brasfield Dam, Falling Creek Reservoir, Dover Lake – Relatively Moderate.

A small portion of the area protected the James River Levee System in Richmond is an area of relatively moderate social vulnerability. The Appomattox River Levee in Colonial Heights lies between an area of relatively high social vulnerability to the northwest near Southpark Mall, and an area of relatively moderate social vulnerability to the east in Petersburg.

According to DCR, social vulnerability is a factor in assessing grant applications prepared by dam owners in the region. Project engineers are also responsible for addressing impacts on historical and cultural impacts in accordance with state and federal regulations.

Future Vulnerability, Land Use and Climate Change

Based on historical experience and the fact that the dams in the study area are aging, precipitation patterns are increasingly more frequent and severe as a result of climate change, and the dams are categorized as High Hazard, there is a moderate probability of a future event involving a dam or levee failure in the study area. There is not expected to be a problem with mass evacuation due to a dam or levee failure, although evacuation on a smaller regional scale is likely and is capably managed by local emergency managers.

5.6 Severe Wind Events (including Tropical Storms, Derechos and Nor'easters)

Wind can be one of the most destructive forces of nature. Strong winds can erode mountains and shorelines, topple trees and buildings, and destroy a community's critical utilities and infrastructure. The analysis in this section focuses on hurricane and tropical storm winds as the most likely type of widespread wind hazards to occur in the region, though more localized damage from high winds also can be caused by straight-line wind events (*i.e.,* derechos), nor'easters, thunderstorms, and tornadoes. Thunderstorms, lightning and tornadoes are discussed in separate subsections of this HIRA.

Hazard Profile

A tropical cyclone is the generic term for a low pressure, non-frontal synoptic scale low-pressure system over tropical or sub-tropical waters with organized convection and definite

cyclonic surface wind circulation. Tropical cyclones rotate counterclockwise throughout the Northern Hemisphere. Depending on strength, these weather systems are classified as hurricanes or tropical storms. They are called tropical depressions when wind speed is less than 39 mph, but become tropical storms when their wind speeds are between 39 mph and 73 mph. When wind speeds reach 74 mph the system is classified as a hurricane. Tropical cyclones involve both atmospheric and hydrologic characteristics, such as severe winds, storm surge flooding, high waves, coastal erosion, extreme rainfall, thunderstorms, lightning, and, in some cases, tornadoes. Storm surge flooding can push inland, and riverine flooding associated with heavy inland rains can be extensive. High winds are associated with hurricanes, with two significant effects: building damage and power outages due to airborne debris and downed trees.

The hurricane season in the North Atlantic runs from June 1 until November 30, with the peak season between August 15 and October 15. The average hurricane duration after landfall, is 12 to 18 hours. Wind speeds may be reduced by 50% within 12 hours after the storm reaches land.

Tropical storms are capable of producing great amounts of rain in a short period of time. For example, the Richmond-Crater region experienced more than 12 inches of rain during Tropical Depressions Camille, Isabel and Gaston over a short duration. These high rates of precipitation may cause flash floods and mudslides. The runoff eventually drains into the large rivers which may still be flooding for days after the storm has passed. To complicate matters, storm surge flooding can push inland as was experienced in Claremont and Sunset Beach in Surry County during Hurricane Isabel. Riverine and urban flooding associated with heavy inland rains can be extensive. Many areas of the Coastal Plain region are flat, and intense prolonged rainfall tends to accumulate without ready drainage paths. Storm surge or coastal flooding, and riverine flooding are discussed separately in this HIRA.

Typically occurring in the summer in the Northern Hemisphere, a *derecho* (from the Spanish, meaning “straight”) is a wide, long-lived, straight-line windstorm. Derechos are often associated with a fast-moving group of severe thunderstorms forming a mesoscale convective system. Similar to a regular thunderstorm’s gust front, a derecho’s wind remains sustained for a greater period of time and may exceed hurricane force. The system may remain active for hours or even days as it moves over land.

Similar to hurricanes, nor’easters are coastal storms capable of causing substantial damage to coastal areas in the Eastern United States due to their strong winds and heavy surf. Nor'easters are named for the winds that blow in from the northeast and drive storms up the East Coast along the Gulf Stream, a band of warm water that lies off the Atlantic coast. They are caused by the interaction of the jet stream with horizontal temperature gradients and generally occur during the fall and winter months when moisture and cold air are plentiful.

Nor'easters are known for dumping heavy amounts of rain and snow, producing hurricane-force winds, and creating high surf that causes severe beach erosion and coastal flooding. There are two main components to a nor'easter: (1) a Gulf Stream low-pressure system (counterclockwise winds) generated off the southeastern U.S. coast, gathering warm air and moisture from the Atlantic, and pulled up the East Coast by strong northeasterly winds at the leading edge of the storm; and (2) an Arctic high-pressure system (clockwise winds) which meets the low-pressure system with cold, arctic air blowing down from Canada. When the two systems collide, the moisture and cold air produce a mix of precipitation and have the potential for creating dangerously high winds and heavy seas. As the low-pressure system deepens, the intensity of the winds and waves increase and can cause serious damage to coastal areas as the storm moves northeast. The coastal counties in the eastern portion of the study area are susceptible to the flooding and high wind impacts from nor'easters.

Extreme wind events pose a danger in the region because they can result in localized or widespread power outages, property damage, falling trees, toppled utility poles and damaged buildings. Mobile homes can be particularly vulnerable to high winds, especially if improperly installed. Injury or death to people can result from falling objects or flying debris. Communication and electricity may be lost for days, and roads can be impassable due to standing water, fallen trees and debris. Local businesses can be closed for extended periods of time due to building and content damage, loss of utilities, and transportation challenges. Extreme wind events can blow over tractor trailers on the highway and make driving difficult in a high-profile vehicle or lightweight vehicle. High winds can turn trash cans, lawn and patio furniture, and other property into projectiles resulting in further property damage.

Most deaths in extreme wind events (from wind) are caused by trees falling onto cars or homes. Dead trees or trees weakened by drought, disease, rotting, or pest infestations are the most susceptible to falling. Property owners using chainsaws to remove fallen debris or generators and grills for cooking when power outages occur also account for many deaths and injuries in the aftermath of severe wind events.

Magnitude or Severity

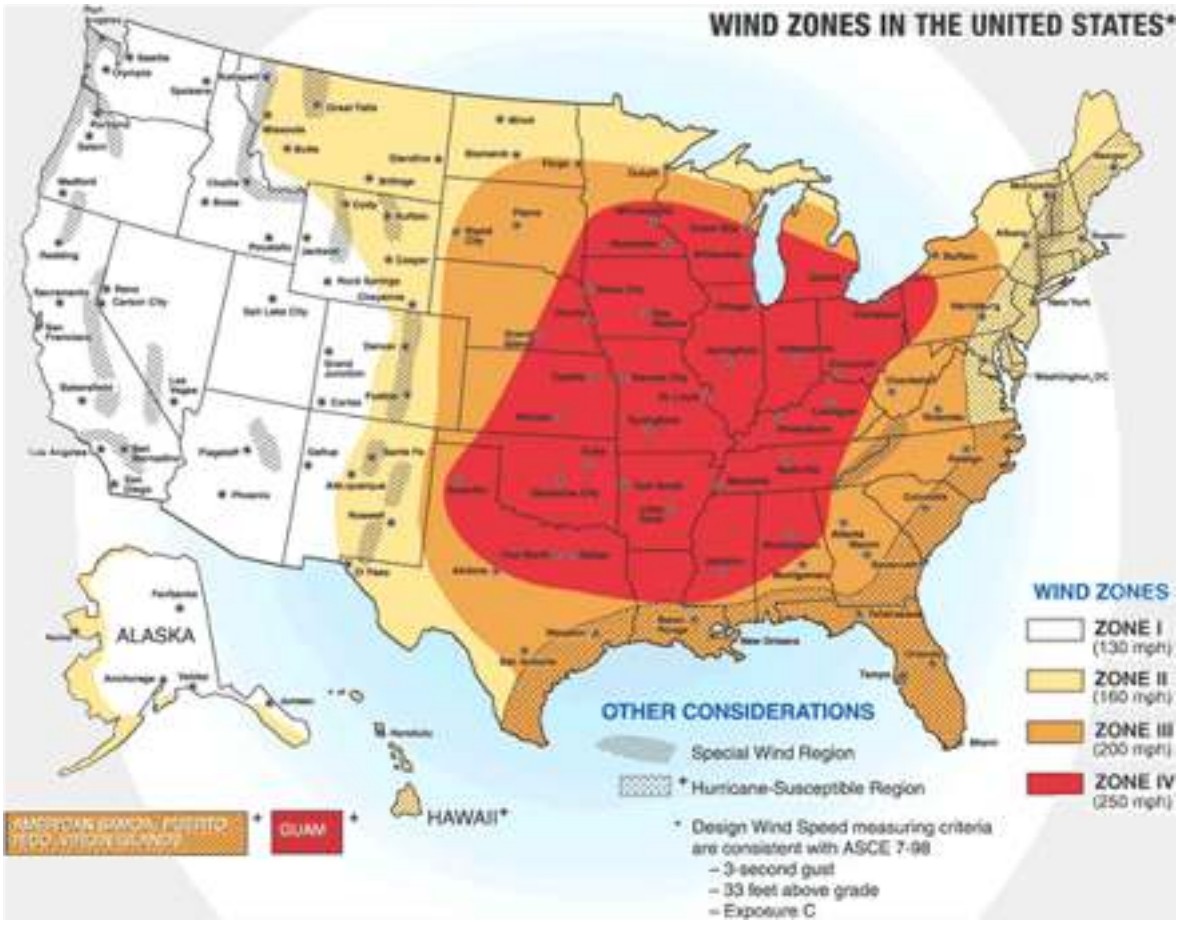
The strength of a hurricane is classified according to wind speed using the Saffir-Simpson Hurricane Damage Scale. This scale provides an estimate of the potential property damage and flooding expected along the coast from a hurricane landfall. Wind speed is the determining factor in the scale, as storm surge values are highly dependent on the slope of the continental shelf in the landfall region. **Table 5.13** provides a description of typical damages associated with each hurricane category.

Table 5.13: Saffir-Simpson Hurricane Damage Scale			
Hurricane Category	**Sustained Winds (mph)**	**Damage Potential**	**Description**
1	74–95	Minimal	Minimal damage to unanchored mobile homes along with shrubbery and trees. There may be pier damage and coastal road flooding, with storm surge 4–5 feet above average.
2	96–110	Moderate	Moderate damage potential to mobile homes and piers, as well as significant damage to shrubbery and trees with some damages to roofs, doors, and windows. Impacts include flooding 2-4 hours before arrival of the hurricane in coastal and low-lying areas. Storm surge can be 6–8 feet above average.
3	111–130	Extensive	Extensive damage potential. There will be structural damage to small residences and utility buildings. Extensive damage to mobile homes and trees and shrubbery. Impacts include flooding 3-5 hours before the arrival of the hurricane cutting off the low-lying escape routes. Coastal flooding has the potential to destroy small structures, with significant damage to larger structures as a result of the floating debris. Land that is lower than 5 feet below mean sea level can be flooded 8 or more miles inland. Storm surge can be 6–12 feet above average.
4	131–155	Extreme	Extreme damage potential. Curtain wall failure as well as roof structure failure. Major damage to lower floors near the shoreline. Storm surge generally reaches 13–18 feet above average.
5	> 155	Catastrophic	Severe damage potential. Complete roof failure on residence and industrial structures, with complete destruction of mobile homes. All shrubs, trees, and utility lines blown down. Storm surge is generally greater than 18 feet above average.

Hazard History

Figure 5.12 shows how the frequency and strength of extreme wind events vary across the United States. The map was produced by FEMA and is based on 40 years of tornado history and more than 100 years of hurricane history. Zone IV, the darkest area on the map, has experienced both the greatest number of tornadoes and the strongest tornadoes. As shown by the map key, wind speeds in Zone IV can be as high as 250 mph. Most of the planning region falls within Zone II (winds up to 160 mph) and is considered to be susceptible to hurricanes.

Figure 5.12: Wind Zones in the United States



Source: FEMA, 2011

The Richmond-Crater region is categorized by the American Society of Civil Engineers in its *Minimum Design Loads for Buildings and Other Structures* (ASCE 7) as located in a 90-mph wind zone, based on a 50-year recurrence interval. Based on ASCE 7, the potential wind speed for an event with a 100-year recurrence interval was estimated to be 107% of the 50-year wind speed, or 96.3 mph. The Virginia Uniform Statewide Building Code (VUSBC) requires a 90 mph minimum design wind speed.

High wind events have occurred in every portion of the region. There are no proven indicators to predict specifically where high winds may occur, and wind events can be expansive enough to affect the entire area. The counties on the eastern side of the region are closer to the coast and might experience higher wind speeds from tropical storms or nor'easters that affect Virginia, North Carolina or the northeast United States.

Based on NCEI historical data dating back to the mid-1990s, there have been two deaths and 36 injuries in the region that have resulted from wind, and approximately eight deaths that have resulted from hurricanes. **Table 5.14** includes descriptions of damaging tropical storm and hurricane events in the region, of which there are several. Events have been broken down by the date of occurrence and when available, by individual community descriptions. When no community-specific description is available, the general description applies to the entire region. Although NCEI and VDEM were the primary source of general descriptions, other sources are referenced where more specific information was available.

Table 5.14: History of Wind Events and Damages, 2010–2020*

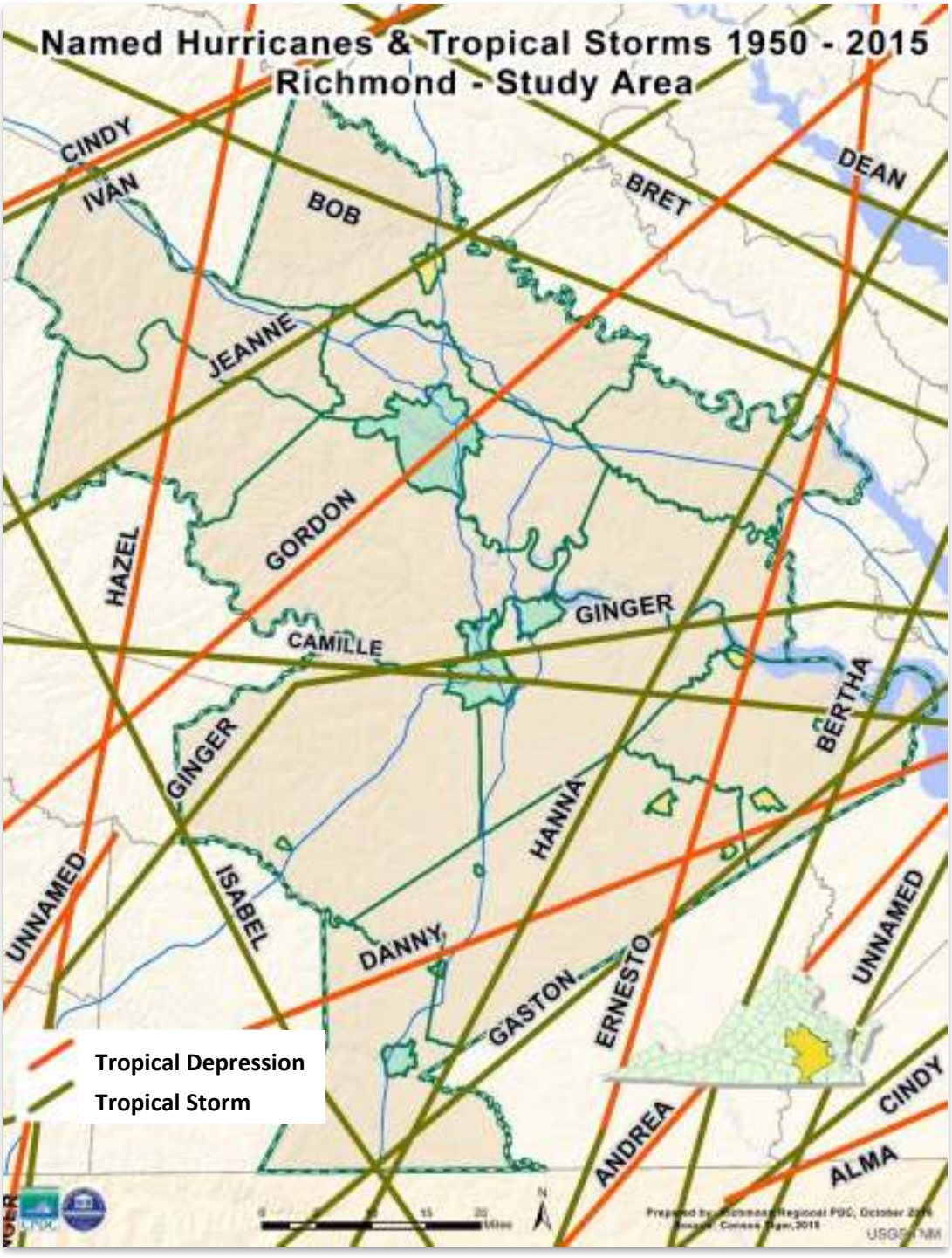
Date	Damages
June 28, 2010	Scattered severe thunderstorms in advance of a cold front produced damaging winds across portions of central Virginia. Trees were downed across eastern portions of Chesterfield County. Trees downed on a home caused the house to collapse in the Sherwood Ridge Subdivision. There was one minor injury. Property damage of $100,000 incurred.
August 27, 2011	Hurricane Irene – See full description in Flood section.
September 4, 2011	Hurricane Lee – See full description in Flood section.
June 29, 2012	A devastating line of thunderstorms known as a derecho moved east-southeast at 60 miles per hour (mph) from Indiana in the early afternoon to the Mid-Atlantic region around midnight. Winds were commonly above 60 mph with numerous reports of winds exceeding 80 mph. Some areas reported isolated pockets of winds greater than 100 mph. Nearly every county impacted by this convective system suffered damages and power outages. To make matters worse, the area affected was in the midst of a prolonged heat wave. Unlike many major tornado outbreaks in the recent past, this event was not forecast well in advance. Warm-season derechos, in particular, are often difficult to forecast and frequently result from subtle, small-scale forcing mechanisms that are difficult to resolve more than 12-24 hours in advance. (Source: http://www.nws.noaa.gov/os/assessments/pdfs/derecho12.pdf)
October 26, 2012	Hurricane Sandy made landfall along the southern New Jersey shore on October 29, 2012, causing historic devastation and substantial loss of life. The National Hurricane Center (NHC) Tropical Cyclone Report estimated the death count from Sandy at 147 direct deaths. In the United States, the storm was associated with 72 direct deaths in eight states: 2 in Virginia. The storm also resulted in at least 75 indirect deaths (i.e., related to unsafe or unhealthy conditions that existed during the evacuation phase, occurrence of the hurricane, or during the post-hurricane/clean-up phase). These numbers make Sandy the deadliest hurricane to hit the U.S. mainland since Hurricane Katrina in 2005, as well as the deadliest hurricane/post-tropical cyclone to hit the U.S. East Coast since Hurricane Agnes in 1972. (Source: http://www.nws.noaa.gov/os/assessments/pdfs/Sandy13.pdf)

Table 5.14: History of Wind Events and Damages, 2010–2020*	
Date	**Damages**
October 12, 2018	Michael was downgraded to extra-tropical shortly after the eye passed over the Virginia-North Carolina border. Winds were 45-50 knots in the region. Wind-related property damages of $19,000 were reported.
October 20, 2019	Nestor was extra-tropical by the time it passed through the region, with wind speeds of 40 knots. The slow-moving disorganized eye passed through the southern part of the study area, between Wakefield and Windsor, and then turned eastward and crossed the James River into Newport News. Wind-related property damages of $6,000 were reported.
August 4, 2020	Isaias was a tropical storm with wind speeds of 60 knots when passing through study area. Gusting winds caused power outages and torrential rains caused flooding that closed roads and bridges. According to the *Richmond Times-Dispatch*, 34 roads in the region were impassable. The paper also reported that the Richmond Metropolitan area had over 28,000 power outages. The storm spawned several tornados, but none reported in the study area. Tropical storm-related property damages of $100,000 were reported in Surry County.

**History from 1827-2010 in Appendix F-4*
Source: NCEI, 2021

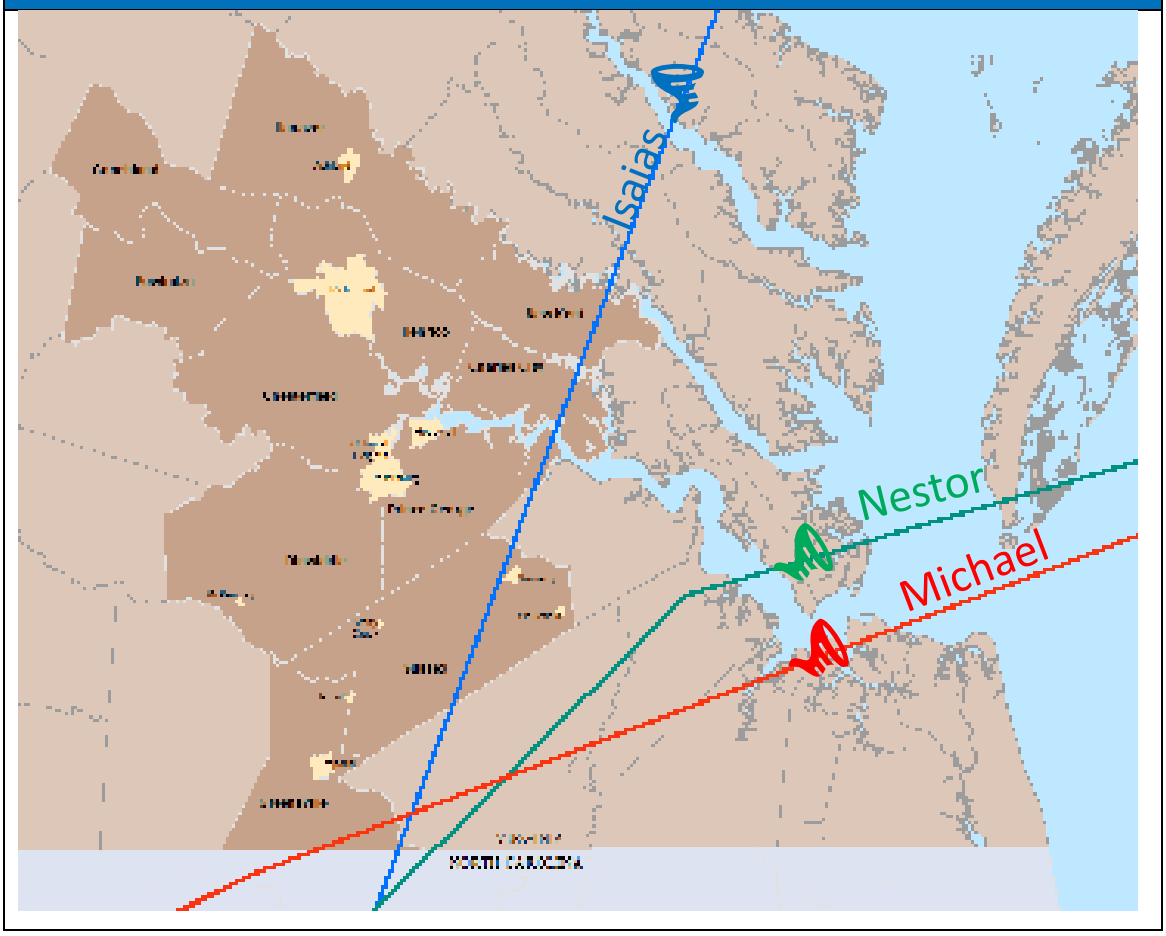
The NOAA Coastal Services Center maintains historical hurricane, tropical storm, and tropical depression track data dating back to the mid-1880s. **Figure 5.13** shows all tropical system and hurricane tracks through and near the region between 1950 and 2015. **Figure 5.14** provides a map of the most recent hurricane or tropical storm tracks between 2015 and 2020.

Figure 5.13: Named Hurricane and Tropical Cyclone Tracks, 1950–2015



Source: NOAA Coastal Services Center, 2021

Figure 5.14: Regionally Significant Hurricane and Tropical Cyclone Tracks, 2015- 2020



Source: NOAA Coastal Services Center, 2021

Vulnerability Analysis

Historical evidence shows that the Richmond-Crater region is vulnerable to damaging storm-force winds, whether associated with coastal storms like nor'easters, tropical storms such as hurricanes, or straight-line winds such those generated by a thunderstorm derecho. As shown in Figure 5.13 above, 36 hurricanes or tropical storms have passed within 75 miles of the region since the first unnamed hurricane in 1854. This equates to a 22-percent annual chance that a storm will similarly impact the region.

Table 5.15 analyzes the historical annual hurricane occurrences in the region with Prince George, Surry and Dinwiddie counties reporting the highest historical annual damages.

Table 5.15: Annualized Hurricane Events and Losses, 1993 - 2020				
Jurisdiction	**Annualized Number of Events**	**Annualized Property Losses**	**Annualized Crop Losses**	**Annualized Total Losses**
Charles City County	0.074	$3,296	$23,741	$27,037
Chesterfield County	-	-	-	-
City of Colonial Heights	-	-	-	-
City of Emporia	-	-	-	-
City of Hopewell	-	-	-	-
City of Petersburg	-	-	-	-
City of Richmond	-	-	-	-
Dinwiddie County	0.074	$214,074	$90,741	$304,815
Goochland County	0.037	$0	$10,481	$10,481
Greensville County	0.074	$8,111	$1,852	$9,963
Hanover County	0.074	$3,704	$14,815	$18,519
Henrico County	0.000	$0	$0	$0
New Kent County	0.074	$926	$4,519	$5,444
Powhatan County	0.037	$148,148	$13,296	$161,444
Prince George County	0.074	$314,815	$229,630	$544,444
Surry County	0.222	$232,111	$81,481	$313,593
Sussex County	0.111	$3,963	$37,037	$41,000
Totals	**0.852**	**$929,148**	**$507,593**	**$1,436,741**

Source: NCEI, 2020

Detailed loss estimates for the wind damage associated with the tropical storm hazard were developed based on probabilistic scenarios using Hazus (Level 1 analysis). **Table 5.16** shows estimates of potential building damage for the 100-year return period, and annualized total losses. In summary, the region may be susceptible to an estimated total of approximately $178 million in building damages from a 100-year wind event, equating to $9.7 million average annual damages.

Table 5.16: Estimates of Potential Building Damage – 100-Year Wind Only Event					
Community	**Building Damage**	**Contents & Inventory Damage**	**Income Losses**	**Total***	**Annualized Total Losses**
Charles City County	$969,000	$532,000	$0	$1,501,000	$125,000
Chesterfield County	$49,095,000	$7,696,000	$59,000	$56,850,000	$2,271,000
Colonial Heights	$3,645,000	$529,000	$24,000	$4,198,000	$174,000
Dinwiddie County	$8,111,000	$2,181,000	$194,000	$10,486,000	$252,000
Emporia	$953,000	$279,000	$11,000	$1,243,000	$90,000
Goochland County	$2,860,000	$1,297,000	$0	$4,157,000	$201,000
Greensville County	$1,562,000	$571,000	$1,000	$2,134,000	$137,000
Hanover County	$9,861,000	$5,123,000	$1,000	$14,985,000	$1,347,000
Henrico County	$24,076,000	$2,623,000	$58,000	$26,757,000	$2,059,000
Hopewell	$3,641,000	$843,000	$28,000	$4,512,000	$222,000
New Kent County	$2,337,000	$1,386,000	$0	$3,723,000	$441,000
Petersburg	$6,891,000	$1,429,000	$213,000	$8,533,000	$326,000
Powhatan County	$5,715,000	$3,128,000	$0	$8,843,000	$265,000
Prince George County	$8,093,000	$2,298,000	$24,000	$10,415,000	$412,000
Richmond	$14,589,000	$1,380,000	$140,000	$16,109,000	$1,235,000
Sussex County	$3,185,000	$1,012,000	$89,000	$4,286,000	$147,000
Totals	$145,583,000	$32,307,000	$842,000	$178,732,000	$9,704,000

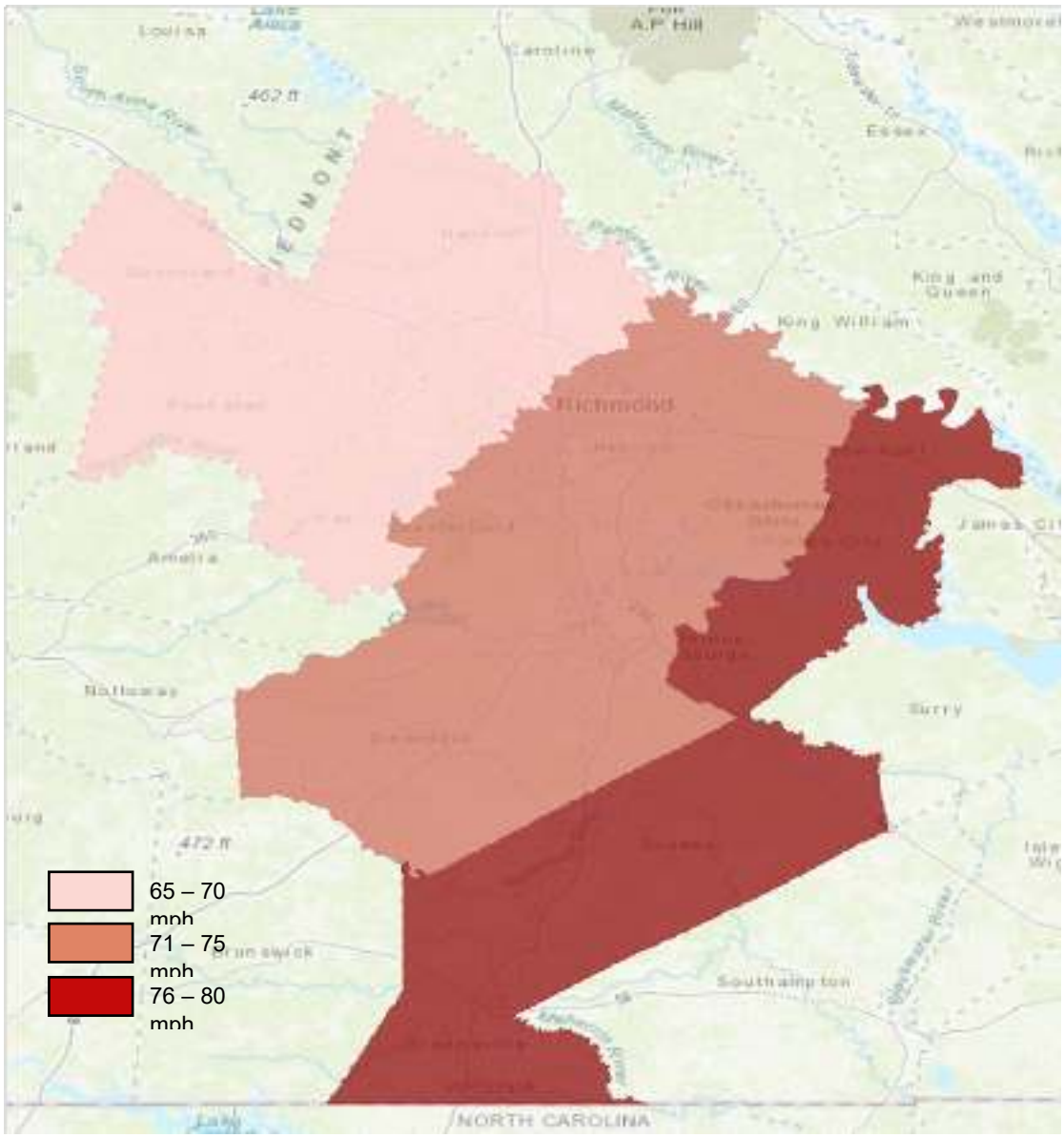
** income losses from relocation, lost wages, and lost rental income*
Source: Hazus

Based on the data in Table 5.16, Chesterfield County, Hanover County, Henrico County and the City of Richmond have the highest annualized total losses from wind associated with a 100-year wind event. These communities are also the most vulnerable for flood, so these 3 communities are considered the most vulnerable to the combined wind and flooding effects of Tropical Storms. Prince George County, Dinwiddie County and Hanover County are also very vulnerable to wind effects from the 100-year wind event. Emporia, Charles City County and Greensville County are significantly further west, have less overall development, and are thus less likely to experience the devastating impacts of wind than the remainder of the Richmond-Crater region. Annualized losses for the region total just over $9.7 million, but vary remarkably throughout the area, with Emporia having annualized damages of $90,000 and Chesterfield County with over $2.2 million.

Figure 5.15 provides a map of winds expected from the 100-year event across the study area, also modeled through Hazus. Consistent with the expected exposure to hurricane

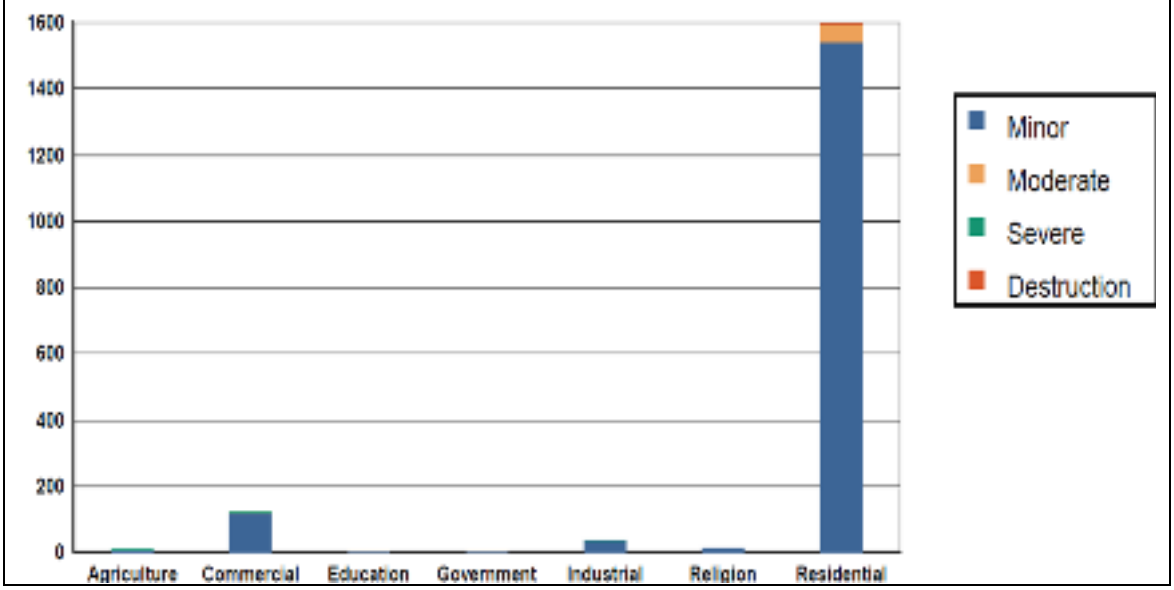
force winds near the coast, the most vulnerable area to high winds is typically in the eastern portion of the study area. Areas west of Richmond and into the Virginia Piedmont region are less susceptible.

Figure 5.15: 100-year Return Period Peak Gusts (mph)



Source: Hazus, 2021

Figure 5.16: Expected Building Damage by Occupancy, 100-year Wind Event



Source: Hazus, 2021

Hazus was also used to model summary building damage estimates based on percentage of damage (by damage state) for the 100-year return period (**Figure 5.16**). These data can be useful when used in conjunction with Table 5.16 above because building wind damage can range from minor, easily repairable damage to gutters or roof features, to destruction of roofs and buildings from fallen trees, or structural failure.

For this update, Hazus was used to model a recurrence of Hurricane Hazel, which struck the Central Virginia region in 1954. The storm track was unique; it approached central Virginia from the south. On October 15, the storm made landfall near the North Carolina/South Carolina line and is estimated to have been a Category 4 storm at that time. As it moved north across North Carolina, Hazel became extratropical over Raleigh. Hazel rocketed north over Central Virginia at a forward speed of 50 miles per hour and brought with it wind gusts of 79 miles per hour in Richmond. But the speed of the storm kept the damage from being devastating. Many homes in Richmond lost roofs.

An examination of Hazel using modern building exposure data was possible through Hazus. **Table 5.17** provides a summary of the damage data for this "what-if" scenario, examining the damage caused if a storm similar to Hurricane Hazel struck the Richmond-Crater study area in the 21st century. Total estimated losses are over $2.3 billion, with most significant damages in Chesterfield County, Hanover County, Henrico County, and the City of Richmond.

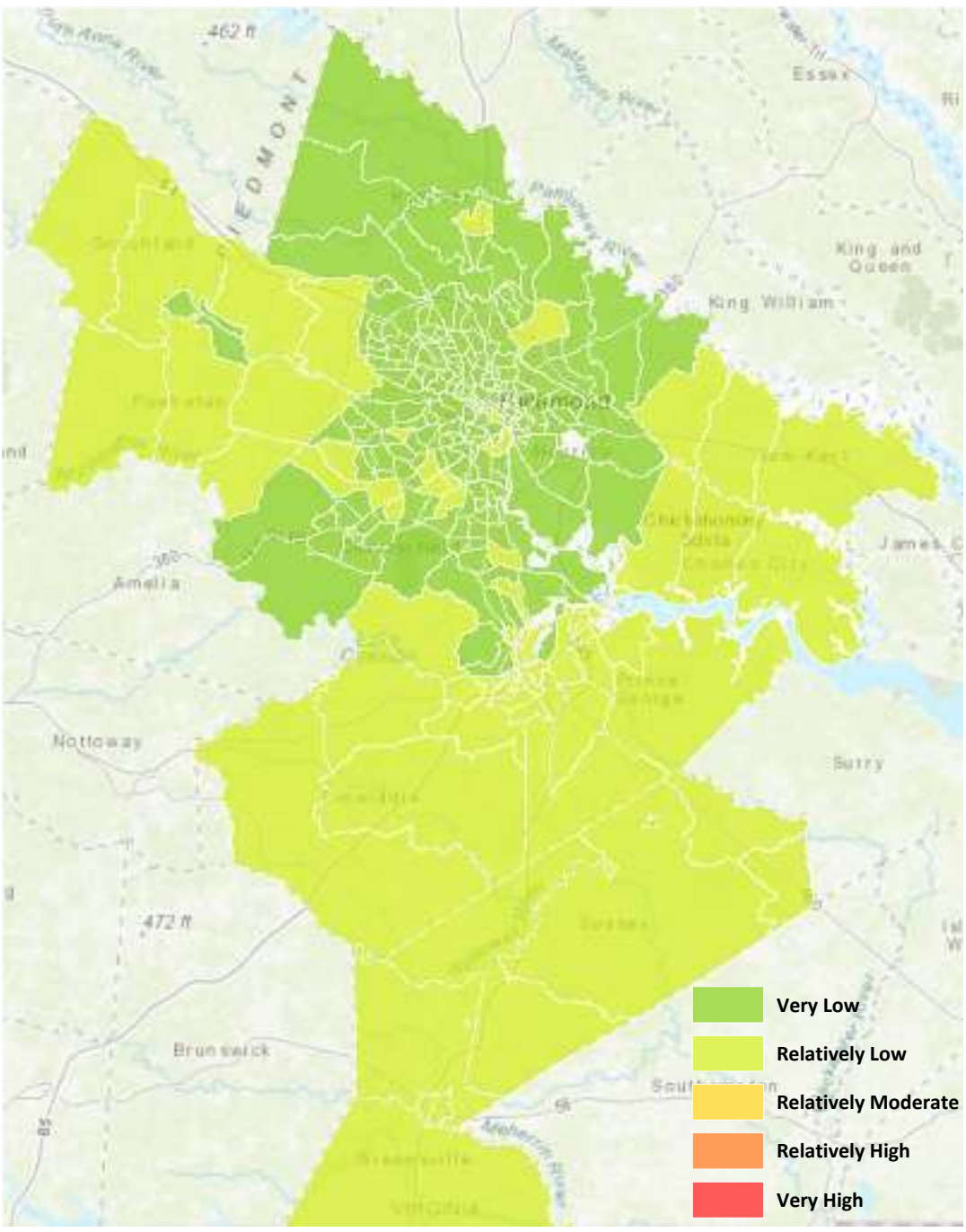
Table 5.17: Estimates of Potential Building Damage – Hurricane Hazel in 2021				
Community	**Building Damage**	**Contents & Inventory Damage**	**Income Losses**	**Total***
Charles City County	$6,537,000	$3,091,000	$190,000	$9,818,000
Chesterfield County	$504,598,000	$93,278,000	$36,964,000	$634,840,000
Colonial Heights	$23,552,000	$4,123,000	$2,858,000	$30,533,000
Dinwiddie County	$38,661,000	$11,292,000	$3,342,000	$53,295,000
Emporia	$8,258,000	$2,574,000	$1,239,000	$12,071,000
Goochland County	$27,418,000	$9,446,000	$1,175,000	$38,039,000
Greensville County	$12,319,000	$4,491,000	$1,150,000	$17,960,000
Hanover County	$209,059,000	$89,736,000	$10,711,000	$309,506,000
Henrico County	$513,786,000	$88,870,000	$50,033,000	$652,689,000
Hopewell	$22,906,000	$5,225,000	$2,076,000	$30,207,000
New Kent County	$20,972,000	$10,843,000	$462,000	$32,277,000
Petersburg	$41,072,000	$9,539,000	$5,277,000	$55,888,000
Powhatan County	$31,513,000	$14,209,000	$874,000	$46,596,000
Prince George County	$32,559,000	$9,329,000	$1,464,000	$43,352,000
Richmond	$302,153,000	$48,356,000	$45,582,000	$396,091,000
Sussex County	$7,234,000	$2,306,000	$415,000	$9,955,000
Totals	**$1,802,597,000**	**$406,708,000**	**$163,812,000**	**$2,373,117,000**

** Also includes income losses from relocation, lost wages, and lost rental income.*
Source: Hazus

Social Vulnerability

The NRI data for social vulnerability to hurricanes are shown in **Figure 5.17**. Most of the urbanized portion of the study area is shown as having very low social vulnerability, while the more rural land use areas are shown as having relatively low social vulnerability. This disparity could be a result of the lack of recorded hurricane or tropical storm losses for the cities in the region. Table 5.15 above (Annualized Hurricane Events and Losses, 1993 – 2020) shows that the NCEI database does not include any recorded events for any of the cities in the study area. Therefore, the modeling included a large number of no loss or low loss events.

Figure 5.17: National Risk Index, Hurricane Risk Rating



Source: National Risk Index, FEMA 2021

Note: The Town of Surry has relatively moderate social vulnerability for hurricane.

Future Vulnerability, Land Use and Climate Change

The type of building construction has a significant impact on potential damages from high wind events in the future, as type of construction is also a key factor in determining the life of a structure. Basic building types in declining order of wind vulnerability are manufactured, non-engineered wood, non-engineered masonry, lightly engineered and fully engineered buildings. The primary residential construction type in the study area is wood framed, varying from single story to multiple stories, although some masonry and steel properties are present as well. With the prevalence of non-engineered, wood-framed structures throughout the Richmond-Crater region, a majority of structures in the area could be classified as having a high level of vulnerability to damages due to a high wind event in the future. Using Hazus, an analysis of the damage caused by a 100-year frequency wind event indicates that 815 wood-framed structures would have minor, moderate or severe damage, while 723 masonry structures would have minor, moderate or severe damage.

All future structures built in the Richmond-Crater region will likely be exposed to hurricane and tropical storm-force winds and may also experience damage not accounted for in the loss estimates presented in this section. The VUSBC continues to reduce vulnerability of newly constructed buildings to the wind hazard.

The VASEM 2021 report concludes that the research on climate change impacts in the study region is conflicted regarding increased frequency of Atlantic Coast hurricanes. However, the report indicates consensus that there will be an increase in average cyclone intensity, precipitation rates, and the number of strong storms. Strong storms combined with sea level rise are particularly alarming for the eastern region of the study area. Even in rural areas in the western portion of the study area, increasing storm intensity can damage crops and soil in addition to vulnerable agricultural structures.

Similar to the discussion in the subsection above regarding flooding, mass evacuations due to coastal wind events, particularly tropical storms, is a possibility. However, the last time a mass evacuation impacted the area was Hurricane Floyd in September 1999. Transportation disruptions and impacts on infrastructure are the most likely problems that communities in the study area may experience.

5.7 Tornadoes

Hazard Profile

A tornado is a violent windstorm characterized by a twisting, funnel-shaped cloud extending to the ground. Tornadoes are most often generated by thunderstorm activity when cool, dry air intersects and overrides a layer of warm, moist air forcing the warm air to rise rapidly. The damage caused by a tornado is a result of the high wind velocity and wind-blown debris, also accompanied by lightning or large hail. According to the NWS, tornado wind speeds normally range from 40 to more than 200 mph. The most violent tornadoes (EF5) have rotating winds of 200 mph or more and are capable of causing extreme destruction and turning normally harmless objects into deadly missiles.

Each year, an average of over 1,200 tornadoes is reported nationwide, resulting in an average of 80 deaths and 1,500 injuries. They are more likely to occur during the spring and early summer months of March through June and can occur at any time of day but are likely to form in the late afternoon and early evening. Most tornadoes are a few dozen yards wide and touch down briefly, but even small, short-lived tornadoes can inflict tremendous damage. Highly destructive tornadoes may carve out a path over a mile wide and tens of miles long.

Magnitude or Severity

The destruction caused by tornadoes ranges from light to devastating depending upon the intensity, size, and duration of the storm. Typically, tornadoes cause the greatest damages to structures of light or wood-framed construction such as residential homes (particularly mobile homes) and tend to remain localized in impact. The traditional Fujita Scale for tornadoes, introduced in 1971, was developed to measure tornado strength and associated damages. Starting in February of 2007, an "enhanced" Fujita (EF) Scale was implemented, with somewhat lower wind speeds at the higher F-numbers, and more thoroughly refined structural damage indicator definitions. **Table 5.18** provides a summary of the EF Scale. Assigning an EF Scale rating to a tornado involves the following steps:

- Conduct an aerial and ground survey over the entire length of the damage path;
- Locate and identify damage indicators in the damage path;
- Consider the wind speeds of all damage indicators and assign an EF Scale category for the highest wind speed consistent with wind speeds from the other damage indicators;
- Record the basis for assigning an EF scale rating to a tornado event; and
- Record other pertinent data related to the tornado event.

Table 5.18: Enhanced Fujita (EF) Scale for Tornadoes	
EF-Scale Number	**3 Second Gusts (mph)**
F0	65-85
F1	86-110
F2	111-135
F3	136-165
F4	166-200
F5	over 200

Source: NWS Storm Prediction Center

In Virginia, tornadoes primarily occur from April through September, although tornadoes have been observed in every month. Low-intensity tornadoes occur most frequently; tornadoes rated F2 or higher are very rare in Virginia, although F2, F3, and a few F4 storms have been observed. According to the *2013 Commonwealth of Virginia, Mitigation Plan*, Virginia ranks 28th in terms of the number of tornado touchdowns reported between 1950 and 2006. The 2018 update did not provide an updated ranking.

Tornadoes are high-impact, low-probability hazards. The net impact of a tornado depends on the storm intensity and the vulnerability of development in its path. Because the path of each tornado is unique to each event, general descriptions of impacts in the study area can be drawn from the impacts of previous storms (see also **Table 5.19** below). Communities rarely activate EOCs before tornadoes due to the short warning times, but after extreme events with catastrophic damage that displace a large number of residents, such activation may become necessary.

In the Richmond-Crater region, a high intensity tornado, while rare, can be expected to impact almost everything within the storm's path: homes, especially those constructed prior to the use of building codes; infrastructure, especially above-ground power lines in the commercial zones and bridges throughout the region; cars and personal property; landscape elements such as trees, fences and shrubs; and even human lives. Downed trees can block roadways, impeding traffic and blocking access and egress if any of the region's thoroughfares are impacted. Manufactured homes are particularly vulnerable to damage in the event of tornadoes, as well, particularly if they were placed outside of flood zones and before building codes were in effect requiring foundation tie-downs.

Tornadoes associated with tropical cyclones are somewhat more predictable. These tornadoes occur frequently in September and October when the incidence of tropical storm systems is greatest. They usually form around the perimeter of the storm, and most often to the right and ahead of the storm path or the storm center as it comes ashore. These tornadoes commonly occur as part of large outbreaks and generally move in an easterly direction. Tracking and prior notification by the National Weather Service and local news media helps save lives locally.

Most tornado strikes in the region have been F0 or F1 and the effects were somewhat less than as described above for severe storms. Critical damage to structures in the tornado's

path is common, with indiscriminate damage to public-and privately-owned structures, some infrastructure, and downed trees that make transportation difficult. In areas adjacent to the path, minor damage, especially to roofs and windows from trees and flying debris, can also be expected. While downed trees may block transportation routes and result in power outages for some customers, these impacts are typically cleared within a few days.

Hazard History

Table 5.19 includes descriptions of major tornado events that have touched down and been recorded in the region since 2011. Prior events are included in Appendix F-5. Events have been broken down by the date of occurrence and, when available, by individual community descriptions. When no community description is available, the general description applies to the entire region. Although not comprehensive in terms of tornado fatalities and injuries, the NCEI database indicates that since 1950 there have been 11 deaths and 348 injuries in the region due to tornadoes.

Table 5.19: History of Tornado Events and Damages, 2011–2020*

Date	Description	Damages
April 16, 2011	**Dinwiddie County:** Tornado path started on Doyle Road west of Glebe Road and then tracked east-northeast to the Five Forks area of Dinwiddie County. Hundreds of trees were either downed or snapped off. Numerous power lines were also downed, and there were several homes and outbuildings with minor to moderate damage. Most significant damage was on Patillo Road at Wooded Lane, and on Wilkinson Road near Shannon Drive. EF-1	**$1,500,000 (property)** **5 injuries**
April 27, 2011	**Goochland County:** Scattered severe thunderstorms well in advance of a cold front produced damaging winds, large hail, and several tornadoes across portions of central Virginia. Tornado tracked from Bridgewater Bluff to Pony Farm Road, crossing Interstate 64. Numerous trees were downed or sheared off. The tornado tracked into Louisa County. EF1	**$25,000 (property)**
April 28, 2011	**Hanover County:** Scattered severe thunderstorms in advance of a cold front produced damaging winds and one tornado across portions of central and eastern Virginia. Tornado paralleled Old Ridge Road for 1.5 miles before crossing Coatesville Road. The tornado then tracked northeast approximately 1 mile and crossed Old Ridge Road. Numerous trees were downed or sheared off. A single tree fell on a house on Old Ridge Road causing minor roof damage. EF1	**$25,000 (property)**
October 13, 2011	**New Kent County:** Tornado first touched down along Emmaus Church Road or Route 609 just into New Kent County north of U.S. Route 60. The NWS Storm Survey rated the tornado as an EF1 with winds estimated at 95 mph as it reached the Woodhaven Shores Subdivision on both sides of Kent Lake. According to county emergency management, over 30 homes were damaged in the Woodhaven Shores Subdivision on both sides of Kent Lake, primarily due to trees falling on	**$1,000,000 (property)**

Table 5.19: History of Tornado Events and Damages, 2011–2020*		
Date	**Description**	**Damages**
	homes. Damage was most extensive along and adjacent to Lakeshore Drive which surrounds Kent Lake. EF1 damage extended just to the north of Kent Lake and included two barns that were destroyed along Ashland Farm Road. The tornado then weakened to a high-end EF0 and turned northeast as it crossed north of Interstate 64. Damage at GW Watkins Elementary School included aluminum roofing panels that were popped off along with a few busted windows. EF0 damage was observed farther northeast with several trees downed or snapped off along Talleysville Road near Old River Road. The tornado lifted just before entering King William County. EF-1	
June 1, 2012	Scattered severe thunderstorms in advance of a cold front produced damaging winds, large hail and several tornadoes across portions of central and eastern Virginia. **Petersburg:** The tornado tracked approximately 3 miles beginning on the western edge of Fort Hayes Common where a couple of trees were damaged. It then continued northeast through portions of the Battlefield Park, Oakhurst and East Walnut Hill sections of Petersburg. The tornado then crossed Interstate 95 causing minor damage, mainly windows blown out and signs damaged just east of the intersection of Route 460 and Hickory Hill Road. The last damage or debris was observed on the north side of the Petersburg National Battlefield. The tornado damage was characterized by trees, large limbs and power lines down. A number of trees fell on homes. The most significant damage occurred in the East Walnut Hill neighborhood and the northeast sections of the Oakhurst neighborhood. EF0 **Hanover County:** A brief tornado touched down just west of Highway 301 tracking southeast. The tornado knocked down numerous trees blocking roads including Highway 301. Tornado downed numerous trees and produced some minor structural damage in the Hadensville area of Goochland County. EF0	**$175,000 (property)** **5 injuries**
June 25, 2012	**Goochland County:** Scattered severe thunderstorms in advance of a cold front produced damaging winds, large hail and a tornado across portions of central and eastern Virginia. EF0	**$15,000 (property)**
June 30, 2012	**Hanover County:** The tornado downed numerous trees and produced some minor structural damage in the area. The tornado initially touched down near Williamsville Acres Lane, then tracked south southeast before lifting east of Mechanicsville near the intersection of Crown Hill Road and State Route 628. EF-0	**$15,000 (property)**
May 22, 2014	**Prince George County:** _ The tornado was confirmed near the city of Prince George. The storm intensified northwest of Richmond, then produced wind damage in the City of Richmond, with trained storm spotters periodically reporting a funnel cloud in the Metro as it raced southeast. At 5:45 p.m., a tornado touched down on Kurnas Lane, destroying a shed, snapping trees and causing minor damage to a home. The tornado was rated an EF-0, with winds of 70 mph. It was 25	**$50,000 (property)**

Table 5.19: History of Tornado Events and Damages, 2011–2020*		
Date	**Description**	**Damages**
	yards wide and was on the ground for 75 yards. No injuries were reported. EF-0 **Sussex County:** The tornado was confirmed near Waverly in Sussex County at 6:20 p.m. The tornado developed just north of Highway 460 and south of Petersburg Road, about mile northwest of Waverly. It moved south and crossed Highway 460 just north of Waverly. It struck an auto parts store, causing minor damage. Many large trees were uprooted along Highway 460, and the highway was closed due to trees on the road. The tornado tracked southward to North Church Street, causing minor damage to the First Baptist Church. Many large trees fell into the nearby cemetery, causing damage. The tornado moved across New Street, snapping trees and damaging homes. The tornado lifted shortly after crossing Highway 460 on the west side of Waverly. This tornado was classified as an EF-0 tornado, with winds of 75 mph. It was 100 yards wide and was on the ground for 1.5 miles. No injuries were reported. EF-0 (Source: http://wtvr.com/2014/05/23/two-tornadoes-confirmed-from-may-22-storm/)	
June 27, 2015	**Hanover County:** Scattered severe thunderstorms along a warm front and in advance of a cold front produced damaging winds, a weak tornado, and heavy rain across portions of central and eastern Virginia. A weak tornado touched down several times in Hanover County. It began just north and east of the Interstate 295 and Interstate 95 interchange. It then tracked east northeast for about 3.5 miles, crossing Route 301 before lifting and dissipating. Minor damage to tops of trees occurred. EF0	$2000 (property)
Feb 24, 2016	**Waverly:** NWS storm survey concluded that an EF1 tornado occurred near Waverly. The tornado began a few miles south southwest of Waverly, moved fast through the town of Waverly, then ended about five miles north northeast of Waverly in Surry County. Maximum winds were between 100 and 110 mph. Numerous trees were downed, with two mobile homes destroyed and several homes and businesses damaged. EF-1	$2,600,000 (property damage) 3 deaths, 8 injuries
May 5, 2017	**Mosely:** Tornado tracked from near the Norfolk Southern Railroad northeast to near the intersection of Bradbury Road (VA-672) and Moseley Road (VA-605). Many trees were found snapped or uprooted along this route, including several onto homes. EF-0 **McKenney:** Tornado tracked from Brunswick County into Dinwiddie County. The tornado continued north northeast into Dinwiddie County along Old White Oak Road. It crossed Old White Oak Road near Route 40, then continued north northeast before a visible damage path ended just north of Lew Jones Road. Numerous trees were uprooted or sheared off, and there was significant damage to a few homes and one large shed was destroyed. Also, there was extensive crop damage, as well as damage to farm equipment and land damage. EF-1	$578,000 (property) $40,000 (crops)

Table 5.19: History of Tornado Events and Damages, 2011–2020*		
Date	**Description**	**Damages**
	Dinwiddie County: Information obtained from the Dinwiddie County emergency manager and the Virginia Department of Forestry suggests a tornado touched down in timberland in northern Dinwiddie County. The tornado first touched down north of Route 460, to the west northwest of Sutherland, then tracked north northeast, ending near Namozine Road. Extensive damage to trees occurred along the path, with no damage to structures. EF-1	
September 17, 2018	**Rockville:** A brief EF1 tornado touched down just northwest of the intersection of Echo Meadows Road and Rockville Road in Hanover County. The storm then moved north northeast, causing numerous trees to be uprooted or snapped. In addition, an open shed was completely destroyed, with numerous round bales of hay moved into the field to the north. The tornado then lifted near Franklin Hills Drive. EF-1 **Hallsboro**: The tornado first crossed Beaver Bridge Road and then Beach Road. The bulk of the structural damage occurred in the Hampton Park Neighborhood. It then crossed Hull Street and entered Moseley, before dissipating near the Fox Club Parkway. EF-1 **Richmond:** An EF1 tornado touched down in the Stony Point area of the City of Richmond just south of West Huguenot Road. The tornado then tracked northward into Tuckahoe before lifting just south of Three Chopt Road. Numerous trees were downed or snapped with air conditioning units blown off the West End Church near West Parham Road. EF-1 **Bon Air:** Beginning in Winterpock, the tornado started as a weak EF1 before moving into a residential area north of River Road. The tornado reached peak intensity (EF2) when it crossed Hull Street Road. At this point, it took off the roof of Gabe's and damaged several other businesses. After crossing Hull Street Road, it destroyed the Old Dominion Warehouse, where one person was killed, and one was injured. It remained an EF2 until about Gregwood Drive, completely destroying trees and damaging other structures. It then quickly weakened to an EF0 as it reached Powhite Parkway and continued as an EF0 toward Route 60 in Bon Air. One death and one injury were reported. EF-2 **Pilkinton:** This was a weak tornado that uprooted a few trees and snapped some tree limbs. EF-0 **Richmond:** The tornado briefly touched down on New Kent Road where numerous trees were snapped. EF-0 **Richmond:** The tornado touched down on West Wood Avenue, then onto Confederate Avenue and Lamont Street where numerous trees and several power poles were snapped. EF-0 **Richmond:** The tornado touched down in the City of Richmond on the north side of the James River between Byrd Park and the Powhite Parkway. The tornado continued across the Powhite Parkway into the	$1,078,000 (property) 1 death, 1 injury

Table 5.19: History of Tornado Events and Damages, 2011–2020*		
Date	**Description**	**Damages**
	Windsor Farms section of the City of Richmond. The tornado mainly snapped and uprooted trees along its path. EF-0 **Atlee:** Public video of a tornado touchdown near Atlee High School. Tornado touched down briefly then lifted off the ground causing no damage. EF-0 **Richmond:** The tornado touched down near Stratford Road, then moved north across Chippenham Parkway, and ending near Cherokee Road where numerous trees and several power poles were snapped. EF-0	
October 11, 2018	**Lanexa:** A tornado touched down on Colony Trail in Lanexa where it downed several trees and damaged four homes before lifting near the intersection of Colony Trail and Waterside Drive. EF-0	$50,000 (property)
April 19, 2019	**Gaskins:** The tornado touched down approximately 1/2 mile west of Creek Road in rural southeast Greensville County. The tornado tracked north northeast over rural portions of Greensville County before finally lifting one mile north of Moores Lane. The tornado mostly snapped trees along its path. EF-0 **Dahlia:** The tornado tracked from Northampton County, NC, into Greensville County, VA. The tornado tracked across Skippers Road where additional trees were snapped. The tornado then briefly lifted while shifting its track slightly east, while remaining in Greensville County. EF-0 **Skippers:** The same tornado that started in Northampton County NC, shifted its track slightly east within Greensville County, VA and touched down again near Taylor`s Mill Road. From there, the tornado continued northeast crossing Caney Swamp and causing EF1 damage to numerous trees along Little Low Ground Road. The tornado then continued into extreme southwest Southampton County. EF-1 **Emporia:** The tornado touched down near the intersection of Brink Road and Collins Road, about 3 miles southwest of Emporia, VA in Greensville County. The tornado snapped trees and did damage to a couple of outbuildings along its path. Minor damage also occurred at a shopping center in Emporia. The tornado lifted just north of town. EF-0 **Newville:** The tornado touched down just south of Sussex Drive about 4 miles east of Stony Creek in Sussex County. It then traveled northeast and crossed Jerusalem Park Road near Courthouse Road, before continuing northeast across General Mahone Highway and lifting before reaching Centerville Road in Prince George County. The tornado mostly uprooted and snapped trees along its path. A garage was also destroyed from a tree falling on it. EF-0 **Burrowsville:** The tornado touched down near Fireside Drive in Disputanta causing some downed trees and a car port to be blown over, consistent with EF0 damage. The tornado continued moving north northeast across Webb Road and then Lebanon Road, Cedar Lane and Pole Run Road. Many trees were snapped or uprooted, and	$293,000 (property)

Table 5.19: History of Tornado Events and Damages, 2011–2020*		
Date	**Description**	**Damages**
	numerous sheds and outbuildings received significant damage or were destroyed between Lebanon Road and Pole Run Road. This area was where the EF1 damage occurred. The tornado lifted north of Pole Run Road before Route 10. There was additional tree damage along Hines Road just north of Newville. EF-1 **Ruthville:** The National Service in Wakefield confirmed an EF2 tornado just northeast of Charles City. The tornado touched down just east of The Glebe Lane about 1.7 miles northeast of Charles City causing some trees to be uprooted and snapped along Ruthville Road. Soon after crossing Ruthville Road, the tornado intensified to an EF2, causing extensive damage to Charles City Rod and Gun Club. The roof of the building was lifted off and blown partially off. In addition, the south facing exterior wall was blown in. The tornado continued tracking northeast, crossing Old Elam Cemetery Road and then The Glebe Lane, causing extensive tree damage including snapped and uprooted trees consistent with EF1 damage. The tornado then weakened to an EF0, before lifting just northeast of Sturgeon Point Road. EF-2	

**History from 1790-2010 in Appendix F-5*
Source: NOAA, NCEI data through 11/30/2020, accessed 3/18/21.

By far, the most memorable tornado in the region's history since 1950 occurred in the summer of 1993, affecting Petersburg, Colonial Heights, Prince George County and Hopewell. August 6, 1993, started out quietly for southeastern Virginia, with highs in the mid-70s and partly cloudy skies. However, as a warm front moved north across Richmond and Henrico County and an approaching low pressure center moved in, these clouds disappeared leading to intense warming throughout the day. Unfortunately, the mild temperatures and high humidity levels in place that day were two of the key ingredients that allowed a warm August afternoon to turn into an historical and deadly evening. (Source: https://www.weather.gov/akq/severe_Aug061993)

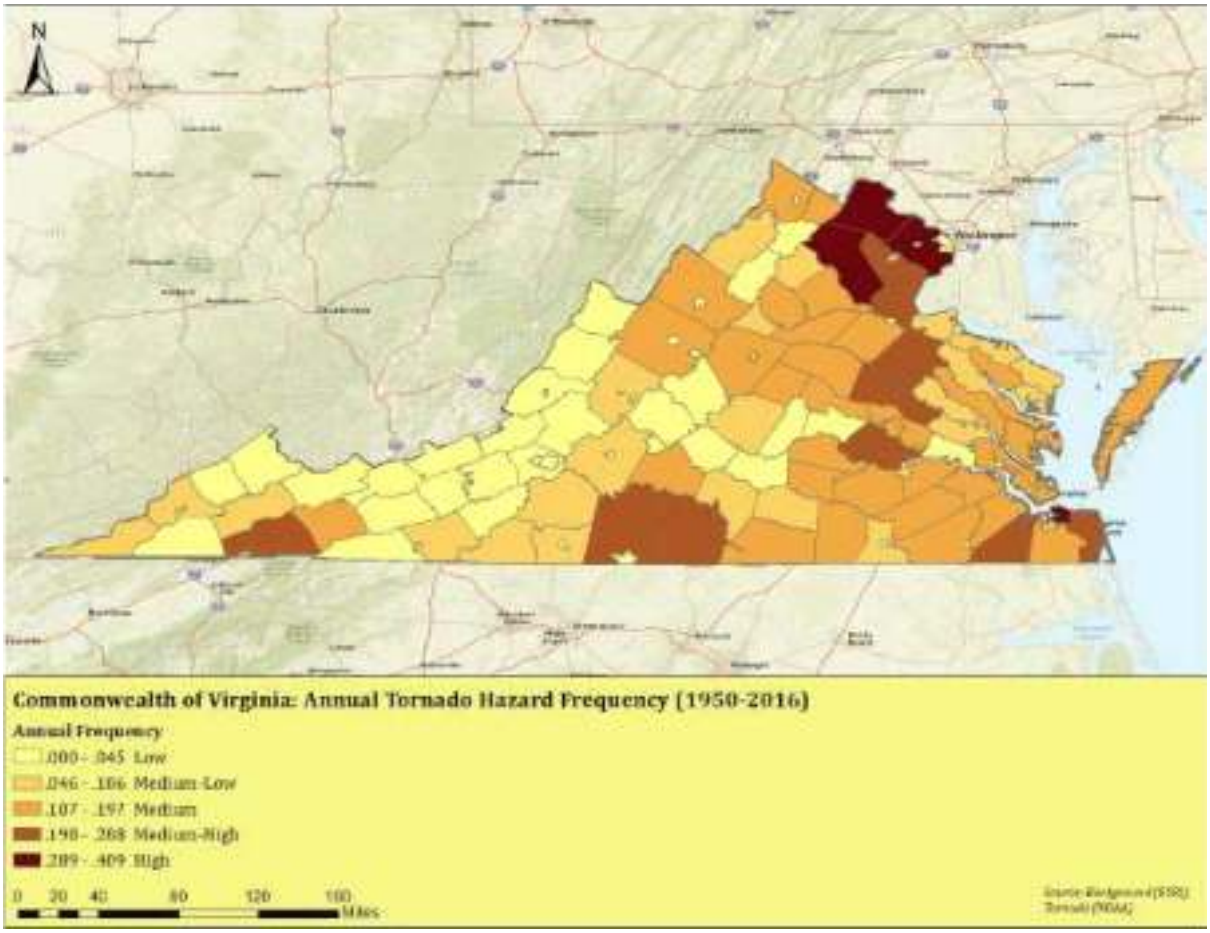
As pressures fell due to a low center developing along the front over southwest Virginia, an upper-level short-wave (disturbance) approached. Surface winds and winds aloft struggled against each other producing the ideal vertical wind shear needed for tornadic development that afternoon. The most devastating tornado of the day touched down one mile southwest of Petersburg at approximately 1:30 pm. This tornado rapidly grew in size and strength as it moved northeast into the commercial historic district of Petersburg. Numerous homes and businesses sustained major damage. Damage estimates for the area were $15 million. Forty people were injured.

Often called the “Tri-Cities Tornado”, the storm crossed the river into Colonial Heights and struck one of the area's shopping districts. It destroyed some buildings and did major damage to numerous other buildings including the Wal-Mart, where three people were killed and nearly 200 were injured. Total damage estimates in Colonial Heights were $29.5 million.

The tornado crossed the Appomattox River again into Prince George County where it struck a sand and gravel pit company. A block building collapsed, and numerous vehicles and other equipment were destroyed. One person was killed. Damage estimates were $750,000. It then moved into the northern section of Hopewell, where it ripped into the Riverside Park Apartment Complex, tearing the roofs off of several buildings. Minor damage was done to another 49 homes, major damage to 13 homes and destruction of 2 homes. The tornado weakened then dissipated near the confluence of the Appomattox and James Rivers. Final records indicate that the tornado caused 4 deaths, 246 injuries and approximately $50 million in damage. According to NCEI records, this tornado is one of only two F4 or greater tornadoes in Virginia history since 1950 and is by far the most destructive.

Figure 5.18 presents the results of a tornado frequency analysis performed as part of the *2018 Virginia State Hazard Mitigation Plan* update. The analysis suggests that relative to the entire Commonwealth of Virginia, the Richmond-Crater region is considered “Medium” to “Medium-High” in terms of tornado frequency. The State plan emphasizes that historical data may contain meteorological biases that should be considered when viewing the results of the probability analysis shown in **Figure 5.18**. Increased population and advanced technology have likely led to vastly higher numbers of low intensity tornadoes reported in recent decades, and more tornadoes are reported in areas of higher population because people are more likely to see and report the resultant damage. This map is also specific to Virginia, and “high frequency” in the Commonwealth is still relatively low frequency in parts of the Midwest and southern United States.

Figure 5.18: Historical Tornado Hazard Frequency Analysis



Source: 2018 Virginia State Hazard Mitigation Plan

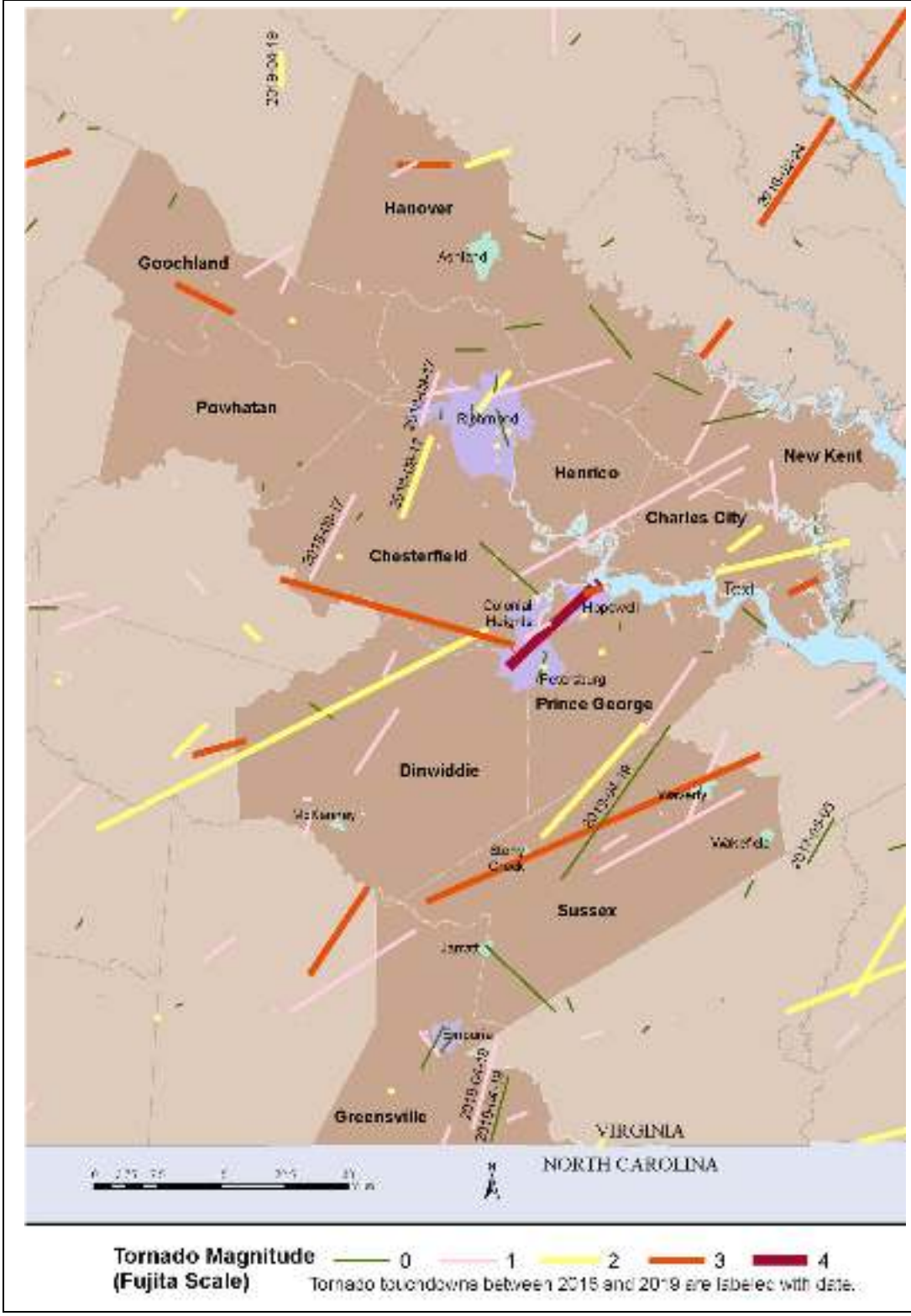
Table 5.20 presents summary data about the historical tornado events by jurisdiction and provides an estimate of annualized losses from tornadoes for each jurisdiction based on reports included in the NCEI database.

Table 5.20: Annualized Tornado Events and Losses, 1950 - 2020			
Jurisdiction	**Number of Events**	**Total Property Damages**	**Annualized Loss**
Charles City County	4	$700,000	$10,000
Chesterfield County	16	$7,073,250	$101,046
City of Colonial Heights	1	$2,000,000	$28,571
Dinwiddie County (inc. Town of McKenney)	11	$2,453,000	$35,043
City of Emporia	3	$125,000	$1,786
Goochland County	8	$553,500	$7,907
Greensville County (inc. Town of Jarratt)	8	$823,000	$11,757
Hanover County (inc. Town of Ashland)	16	$1,401,500	$20,021
Henrico County	11	$3,322,530	$47,465
City of Hopewell	2	$2,510,000	$35,857
New Kent County	6	$1,090,000	$15,571
City of Petersburg	7	$75,925,000	$1,084,643
Powhatan County	3	$103,000	$1,471
Prince George County	9	628000	$8,971
City of Richmond	14	$1,122,000	$16,029
Surry County (inc. Towns of Claremont (3), Dendron, Surry(2))	9	$696,000	$9,943
Sussex County (inc. Towns of Stony Creek, Wakefield, Waverly)	10	$3,692,000	$52,743
Total	**138**	**$104,217,780**	**$1,488,825**

Source: NOAA NCEI Database

Figure 5.19 graphically depicts tornado events in the region between 1950 and 2019, the latest year for which geographical data were available during the planning stage of this update. The thick burgundy swath across Petersburg and Hopewell represents the EF4 tornado from August 1993. The most recent events since the 2017 update to this plan are labeled with the date of occurrence.

Figure 5.19: Tornado Events, 1950 – 2019



Source: NOAA, 2021

Vulnerability Analysis

Human vulnerability to death or injury from tornado is based more on the availability, reception, and understanding of early warnings of tornadoes (e.g., tornado warnings issued by the NWS) and access to safe, substantial indoor shelter than it is on a person's location within the study area. While one might generalize that areas of high population are more vulnerable due to exposure of more people, property and infrastructure, Table 5.20 and Figure 5.19 demonstrate that tornadoes have struck both rural and urban jurisdictions of the study area. Access to technology (computers, radio, television, cell phones, outdoor sirens, etc.) that allows for receiving warnings, physical ability to relocate oneself safely to a tornado-safe space, and language comprehension that allows for suitable understanding of warnings are all factors affecting human vulnerability.

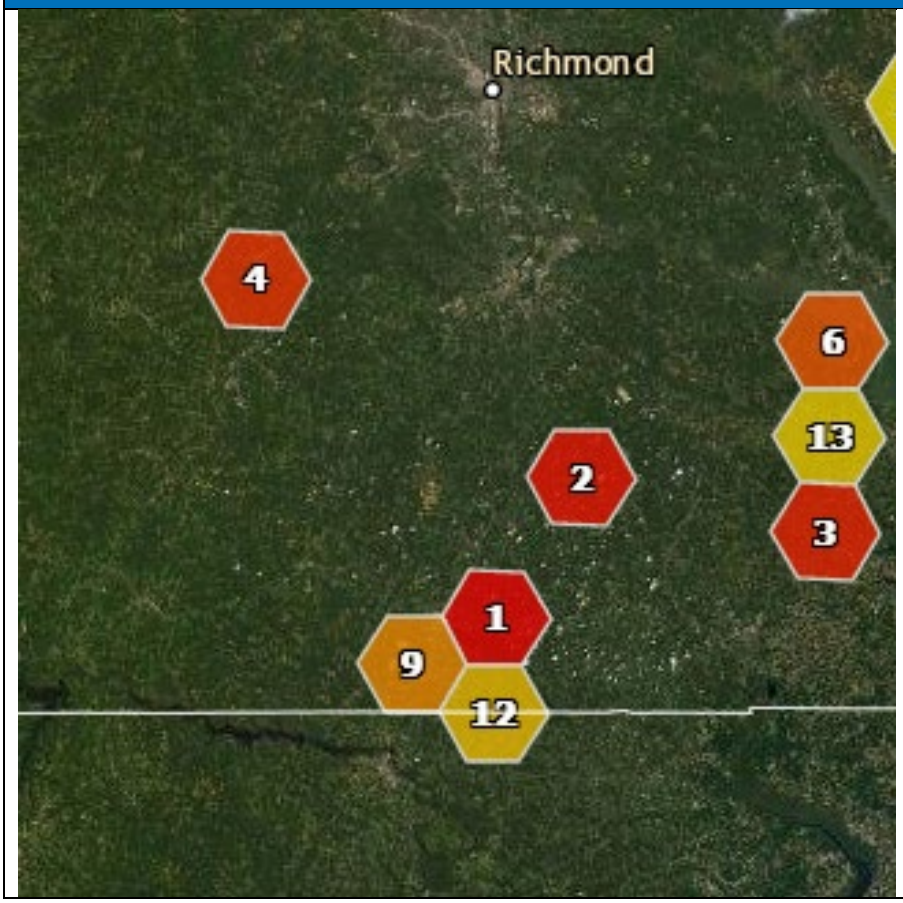
Low-intensity tornadoes may not completely destroy a well-constructed building, although even the most well-constructed buildings are vulnerable to the effects of a more intense (F2 or higher) tornado throughout the study area. A structure's tornado vulnerability is the same as that for other types of extreme wind events and is based in large part on building construction methods and design standards, as discussed in greater detail in Section 5.6 regarding Tropical Storm vulnerability. Other factors such as structure elevation, condition, and maintenance or location of trees and treelines also play a significant role in determining vulnerability to tornado damage. The statewide building code provides a reasonable level of protection for newly constructed buildings, while structures built before the code went into effect are most vulnerable to damage.

Although historical data indicate that there have been variations in the distribution of tornadoes across the region, the probability of experiencing a tornado is roughly equal for all of the jurisdictions. The vulnerability of critical facilities across the area is largely determined by construction type of each particular facility. Wood-framed structures are generally considered to be more vulnerable to tornado damage than steel, brick, or concrete structures. The population concentrations in the urbanized areas of Metropolitan Richmond and Petersburg may experience more damage as a result of a similar event than more rural areas of Greensville County or New Kent County, for example, but the vulnerability to tornado strike is characterized uniform throughout the study area.

Probably the most vulnerable type of structure with regard to tornado damage is a manufactured home. Proper anchoring of these structures can reduce damage exposure, but not entirely. Researchers at ODU have been documenting spatial variability and trends in tornado occurrence in the Commonwealth, and have overlaid areas of increased tornado activity with the highest percentage of manufactured homes in the state using data from the 2014-2018 American Community Survey.

Based on their analysis, there are several areas that have experienced an increased trend in number of tornadoes since 1950, and which have a high concentration of mobile homes, including the Richmond-Crater areas of: Emporia, Greensville County, Sussex County, and Surry County. **Figure 5.20** from the ODU study shows these areas in more detail.

Figure 5.20: Virginia Tornado Mobile Home Risk Index



#1 – (up trend since 1950 with 99% confidence), 23.52% mobile homes, Emporia, Greensville County, Sussex County, Southampton County

#2 – (up trend 95% confidence), 36.75% mobile homes, Sussex County

#6 – (up trend 95% confidence), 17.97% mobile homes, Surry County

#9 – (up trend 95% confidence), 15.25% mobile homes, Emporia, Greensville County

#12 – (up trend 95% confidence), 13.68% mobile homes, Greensville County

#13 – (up trend 95% confidence), 13.13% mobile homes, Isle of Wight County, Surry County

Source: Old Dominion University, accessed online at: https://odu-gis.maps.arcgis.com/apps/Cascade/index.html?appid=723e660c2c09447fa8a57d3186dc8d2a, 2021.

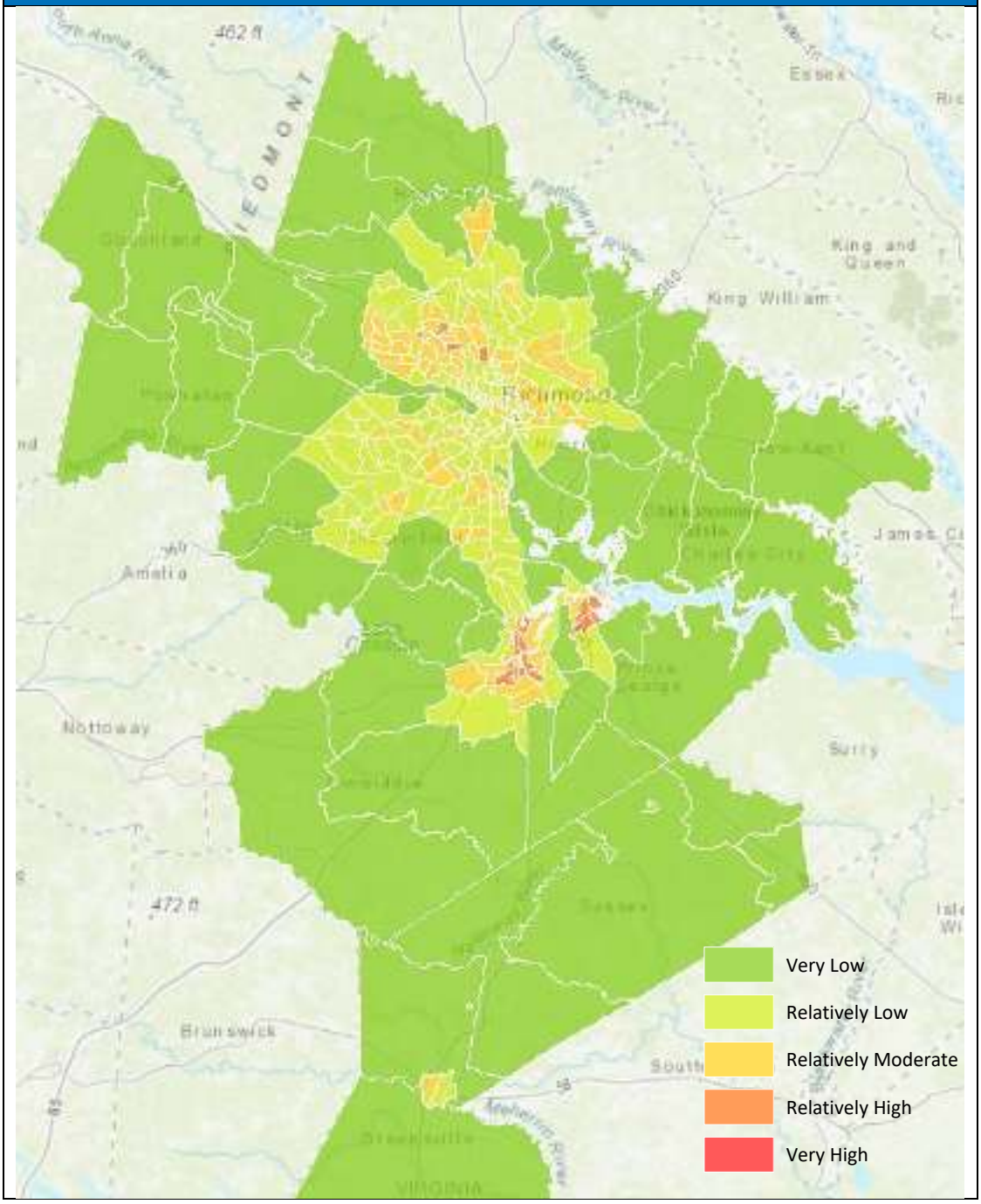
Because scientists and weather experts cannot predict exactly where a tornado may strike, there are no geographic boundaries for this hazard or methodology for modeling detailed loss estimates. Therefore, all buildings and contents within the region are considered to be exposed and could potentially be impacted on some level by the tornado hazard.

Based on historic property damages for the 70-year period of record between 1950 and 2020 as shown in Table 5.20, there were 138 tornado events with an annualized loss estimate of $1.48 million and a recurrence interval of .5 year, or frequency of 2.0 events per year.

Social Vulnerability

The NRI data for social vulnerability to tornadoes are shown in **Figure 5.21**. Despite the higher numbers of manufactured homes in the rural, southeastern portions of the study area, the damage history and built infrastructure exposure in the central part of the region result in higher social vulnerability in the Richmond and Petersburg regions.

Figure 5.21: National Risk Index, Tornado Risk Rating



Source: National Risk Index, FEMA 2021

Note: The Town of Surry has very low social vulnerability for tornado.

Future Vulnerability, Land Use and Climate Change

The link between changing climate and tornado severity and frequency is currently unclear. One problem is that long-term trends are difficult to determine, as records only go back to the 1950s. Another issue is that as population centers have grown and shifted over time, the reporting of tornadoes has been inconsistent. Also, improved observation technology (such a Doppler radar) allows for detection of events that was not possible in earlier years.

Researchers are working to better understand how the fundamental elements required for tornado formation – atmospheric instability and wind shear – interacts with changing climate conditions. It is likely that a warmer, wetter climate will allow for more frequent atmospheric instability. However, it is also likely that a warmer climate will dampen the probability of wind shear. Recent trends observed in the Midwest are inconclusive. It is also possible that climate change would shift the traditional timing or expected locations for tornadoes and have less impact on the total number of tornado occurrences.

Mass evacuations as a result of a tornado or tornado outbreak are unlikely. Evacuations of damaged areas or damaged communities may be required, but would be expected to be within the scope of responsibilities for local emergency management, the community and its partners.

5.8 Wildfires

Hazard Profile

A wildfire is any fire occurring in a wildland area (i.e., grassland, forest, brush land) except for fire under prescription.[12] Wildfires are part of the natural management of the Earth's ecosystems but may also be caused by natural or human factors. Over 80% of forest fires are started by negligent human behavior such as smoking in wooded areas or improperly extinguishing campfires. The second most common cause for wildfire is lightning.

There are three classes of wildland fires: surface fire, ground fire, and crown fire. A surface fire is the most common of these three classes and burns along the floor of a forest, moving slowly and killing or damaging trees. A ground fire (muck fire) is usually started by lightning or human carelessness and burns on or below the forest floor. Crown fires spread rapidly by wind and move quickly by jumping along the tops of trees. Wildland fires are usually signaled by dense smoke that fills the area for miles around.

Fire probability depends on local weather conditions, outdoor activities such as camping, debris burning, and construction, and the degree of public cooperation with fire prevention measures. Drought conditions and other natural disasters (such as hurricanes, tornadoes and lightning) increase the probability of wildfires by producing fuel in both urban and rural settings. Forest damage from hurricanes and tornadoes may block interior access roads and fire breaks, pull down overhead power lines, or damage pavement and underground utilities.

[12] Prescription burning, or "controlled burn," undertaken by land management agencies is the process of igniting fires under selected conditions, in accordance with strict parameters.

The impacts of wildfire in the Richmond-Crater region are both economic and environmental. From an economic perspective, fires destroy most homes, businesses and infrastructure in their path. The population displacement and subsequent rebuilding consumes valuable resources of private and public entities. Communities in the region spend significant capital funds both fighting wildfires and training staff and preparing equipment and infrastructure to fight wildfire. Wildfire also endangers the lives and safety of firefighters and residents. Loss of life is a possible impact of severe wildfire in the region, especially where access roads are limited or impassable.

The region's air, water and soil environments are all altered by wildfire, and even wildfire in adjacent regions. Dense smoke and the fine particles and gases inside the smoke pose a risk to human health. Smoke irritates the eyes and respiratory system and can cause bronchitis or aggravate heart or lung disease even for residents hundreds of miles downwind. Wildfires raise the temperature of forest soils and potentially wipe away organic value of the soil. And although soils do eventually recover, the impact on watersheds in the interim can be detrimental to the region's water bodies. Burned organic matter in soils may negatively affect infiltration and percolation making soil surfaces water repellant. If water is unable to infiltrate, runoff quantity increases and infiltration to groundwater decreases. Both of these factors may negatively impact water quality downstream and could increase risk of flooding and landslides in the event of heavy rains.

Magnitude or Severity

A wildfire can range from a very localized and containable burn to an out-of-control blaze that can spread quickly and is capable of scorching thousands of acres of land over many days. The Virginia wildfire season is normally in the spring (March and April) and then again in the fall (October and November). During these months, relative humidity tends to be lower, and winds are higher. In addition, hardwood leaves are on the ground, providing more fuel and allowing the sunlight to directly reach the forest floor, warming and drying the surface fuels.

As fire activity fluctuates during the year from month to month, it also varies from year to year. Historically, extended periods of drought and hot weather can increase the risk of wildfires. Some years with adequate rain and snowfall amounts keep fire occurrences low; while other years with extended periods of warm, dry, and windy days exhibit increased fire activity.

Long-term climate trends as well as short-term weather patterns play a major role in the risk of wildfires occurring. For instance, short-term heat waves along with periods of low humidity can increase the risk of fire, while high winds directed toward a fire can cause it to spread rapidly.

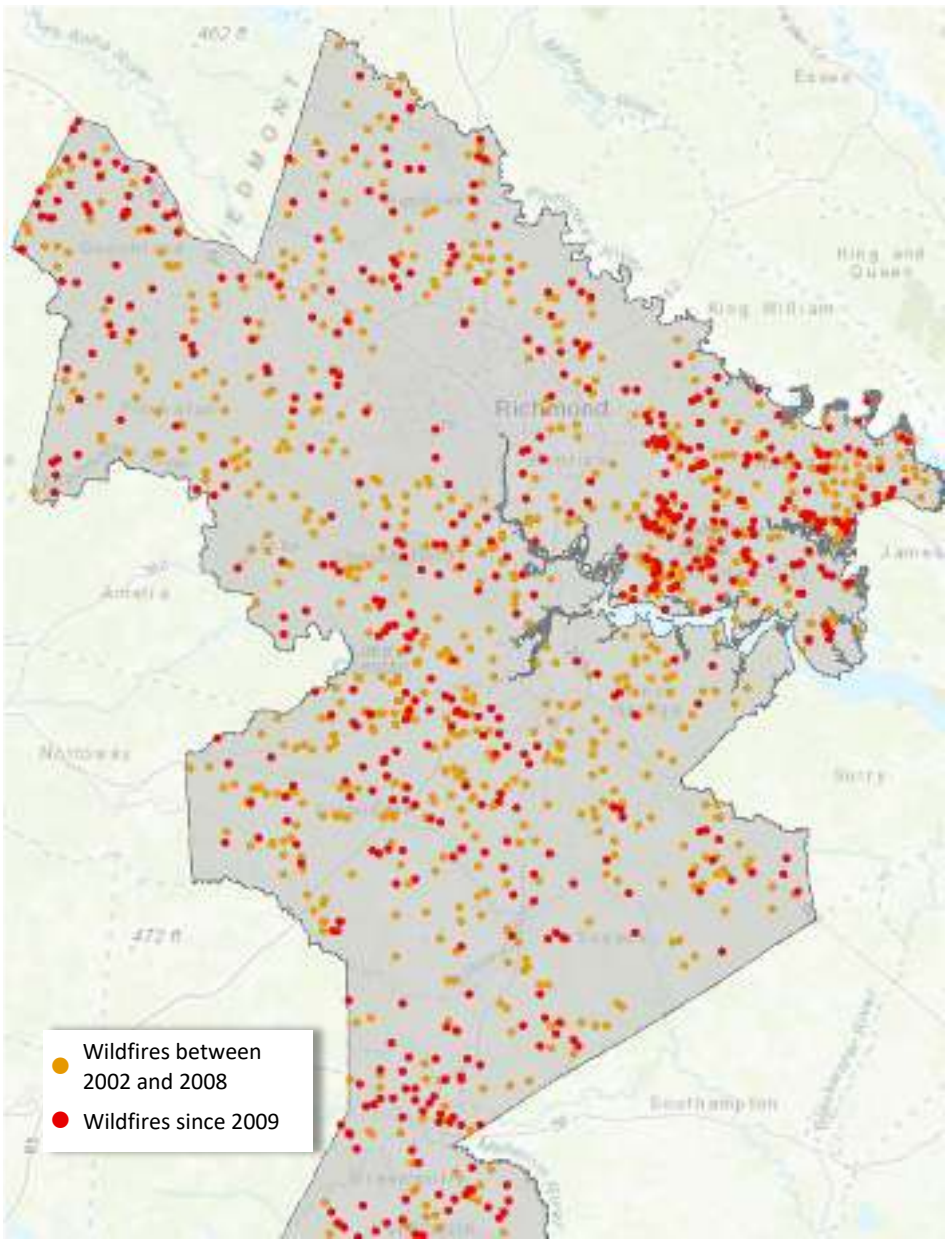
Hazard History

Due to the growth of the population of the commonwealth, there has been an increase in people living in the urban-wildland interface, as well as an increase in use of the forest for recreational purposes. Historical records of wildfire events specific to the study area are

limited, not all wildfires are reported, and the records appear to contain some duplicate entries. Nevertheless, the data provide useful information from a planning perspective.

VDOF provided fire incidence data for the period 1995 to 2020, with detailed data for the period between 2005 and 2020. The fire incidence data provided from 1995 to 2004 were originally included in the *2011 Richmond-Crater Hazard Mitigation Plan*. The data from VDOF are summarized in **Table 5.21** showing the number of wildfires per jurisdiction per year, with acres burned and total damages for the latter periods. **Figure 5.22** indicates the location of VDOF-reported fires since 2002.

Figure 5.22: Wildfire History, 2002 - 2019



Source: VDOF, 2021

According to VDOF records from 1995 to 2020, there were 2,468 wildfires that burned approximately 9,170 acres and caused nearly $3.5 million in damages in the region. The most recent 5-year period, between 2015 and 2020, shows a dramatic reduction in the number of reported fires; from 722 fires in the period 1995 to 1999 down to just 244 fires between 2015 and 2020. In the most recent period, Charles City County shows the highest number of wildfires, while Sussex County experienced the most acres burned by wildfire.

Hanover County suffered the most damages in the most recent period, while Dinwiddie County has the highest annualized damages for the region.

One of the most damaging events in the period between 2000 and 2020 was the February 19, 2011, fire in Goochland County that burned approximately 273 acres and caused a reported $110,000 in damage. High winds exacerbated the brush fire on Cardwell Road that was caused by a limb falling on a power line. An abandoned home burned, as well.

Debris burning was the cause of another notable fire in the region on April 3, 2011, that burned an estimated 545 forested acres in Dinwiddie County, near McKenney. The value of the timber damaged was estimated at $200,000. A NOAA climate report issued in January 2012, indicated that "the overall [weather] pattern during 2011 created ideal wildfire conditions across most of the southern U.S. during the year."[13]

[13] National Centers for Environmental Information, Wildfires – Annual 2011 report, accessed online at: https://www.ncdc.noaa.gov/sotc/fire/201113.

Table 5.21: Wildfire Data, 1995–2020												
Jurisdiction Name	# of Wildfires		2005-2009			2010-2014			2015-2020			Annualized Damages
	1995-1999	2000-2004	# OF FIRES	ACRES BURNED	TOTAL DAMAGES	# OF FIRES	ACRES BURNED	TOTAL DAMAGES	# OF FIRES	ACRES BURNED	TOTAL DAMAGES	
Charles City	49	62	43	171.7	$67,600	52	78.7	$190,600	40	227.8	$65,950	$21,610
Chesterfield	130	36	65	137.8	$6,750	28	264.9	$80,635	19	58.5	$142,650	$15,336
Colonial Heights	0	1	0	0	$0	0	0	$0	0	0	$0	$0
Dinwiddie	54	93	91	3063.6	$780,500	48	826.7	$288,502	29	80.5	$64,950	$75,597
McKenney	0	0	0	0	$0	0	0	$0	0	0	$0	$0
Emporia	1	1	1	1	$0	1	2	$0	0	0	$0	$0
Goochland	76	40	31	153.2	$10,018	34	349.5	$307,330	18	110.1	$6,700	$21,603
Greensville	30	20	36	408.9	$80,900	37	151.2	$68,400	30	183	$77,900	$15,147
Jarratt	0	1	0	0	0	0	0	0	0	0	0	$0
Hanover	56	35	67	151.2	$113,410	30	126.8	$170,250	26	103.8	$207,215	$32,725
Ashland	0	0	2	2	$100	0	0	$0	0	0	$0	$7
Henrico	39	31	16	93.2	$12,000	8	39.7	$373,600	3	21.2	$17,000	$26,840
Hopewell	0	1	0	0	$0	0	0	$0	0	0	$0	$0
New Kent	47	19	58	43.8	$9,800	56	119.9	$118,251	35	92.9	$700	$8,583
Petersburg	0	71	2	26	$0	1	1	$0	1	2.5	$0	$0
Powhatan	99	32	24	38.6	$0	10	44.7	$42,100	11	59.1	$82,985	$8,339
Prince George	40	23	56	90.2	$4,250	8	91.5	$8,850	7	41.5	$2,600	$1,047
Richmond	1	60	0	0	$0	1	7	$0	2	28	$100	$7
Surry	0	0	0	0	$0	0	0	$0	0	0	$0	$0
Sussex	67	43	51	368.3	$21,150	21	228.2	$26,150	17	283.6	$28,550	$5,057
Jarratt	0	1	0	0	$0	0	0	$0	0	0	$0	$0
Stony Creek	0	0	0	0	$0	0	0	$0	0	0	$0	$0
Wakefield	0	1	0	0	$0	0	0	$0	0	0	$0	$0
Waverly	1	1	0	0	$0	0	0	$0	1	1	$0	$0
Totals	**722**	**572**	**543**	**4,749.5**	**$1,106,478**	**335**	**2,331.8**	**$1,674,668**	**239**	**1,293.5**	**$697,300**	**$231,896**

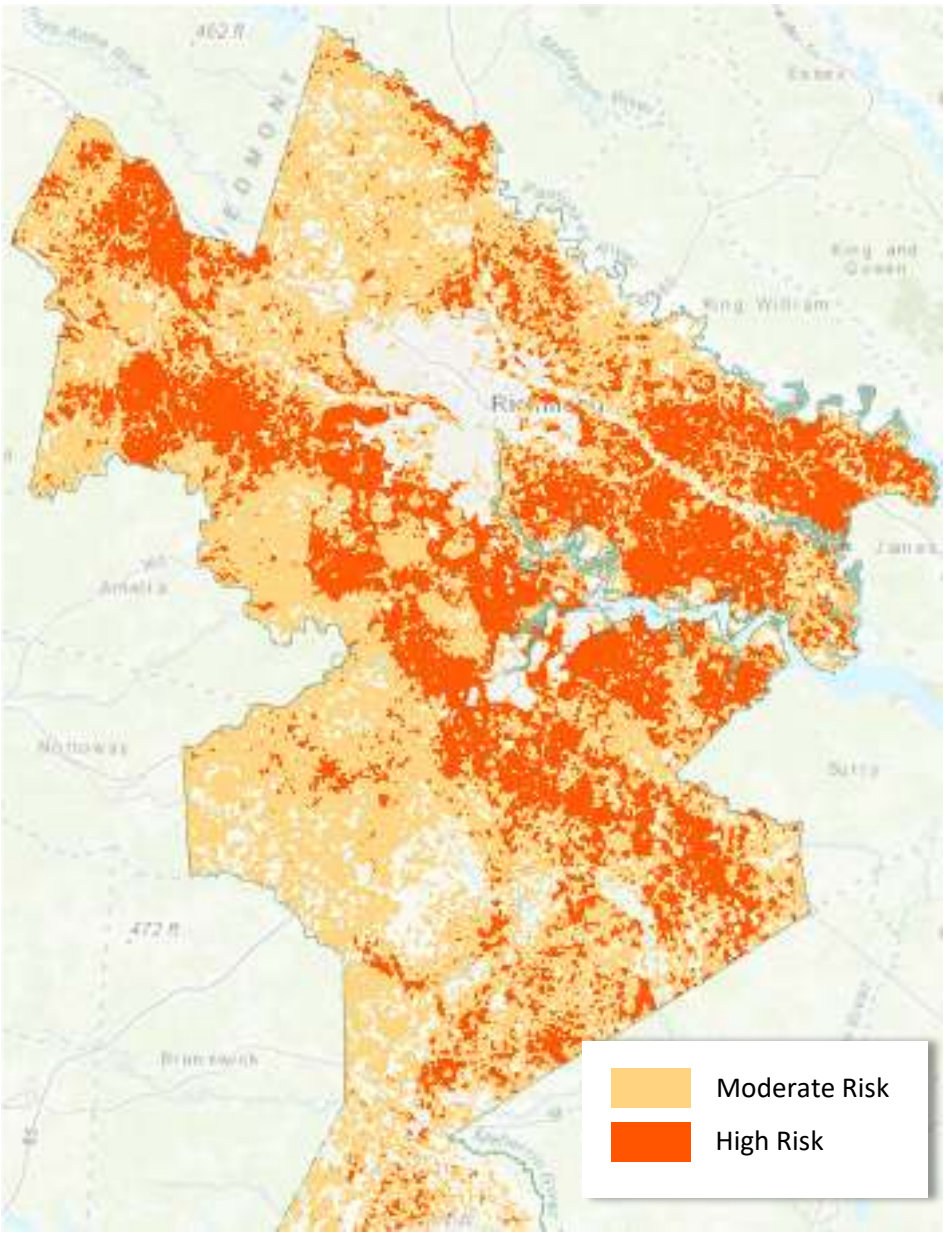
Vulnerability Analysis

The probability of wildfires is difficult to predict, constantly in flux over the short-term, and dependent on numerous factors, including the types of vegetative cover in a particular area, and weather conditions, including humidity, wind, and temperature. Analysis of VDOF data indicates that on an annual basis, approximately 99 wildfires impact the region.

In July 2003, VDOF developed and released a GIS-based wildfire risk assessment for the Commonwealth of Virginia. The data are now part of the Southern Foresters web site at www.southernwildfirerisk.com that serves as a portal for data from several southern states. While this assessment of wildfire risk is not recommended for site-specific determinations of wildfire vulnerability, the data were used in this plan as an indicator of general hazard exposure within the region, as shown in **Figure 5.23**. Risk assessment designation involved several inputs, including slope, aspect, land cover, distance to railroads, distance to roads, population density, and historical fire occurrence. Potential wildfire risk areas are graduated but presented in two overall categories indicating the relative level of threat to the area as high or moderate. Areas without a high or moderate designation are considered to be at low risk of wildfire.

Hurricanes Isabel and Irene downed thousands of trees in both New Kent and Charles City Counties in 2003 and 2011, respectively. While the counties removed the most hazardous trees from public facilities and many homeowners have removed trees from their property, thousands still remain. These trees provide an easy source of fuel for wildfires and create a high risk across these counties.

Figure 5.23: Wildfire Risk Assessment



Source: VDOF and www.southernwildfirerisk.com accessed online 2021

Certain groups of essential facilities were assessed to determine if their location was within a high risk area as determined by the Wildfire Risk Assessment. The analysis looked at facilities that could be particularly hazardous during a wildfire: electric power facilities, hazardous materials facilities, natural gas and oil facilities. All of the natural gas providers in the region have segments of their lines that traverse high wildfire risk areas. The

analysis for other facilities shows the following facilities are located in high wildfire risk areas:

Electric Power Facilities:	Boydton Plan Road Cogen Plant, Petersburg
	Correctional Solar, Barhamsville
	Scott Solar Farm, Powhatan
Hazardous Materials Facilities:	Van Waters & Rogers, Inc, Richmond
	Industrial Chemicals, Inc, Richmond
	Rehrig International, Richmond
	Honeywell Tech Center, Chesterfield
	Carter-Wallace, Colonial Heights
	Super Radiator Coils, Richmond
	Chaparral, Petersburg
	Graphic Packaging Corp. of Virginia, Richmond
	Borden Chemical Inc., Waverly
Oil Facilities:	Atlantic Industrial Services, Chester

VDOF defines woodland home communities as clusters of homes located along forested areas at the wildland-urban interface that could possibly be damaged during a nearby wildfire incident. **Table 5.22** illustrates the number of woodland communities in each jurisdiction, broken down by wildfire risk zone, while **Table 5.23** illustrates the number of homes in woodland communities, also broken down by wildfire risk zone. The data indicate that approximately 46% of woodland home communities in the region are located in a high-wildfire-risk area. Of the 132,218 homes in woodland home communities, approximately 33% are located in a high-fire-risk area.

Table 5.22: Number of Woodland Communities by Fire Risk

Jurisdiction Name	Low	Moderate	High	Total	% High Risk
Charles City County	0	6	36	42	86%
Chesterfield County	82	140	189	411	46%
City of Colonial Heights	0	0	1	1	100%
Dinwiddie County	1	5	4	10	40%
Town of McKenney	1	0	0	1	0%
City of Emporia	5	0	0	5	0%
Goochland County	4	93	79	176	45%
Greensville County	1	5	0	6	0%
Town of Jarratt	0	0	2	2	100%
Hanover County	10	184	79	273	29%
Town of Ashland	2	3	1	6	17%
Henrico County	54	67	74	195	38%
City of Hopewell	1	0	0	1	0%

Table 5.22: Number of Woodland Communities by Fire Risk					
Jurisdiction Name	**Low**	**Moderate**	**High**	**Total**	**% High Risk**
New Kent County	0	8	47	55	85%
City of Petersburg	5	2	4	11	36%
Powhatan County	0	31	73	104	70%
Prince George County	2	7	24	33	73%
City of Richmond	23	2	4	29	14%
Town of Surry	0	0	0	0	0%
Sussex County	0	0	1	1	100%
Town of Jarratt	0	0	2	2	100%
Town of Stony Creek	0	0	0	0	0%
Town of Wakefield	0	0	0	0	0%
Town of Waverly	0	0	0	0	0%
Totals	**191**	**553**	**622**	**1,366**	**46%**

Source: VDOF

Table 5.23: Number of Homes in Woodland Communities by Fire Risk					
Jurisdiction Name	**Low**	**Moderate**	**High**	**Total**	**% High Risk**
Charles City County	0	136	855	991	86%
Chesterfield County	20,697	27,146	25,142	72,985	34%
City of Colonial Heights	0	0	75	75	100%
Dinwiddie County	135	144	253	532	48%
Town of McKenney	31	0	0	31	0%
City of Emporia	240	0	0	240	0%
Goochland County	138	3,099	2,720	5,957	46%
Greensville County	85	149	0	234	0%
Town of Jarratt	0	0	76	76	100%
Hanover County	981	7,278	3,342	11,601	29%
Town of Ashland	255	312	14	581	2%
Henrico County	13,700	4,409	3,761	21,870	17%
City of Hopewell	65	0	0	65	0%
New Kent County	0	293	1,829	2,122	86%
City of Petersburg	555	104	271	930	29%
Powhatan County	0	713	3,204	3,917	82%

Table 5.23: Number of Homes in Woodland Communities by Fire Risk					
Jurisdiction Name	**Low**	**Moderate**	**High**	**Total**	**% High Risk**
Prince George County	415	199	1,397	2,011	69%
City of Richmond	7,595	65	185	7,845	2%
Town of Surry	0	0	0	0	0%
Sussex County	0	0	43	43	100%
Town of Jarratt	0	0	76	76	100%
Town of Stony Creek	0	0	0	0	0%
Town of Wakefield	0	0	0	0	0%
Town of Waverly	0	0	0	0	0%
Totals	**44,892**	**44,047**	**43,279**	**132,218**	**33%**

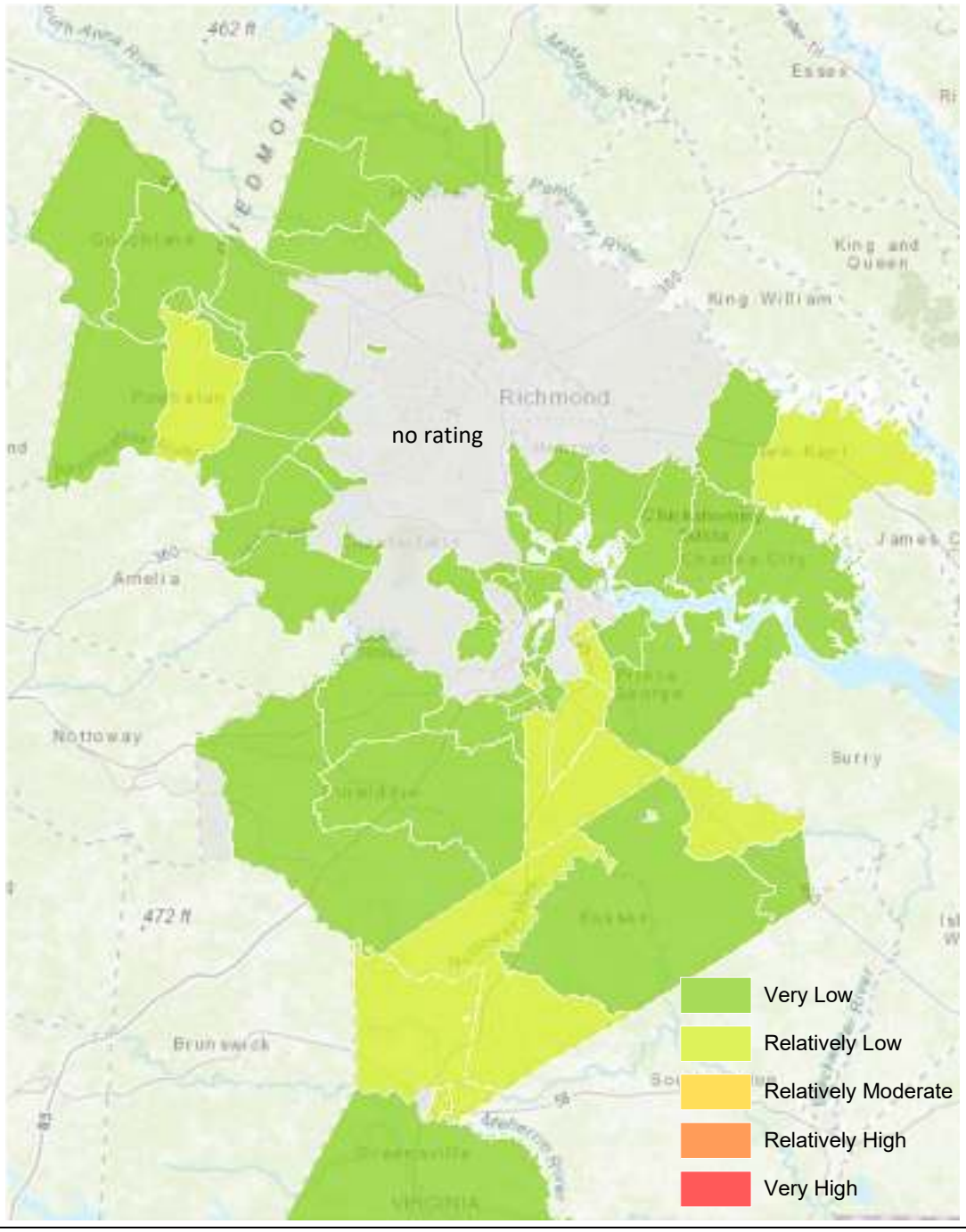
Source: Virginia Department of Forestry, 2010 dataset.

Based on the VDOF historical record from 1995 to 2020, the region experiences approximately 96 fires per year that result in approximately $231,896 in annualized damages.

Social Vulnerability

The NRI data for social vulnerability to wildfire are shown in **Figure 5.24**. Where data and historical events are sufficient to calculate a rating for wildfire, the risk is determined to be very low or relatively low throughout the study area.

Figure 5.24: National Risk Index Rating, Wildfire



Source: National Risk Index, FEMA 2021

Note: The Town of Surry has very low social vulnerability for wildfire south of Route 10 and relatively low social vulnerability for wildfire north of Route 10.

Future Vulnerability, Land Use and Climate Change

The region is expected to continue to incur wildfires, particularly during extended periods of dry and windy weather. The region's zoning ordinances do not generally guide new development away from the Wildland Urban Interface, but the wildfire threat is not as severe as in the western United States.

Climate change increases the risk of the hot, dry weather that is likely to fuel wildfires. Also, because climate change is also a factor in higher intensity windstorms, there is a likelihood of increased fuel for wildfire when downed trees from storms are not removed. For site specific information on historic wildfire ignition density, property owners and planners can visit: www.southernwildfirerisk.com.

While evacuations may be required as a result of wildfire in the Richmond-Crater region, these evacuations would likely be of a locality-manageable scale and are not expected to be considered "mass evacuations". Should larger-scale evacuations be required, adjacent jurisdictions can assist.

A VDOT snowplow plows I-64 East. (Photo by Tom Saunders, VDOT)

5.9 Severe Winter Weather

Hazard Profile

A winter storm can range from a moderate snow over a period of a few hours to blizzard conditions with blinding wind-driven snow that lasts for several days. Some winter storms may be large enough to affect several states, while others may affect only a single community. Many winter storms are accompanied by low temperatures and heavy and/or blowing snow, which can severely impair visibility.

In the Richmond-Crater region, winter storms typically include snow, sleet, freezing rain, or a mix of these wintry forms of precipitation. Sleet—raindrops that freeze into ice pellets before reaching the ground—usually bounce when hitting a surface and do not stick to objects; however, sleet can accumulate like snow and cause a hazard to motorists. Freezing rain is rain that falls onto a surface with a temperature below freezing, forming a glaze of ice. Even small accumulations of ice can cause a significant hazard, especially on roads, power lines and trees. Ice storms have also occurred in the region, when freezing rain falls and freezes immediately upon impact.

Communications and power in the region can be disrupted for days, and even small accumulations of ice may cause extreme hazards to motorists and pedestrians. Perhaps one of the most common impacts of winter storms in the region is vehicle accidents and stranded, disabled vehicles. Unaccustomed to driving in snow and ice much of the year, drivers attempt to drive at normal speeds despite deteriorated road conditions. Lacking the large fleets of snowplows of some counties and municipalities further north, the region's

secondary roads are not cleared as often or as quickly, and roads may remain unplowed or untreated for days. This impacts special needs populations and others who may become housebound by severe winter storms. Airports in the region also shut down for some time until the runways can be cleared.

Recent winter storms in the region have caused severe economic disruption with lengthy school and business closures, damage to vehicles and reduced community services for extended periods. In agricultural portions of the study area such as Greensville County, freezing temperatures may affect agricultural production, depending on when the event occurs relative to the growing periods of certain crops. Nor'easters can cause winter storms in the region, so the impacts of coastal flooding and shoreline erosion can also be associated with winter storm events, especially in New Kent and Charles City Counties.

The impacts of winter storms are usually minimal in terms of property damage and long-term effects. The most notable impact from winter storms is the damage to power distribution networks and utilities. Severe winter storms have the potential to inhibit normal functions of the community. Governmental costs for winter storms accumulate due to personnel and equipment needed for clearing streets. Private sector losses are attributed to lost work when employees are unable to travel. Occasionally, buildings may be damaged when snow loads exceed the design capacity of their roofs or when trees fall due to excessive ice accumulation on branches.

The water content of snow can vary significantly from one storm to another and can significantly impact the degree to which damage might occur. In snow events that occur at temperatures at or even above freezing, the water content of the snowfall is generally higher. Higher water content translates into a heavier, 'wet' snowfall that more readily adheres to power lines and trees, increasing the risk for their failure. Roof collapse is also more of a concern with wetter, heavier snowfall. On the other hand, clearing roadways and sidewalks is considerably easier for a drier, more powdery snow. A dry, fluffy snow is less likely to accumulate on power lines and trees. This type of snow generally occurs in temperatures below freezing with water content decreasing with temperature. The primary impact of excessive cold is increased potential for frostbite, and potentially death as a result of over-exposure to extreme cold.

Homes and businesses suffer damage when electric service is interrupted for long periods of time. Six utility companies provide service to the region, which can make power restoration complicated. Threats to personal health can intensify when frozen precipitation makes roadways and walkways slippery and when prolonged power outages and fuel supplies are combined.

Another challenge with winter weather in the region is the amount of ice that often accompanies the winter season. Even small accumulations of ice from sleet or freezing rain can cause significant hazards to people, especially to pedestrians and motorists, as well as to property. Ice from freezing rain can accumulate on trees, power lines, and communication towers causing damage and leading to power and communication outages that can last for days or weeks. Even small accumulations of ice can be severely dangerous

to motorists and pedestrians. Bridges and overpasses are particularly dangerous because they freeze before other surfaces.

Some of the secondary effects presented by winter storms and extreme or excessive cold temperatures are threats to the health of livestock and pets, and frozen water pipes in homes and businesses that may burst and flood indoor areas. Debris created by the trees can also blocks roadways and impact emergency services. Clean-up of the debris is often complicated because responsibility is shared by the Virginia Department of Transportation (VDOT) and private utility companies.

Magnitude or Severity

NOAA's NCEI is now producing the Regional Snowfall Index (RSI) to evaluate significant snowstorms that impact the eastern two-thirds of the United States. The RSI is a regional snowfall impact scale that uses the area of snowfall, the amount of snowfall, and the number of people living within a snowstorm. Since the index uses population information, it attempts to quantify the societal impacts of a snowstorm. RSI has been calculated for large snowstorms back to 1900 and therefore the index puts a particular event into a century scale historical perspective (**Table 5.24**). A Category 5 snowstorm is a very rare event while Category 0 and 1 snowstorms are quite typical.

Table 5.24: Regional Snowfall Index (RSI)

Category	RSI Raw Score	Approximate Percent of Storms	Description
5	>18	1%	Extreme
4	10-18	2%	Crippling
3	6-10	5%	Major
2	3-6	13%	Significant
1	1-3	25%	Notable
0	0-1	54%	

Source: NOAA NCEI

RSI is calculated for specific regions. Only the snowfall within a particular region is used to calculate the index for that region. The Richmond-Crater study area is within the Southeast study region for the RSI. The RSI differs from other indices because it includes population, which ties the index to societal impacts. Currently, the index uses population based on the 2000 Census. Where available, the RSI value for specific storms is provided in the History section below.

Table 5.25 provides a summary of the most severe winter weather events to strike the Richmond-Crater region.

Table 5.25: History of Winter Storm Events and Damages, 2010–2021		
Date	**Damages**	**RSI Category**
December 25-28, 2010	A 4- to 10-inch snowfall blanketed the region with the heaviest amounts falling over the south and eastern sections. Amounts ranged from 4 inches northwest of the City of Richmond, 6 to 7 inches in the Cities of Petersburg and Emporia, and around a foot near the Town of Wakefield.	2
February 11-14, 2014	This was a major ice and snowstorm that affected the entire region and elsewhere in the Eastern United States. This event produced devastating amounts of freezing rain and snow along and east of Interstate 95 all the way down to the coast. Overall temperatures throughout the winter were much colder in 2014. A Presidential Disaster event was declared in Chesterfield. (Source: http://www.weather.gov/phi/02132014)	4
January 22-24, 2016	What transpired was reasonably close to what was forecast, with a major snowstorm for our entire region, which also included a mix of some sleet across portions of the area as well as small amounts of freezing rain. NOAA ranks Northeast U.S. storms according to overall impact, part of which is dependent on societal and economic factors, thus population density is a key component. This particular storm was ranked as a 4 on the "NESIS" scale of 1-5, or "crippling". It is now 4th on the list of historic storms that have been ranked on the NESIS scale, with only two storms ever ranked as a 5 ("extreme). Presidential Disasters for this study region were declared for Sussex and Henrico Counties. (Source: http://www.weather.gov/media/rnk/past_events/2017_01_2223_Winter.pdf)	4
January 5-8, 2017	Low pressure tracking northeast just off the Southeast and Mid Atlantic Coasts produced between three inches and twelve inches of snow across central, south central, and interior southeast Virginia. Laurel reported 2.5 inches of snow. Ginter Park and Glen Allen reported 2.0 inches of snow.	2
December 8-10, 2017	Low pressure tracking northeast just off the Southeast and Mid Atlantic Coasts produced between three inches and twelve inches of snow across central, south central, and interior southeast Virginia. Reports ranged from 7 to 12 inches across the study area.	2
January 3-5, 2018	Strong low pressure tracking northward just off the East Coast produced between one inch and four inches of snow across central and south central Virginia.	1

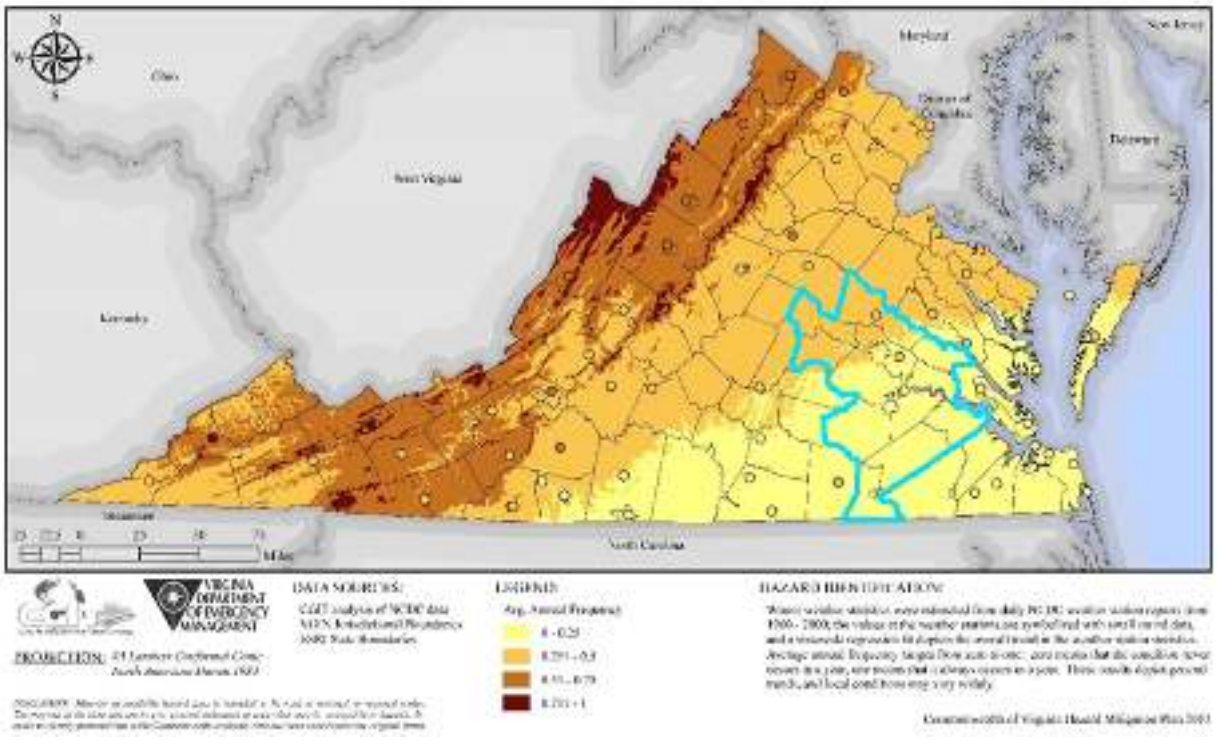
Table 5.25: History of Winter Storm Events and Damages, 2010–2021		
Date	**Damages**	**RSI Category**
March 11-15, 2018	Snowfall totals ranged from one to three inches across the Richmond-Crater region.	1
March 20-22, 2018	Low pressure tracking east northeast off the Mid Atlantic Coast produced between one inch and four inches of snow across portions of central and south central Virginia, and the Middle Peninsula. Snow totals ranged from 1 to five inches in the region.	1
December 7-10, 2018	An area of low pressure became centered over Florida Panhandle as a cold air damming regime set up across interior parts of Virginia and the Carolinas, with winds out of the NNE. A large area of precipitation was impacting the Carolinas and was approaching southern VA by sunrise on the 9th. By Sunday morning, there was snow in most areas except for coastal SE VA/NE NC, where NE winds ushered in milder air. Bands of heavy snow (rates of 1-2"/hour) set up over far southwestern portions of Wakefield area. Snow started changing to sleet then rain over SE VA/northern NC Sunday afternoon. Snow became heavy over Richmond metro area in afternoon, with temperatures slightly below freezing. Moderate to heavy snow continued through afternoon from Richmond metro to Virginia Piedmont, with widespread 9 to 14 inches of snow. Numerous flight cancellations at area airports. Interstates became snow covered and numerous accidents were reported. The 11.5 inches of snow at Richmond International Airport ranks as the 2nd largest December snowstorm on record.	3
January 30 – February 3, 2021	Powhatan County and Oilville in Goochland County had snow totals between 1 to 4 inches, but snow accumulation elsewhere in the region was between .5 inch to 3 inches.	1
February 18 – 19, 2021	Strong surface high pressure centered from the Midwest into New England helped to supply low level cold air into the area, as a prolonged Classic Cold Air Damming regime was in place throughout the duration of the event. With warmer air present aloft, precipitation fell in the form of freezing rain and sleet across central and south central Virginia, and the Virginia Northern Neck, as a couple of weak low pressure areas tracked northeast along and off the Southeast and Mid Atlantic Coasts. There were two distinct waves of precipitation that moved across the area. One that occurred during the early morning-midday on the 18th, and a second wave of light to moderate precipitation that moved across the region during the early to mid morning on the 19th. This resulted in significant ice accretion between 0.20 inch and 0.40 inch, along with sleet accumulations between 0.5 inch and 1.5 inches. Several trees and power lines were downed, with	3

Table 5.25: History of Winter Storm Events and Damages, 2010–2021		
Date	**Damages**	**RSI Category**
	numerous power outages reported. Ice accretions between 0.20 inch and 0.25 inch, along with sleet accumulations between 0.5 inch and 1.0 inch were reported. Damages estimated at $390,000 throughout the region.	

**History from 1940-2010 in Appendix F-6*
Source: NCEI

The Virginia Tech Center for Geospatial Information and Technology performed analyses of weather station daily snowfall data for the Commonwealth of Virginia's *2013 Hazard Mitigation Plan Update*. Station-specific statistics were used as the basis for a seamless statewide estimate based on multiple linear regressions between the weather statistics (dependent variable) and elevation and latitude (independent variables). **Figure 5.25** shows that the average number of days with at least 3 inches of snowfall ranges from 1.51 to 2 days over northwestern portions of the region, including portions of Hanover, Goochland, Powhatan, and Henrico Counties to 1.5 days or fewer over the remainder of the area. A similar analysis was not conducted in the most recent state hazard mitigation plan.

Figure 5.25: Average Annual Frequency of Days with at Least 3 Inches of Snowfall

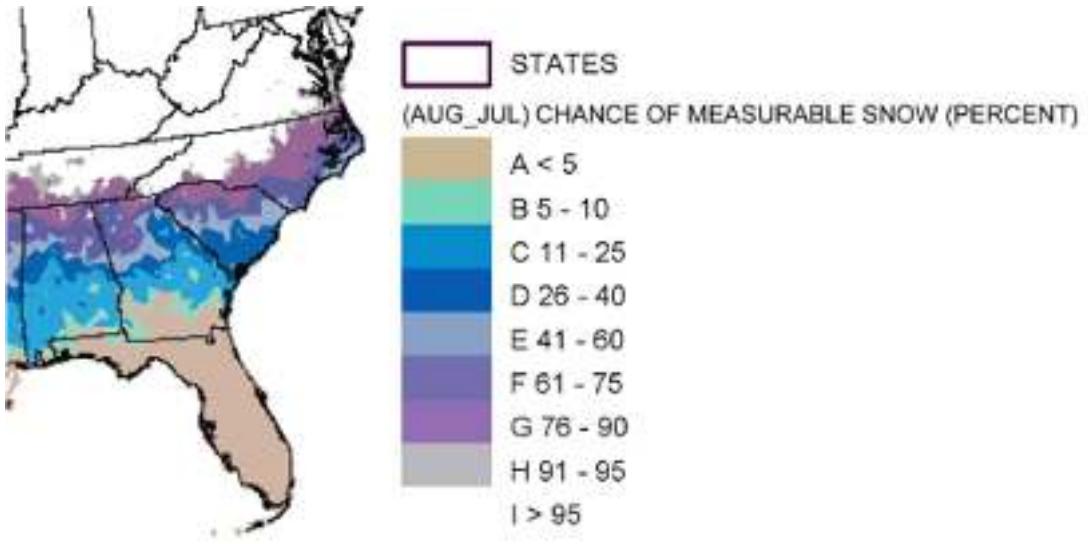


Source: 2013 Commonwealth of Virginia Hazard Mitigation Plan

Vulnerability Analysis

Historical evidence indicates that the region has been impacted by varying degrees of snowstorms and ice storms over the last century. **Figure 5.26** provides graphic evidence that the chance of snow annually is close to or equal to 100 percent in the study area.

Figure 5.26: Annual Percent Chance of Measurable Snow



Source: North Carolina State University, Climate Education web page: http://climate.ncsu.edu/edu/k12/.SEPrecip, undated

To determine the geographic distribution and frequency with which major snow or ice events impact the region, the Iowa Environmental Mesonet (IEM) obtains data from cooperating members that have observing networks. Watch, Warning, and Advisory events were collected and examined between 1986 and 2021 (see **Table 5.26**). The events were sorted into the following categories: Freeze, Freezing Fog, Freezing Rain, Frost, Heavy Snow, Snow, Winter Storm, and Winter Weather. (Data were collected from: http://mesonet.agron.iastate.edu/vtec/search.php)

The most alerts between 1986 and 2021 were for Dinwiddie County, followed by Goochland and Hanover Counties. The fewest alerts were issued for Charles City, Surry County, and Prince George Counties. The most common type of events for all counties were the Winter Weather, Winter Storm, Freeze, and Frost type events.

Table 5.26: National Weather Service Winter Alerts, 1986 - 2021

Jurisdiction	Watch Events	Warning Events	Advisory Events	Total Events	Annualized Events
Charles City County	20	36	59	115	3.3
Chesterfield County	21	38	63	122	3.5
City of Colonial Heights	-	-	-	-	
Dinwiddie County	31	48	88	167	4.8
City of Emporia	-	-	-	-	

Table 5.26: National Weather Service Winter Alerts, 1986 - 2021					
Jurisdiction	**Watch Events**	**Warning Events**	**Advisory Events**	**Total Events**	**Annualized Events**
Goochland County	33	45	73	151	4.3
Greensville County	21	37	62	120	3.4
Hanover County	26	41	77	144	4.1
Henrico County	22	38	64	124	3.5
City of Hopewell	-	-	-	-	
New Kent County	22	34	65	121	3.5
City of Petersburg	-	-	-	-	
Powhatan County	32	46	65	143	4.1
Prince George County	19	38	62	119	3.4
City of Richmond	-	-	-	-	
Surry County	22	34	62	118	3.4
Sussex County	22	37	65	124	3.5
Totals	**291**	**472**	**805**	**1,568**	

**county data includes towns*
Source: Iowa State University, Iowa Environmental Mesonet, accessed 2021 online at: https://mesonet.agron.iastate.edu/vtec/search.php

Winter storm vulnerability can be expressed by impacts to people, property, and societal function. For example, exposure of individuals to extreme cold, falls on ice-covered walkways, carbon monoxide poisoning from generators and automobile accidents is heightened during winter weather events. **Table 5.27** summarizes NCEI historical impacts of winter weather events since 1993. Based on this information, on average, the region experiences approximately one and a half winter weather events annually, of which some rare winter storms have historically included significant accumulations of ice (due to freezing rain). In terms of annualized damages, roughly $40,411 per year in losses is attributed to winter weather events.

Property damage due to winter storms includes damage done by and to trees, water pipe breakage, structural failure due to snow loads, and injury to livestock and other animals. The average amount of total damages due to winter events is $40,400 per year (1993-2017) for the region. The counties most affected from winter events are Prince George ($9,089/yr.), Henrico ($8,948/yr.), and Chesterfield ($7,962/yr.). Disruption of utilities and transportation systems, as well as lost business and decreased productivity represent societal vulnerability.

Table 5.27: NCEI Annualized Winter Weather Events, 1993 - 2020				
Jurisdiction	**Annualized Number of Winter Weather Events**	**Annualized Property Damages**	**Annualized Crop Damages**	**Annualized Total Losses**
Charles City County	2.4	$1,304	-	$1,444
Chesterfield County	5.5	$7,962	-	$7,962
City of Colonial Heights	-	-	-	-
City of Emporia	-	-	-	-
City of Hopewell	-	-	-	-
City of Petersburg	-	-	-	-
City of Richmond	-	-	-	-
Dinwiddie County	2.4	$2,600	-	$2,600
Goochland County	3.3	$3,004	-	$3,004
Greensville County	3.9	-	-	-
Hanover County	3.4	$3,030	-	$3,030
Henrico County	5.6	$8,948	-	$8,948
New Kent County	2.5	$1,444	-	$1,444
Powhatan County	2.9	$2,889	-	$2,889
Prince George County	7.0	$9,089	-	$9,089
Surry County	1.0	-	-	-
Sussex County	2.2	-	-	-
Total		**$40,411**	**$0**	**$40,411**

Source: NOAA NCEI

According to NCEI records dating back to 1993, one fatality was officially recorded resulting from a winter storm event in the area. NCEI storm event records typically do not contain traffic fatalities blamed on wintry weather, and although details were not provided, the fatality reportedly occurred during a severe snowstorm on January 25, 2000.

The number of reported events from the IEM (Table 5.26) and NCEI (Table 5.27) were slightly different. With the number of annual IEM events being 44.8 and the NCEI annual winter events being 46.9. Because of the difference in collection criteria, agencies, and time frames of the reported events, the difference between the two annualized events reported was not significant.

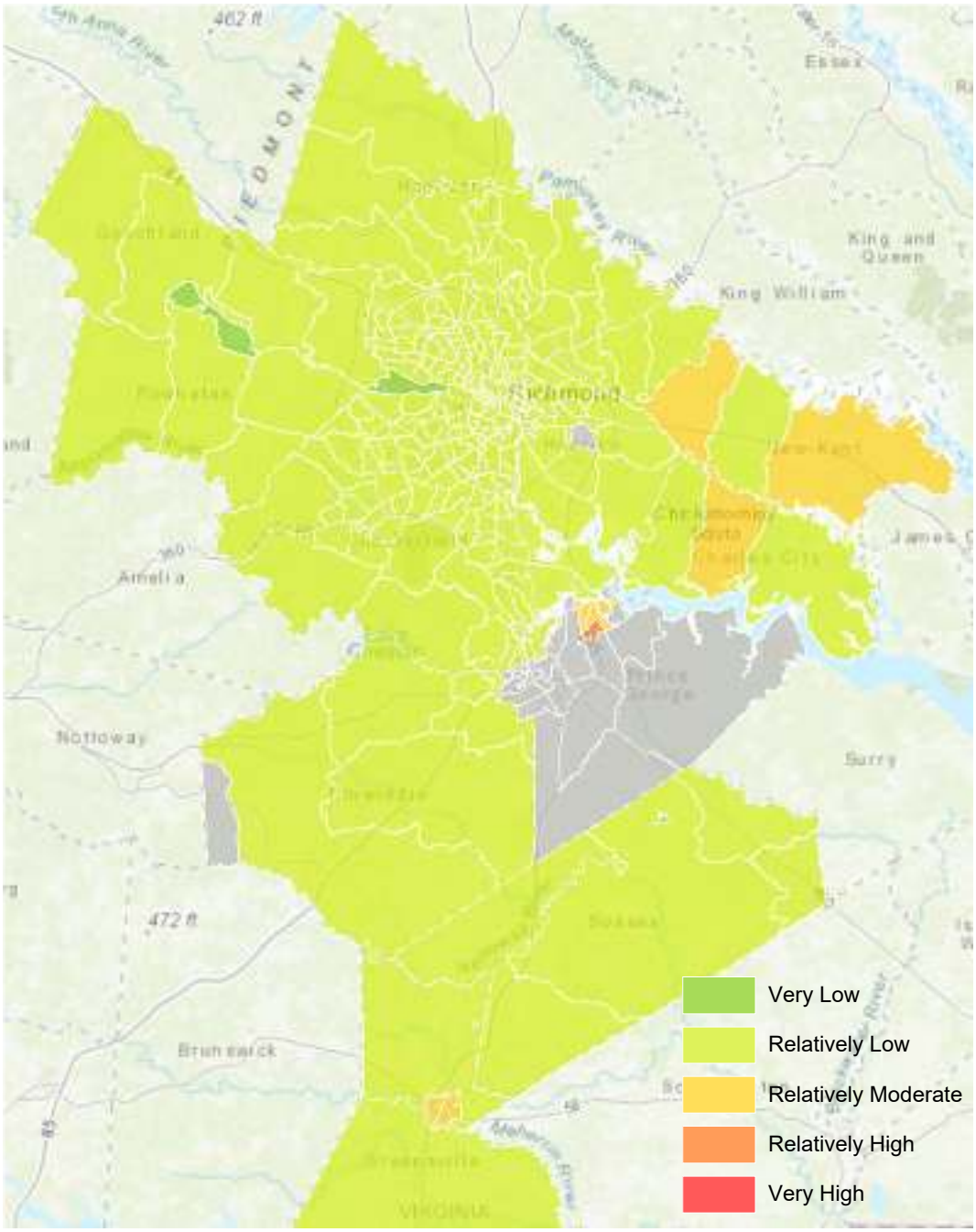
A quantitative assessment of critical facilities for winter storm risk was not feasible for this plan update. Transportation structures and natural gas transmission lines are at great risk from winter storms. In addition, building construction variables, particularly roof span and construction method, are factors that determine the ability of a building to perform under severe stress weights from snow. Finally, critical facilities do not always have

redundant power sources, and many are not wired to accept a generator for auxiliary power.

Social Vulnerability

The NRI data for social vulnerability to winter weather are shown in **Figure 5.27**. Most of the region is rated as Relatively Low, with some moderate areas found in New Kent and Charles City counties, and a Relatively High area in Petersburg. The social vulnerability map does not appear to reflect the disparity between the historically higher impacted areas of Henrico, Prince George and Chesterfield counties and the southern and eastern portions of the study area with fewer reported winter storms. Technical documentation for the NRI indicates that the Iowa Environmental Mesonet data were used for historical occurrences; however, the historic loss ratios were derived from NCEI data which show relatively low dollar value losses for the region. Total reported losses from winter storms for the 27-year period between 1993 and 2020 were just under $1 million.

Figure 5.27: National Risk Index Rating, Winter Weather



Source: National Risk Index, FEMA 2021
Note: The Town of Surry has relatively moderate social vulnerability for winter weather.

Notwithstanding the above, severe winter weather can be problematic for socially vulnerable populations, especially people living in substandard housing or without alternative arrangements when power goes down. Transportation impacts are especially

severe when vulnerable people rely on public transportation and those routes are interrupted by snow or ice accumulation.

Future Vulnerability, Land Use and Climate Change

Winter storms remain a likely occurrence for the region. While storms will be more likely to produce small amounts of snow, sleet or freezing rain, larger storms, though less frequent in occurrence, are also expected to impact the region. The *2018 Commonwealth of Virginia Hazard Mitigation Plan* suggests that the southern and southeastern portions of the state are likely to receive significant winter weather approximately once a decade. Local zoning and comprehensive plans are not focused on winter storm planning in the study area; however, the statewide building code does address snow loads and newer buildings are expected to better withstand roof snow loads, in particular.

As the earth's climate changes, heavy seasonal snow years have begun to occur with greater frequency. According to NOAA's NCEI, the frequency of extreme snowstorms in the eastern US has increased over the past century, with approximately twice as many extreme snowstorms occurring in the last half of the 20th century as in the first half. Conditions that influence snowstorm severity including warmer ocean surface temperatures in the Atlantic. These increased temperatures can lead to exceptionally high amounts of moisture feeding into a storm and contribute to storm intensification.

Global ocean surface temperatures have increased at a rate of +.18 degrees Fahrenheit each decade since 1950. Natural variability can affect surface ocean temperatures, but as global surface temperatures increase, the temperature is higher at any time than it would have been if the climate were not changing. Some research has shown that increasing ocean surface temperature and reductions in Arctic sea ice may produce atmospheric circulation patterns that are favorable for winter storm development in the eastern United States. Notably, a greater prevalence of high pressure blocking patterns over the North Atlantic that result in cold outbreaks in the eastern US, along with slow moving systems can further exacerbate the longevity and severity of a snowstorm.

Studies have shown that natural variability associated with El Niño conditions has a strong relationship and influence on the incidence of severe snowstorms in the eastern US. An analysis of 100 storms in six regions east of the Rocky Mountains found that severe snowstorms are approximately twice as likely to occur in the eastern US – north and south – during years when a moderate to strong El Niño is present as compared to years when more neutral conditions are present.

Mass evacuations are not expected in relation to severe winter weather, including evacuations into the Richmond-Crater region from other areas.

5.10 Thunderstorms (including Hail and Lightning)

Hazard Profile

Thunderstorms are caused when air masses of varying temperatures and moisture content meet. All thunderstorms produce lightning. Droplets of water in a thunderstorm may get picked up in the storm's updraft, a column of rising air. The updraft can carry the droplets to levels of the atmosphere where temperatures are below freezing. The frozen droplets,

now hail, may then fall due to gravity injuring people, property and animals. In Virginia, thunderstorms can occur at any time during any season, but are most common in the late afternoon and evening hours of the summer months.

Magnitude or Severity

A bolt of lightning can reach temperatures approaching 50,000 degrees Fahrenheit. Lightning can remain in-cloud or can contact the ground or other surfaces. A cloud-to-ground bolt of lightning can sometimes strike locations 10 or more miles away from the parent thunderstorm, producing the effect that the lightning came from 'out of the blue' or without warning. Lightning kills an average of 49 people each year in the United States and hundreds more are injured. Some survivors suffer lifelong neurological damage.[14]

In addition to flooding rainfall, damaging winds, and sometimes tornadoes, thunderstorms might also produce large hail and deadly lightning. Hail can be smaller than a pea, or as large as a softball or grapefruit, and can be very destructive to automobiles, glass surfaces such as skylights and windows, roofs, siding, trees, and crops. The amount of damage to crops can be a factor of crop growth stage, amount of hail and how hard it falls, size of the hail (smaller does not necessarily lead to less damage), and concurrent wind speeds and temperatures.

Hazard History

Virginia averages 40 to 50 thunderstorm days per year.[15] Past occurrences of thunderstorm events that produced damage, injuries, or fatalities as a result of hail or lightning since 2010 are listed in **Table 5.28**. The NCEI database shows that at least two people in the region have been killed and three others injured as a result of lightning since 1993 (see **Appendix F-7**). The database did not indicate any deaths or injuries in the region during this period as a result of hail.

[14] https://www.weather.gov/safety/lightning, NWS, accessed September 16, 2021.

[15] Sammler, William. Personal interview, September 15, 2005. (National Weather Service, Warning Coordination Meteorologist, Wakefield, Virginia office.)

Table 5.28: History of Hail/Lightning Events and Damages, 2010–2020	
Date	**Damages**
August 12, 2010	**Hanover County:** Hail, two inches in diameter, damaged vehicles in the county east of Old Cold Harbor.
June 29, 2012	The June 2012 Mid-Atlantic and Midwest derecho was one of the most destructive and deadly fast-moving severe thunderstorm complexes in North American history. The progressive derecho tracked across a large section of the Midwestern United States and across the central Appalachians into the mid-Atlantic states on the afternoon and evening of June 29, 2012, and into the early morning of June 30, 2012. It resulted in 20 deaths, widespread damage and millions of power outages across the study region. (Source: https://en.wikipedia.org/wiki/June_2012_North_American_derecho)
June 13, 2013	On the morning of the 13, another linear complex of severe storms developed along a line near the southern border of Ohio. The storms eventually strengthened into a powerful derecho and raced to the south and east. Fatalities and injuries occurred as a result of falling trees and power lines as the storms ripped through Virginia, along with numerous reports of damaging winds and power outages. The derecho downed numerous tress and damaged structures winds up to 80 mph (130 km/h) in some areas. (Source: https://en.wikipedia.org/wiki/June_12%E2%80%9313,_2013_derecho_series)
May 22, 2014	A large Hail and Thunderstorm event came through the region. Some hail was reported to be as large as ping pong balls. Several areas were affected from fallen electric lines. The NCEI data reports that 12 direct deaths in the study region resulted from this event. (Source: NCEI data & http://www.nbcwashington.com/news/local/Severe-Thunderstorms-DC-Area-May-22-260300391.html)
February 24, 2016	This storm started in the northeastern states and traveled down through Virginia and south. During the thunderstorm, hail in some parts of the region were as large as 3 inches in diameter. (Source: http://www.weather.gov/akq/Feb24-2017TOR)
July 19, 2016	Scattered severe thunderstorms associated with a cold front produced damaging winds and large hail across portions of Henrico, Chesterfield, Sussex and Greensville Counties. Reports of hail size varied from quarter size to hen's egg size in Sussex County, where a corn field was stripped by the large hail on Beaverdam Road near Harrels Mill Pond causing $3000 crop damage.
February 25, 2017	Thunderstorms caused large hail and damaging winds of 50-60 mph throughout the study area. Hail was generally small or quarter size. Minor roof damage of $1000 reported in Bon Air section of Chesterfield County.
May 27, 2017	A low pressure system and warm front produced scattered thunderstorms, causing large hail and damaging winds in Hanover, Henrico, Dinwiddie and Chesterfield Counties. Hail was very large in the Beach area of Chesterfield County, reportedly as large as teacups, with $2000 damage reported.
July 19, 2017	Chesterfield County, Ampt Hill: A lightning strike associated with severe thunderstorms in advance of a cold front caused a small structural fire. There was

Table 5.28: History of Hail/Lightning Events and Damages, 2010–2020	
Date	**Damages**
	also lightning strike on utilities and an adjacent shed on Dulwich Lane. Damages reported at $15,000.
June 22, 2018	Lightning from a thunderstorm produced by a warm frontal boundary caused a house fire in the New Bohemia section of Prince George County. Damage was reported at $10,000.
August 15, 2019	Damaging lightning strikes caused damage in Chesterfield County and Henrico County. Lightning struck a house on Shepherds Drive in Chesterfield causing $5000 damage to the house. In Henrico County, lightning caused a house fire on Linstead Road, with $3000 reported.
August 23, 2019	A house was struck by lightning on Hunnicut Road in Dinwiddie causing $3000 damage.
June 19, 2020	Lightning strike caused a house fire on North Oaks Drive in Hanover with a reported $5000 in damage.

Source: NOAA NCEI

Vulnerability Analysis

Although most frequent in the Southeast and parts of the Midwest, thunderstorms are a relatively common occurrence across the region and have been known to occur in all calendar months. All of the central Virginia region is deemed equally likely to experience severe thunderstorms and associated damages from hail or lightning. **Table 5.29** indicates the annualized number of hail and damaging lightning events by jurisdiction based on NCEI data.

Table 5.29: Annualized Hail and Lightning Events and Losses, 1956 - 2020				
Jurisdiction	**Annualized Hail/Lightning Events**	**Annualized Property Losses**	**Annualized Crop Damages**	**Annualized Total Losses**
Charles City County	0.14	$78	-	$78
Chesterfield County	1.67	$1,773	-	$1,773
City of Colonial Heights	0.19	$31	-	$31
Dinwiddie County (inc. Town of McKenney)	0.36	$516	$1	$517
City of Emporia	0.08	$156	-	$156
Goochland County	0.45	$78	-	$78
Greensville County (inc. Town of Jarratt)	0.13	$0	-	$0
Hanover County (inc. Town of Ashland)	0.95	$2,046		$2,046
Henrico County	1.53	$11,781	-	$11,781

Table 5.29: Annualized Hail and Lightning Events and Losses, 1956 - 2020				
Jurisdiction	**Annualized Hail/Lightning Events**	**Annualized Property Losses**	**Annualized Crop Damages**	**Annualized Total Losses**
City of Hopewell	0.25	$78	-	$78
New Kent County	0.23	$78	-	$78
City of Petersburg	0.11	$187	-	$187
Powhatan County	0.45	$16	-	$16
Prince George County	0.63	$344	-	$344
City of Richmond	0.36	$78	-	$78
Surry County (inc. Town of Surry)	0.16	-	-	-
Sussex County (inc. Towns of Stony Creek, Wakefield, Waverly)	0.31	$313	$47	$360
Total	**0.31**	**$17,553**	**$48**	**$17,601**

Source: NOAA NCEI (events categorized as hail and lightning only)

Table 5.29 is based on NCEI historical data for the 64-year period of record between 1956 and 2020. On average, the region experiences approximately seven to eight hailstorms annually and one damaging lightning event every two years. In terms of damages, roughly $1,200 in losses is attributed to hail and about $16,400 to lightning annually.

Electrical utilities and communications infrastructure are vulnerable to lightning. Damage to power lines or communication towers from direct lightning strikes can cause power and communication outages for residents, businesses, and critical facilities. In addition to lost revenues, downed power lines present a threat to personal safety. Downed wires and lightning strikes have also sparked fires in the past.

A structure's thunderstorm vulnerability is based in large part on building construction and design standards. Other factors, such as location, condition, and maintenance of trees also plays a significant role in determining vulnerability. Windows, roofs, and siding are most vulnerable to the impacts of large hail.

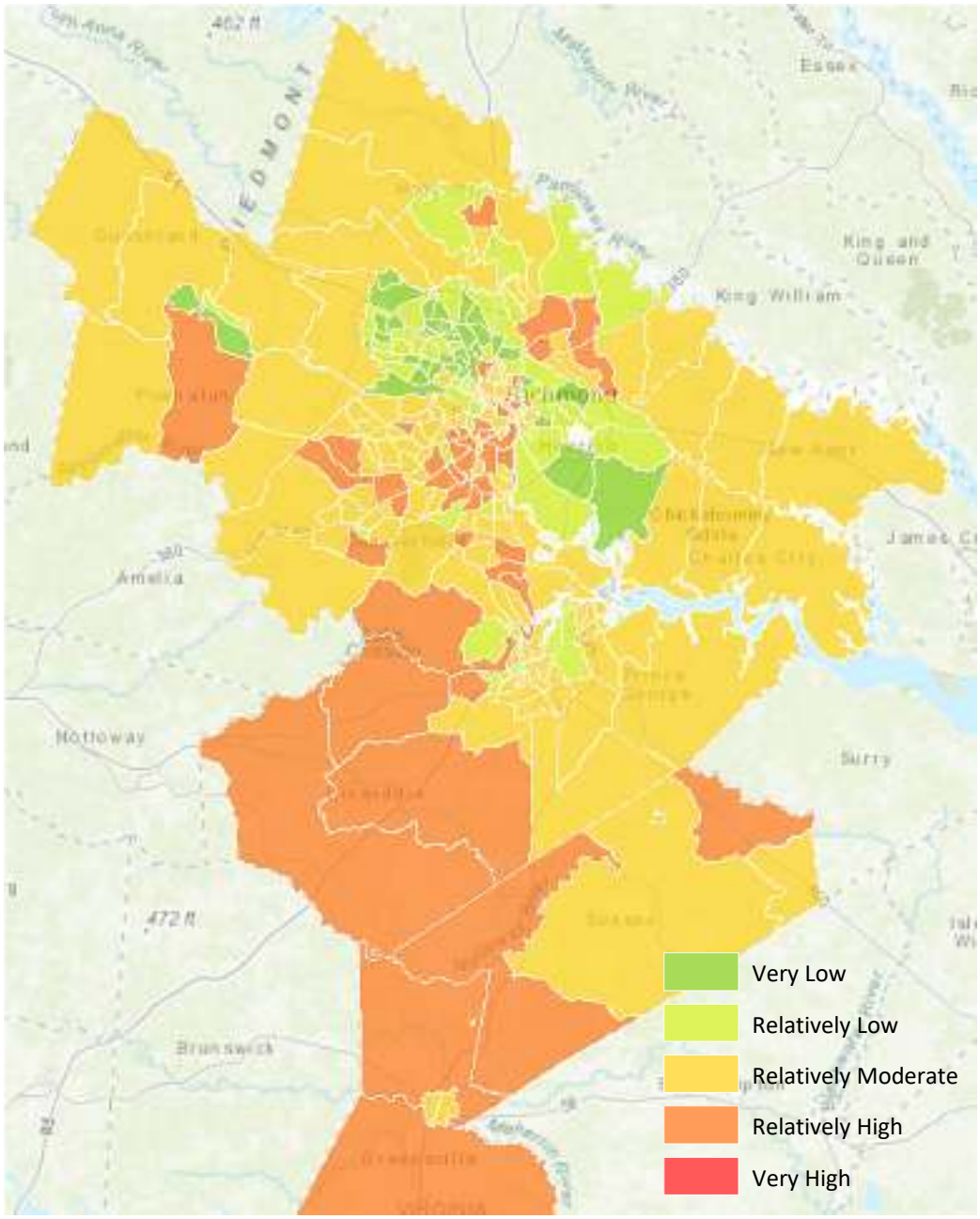
Human vulnerability is based on the availability and reception of early warnings of significant thunderstorm events (i.e., Severe Thunderstorm Warning issued by the NWS) and access to substantial indoor shelter. Seeking shelter indoors on the lowest floor of a substantial building away from windows is recommended as the best protection against thunderstorm-related hazards.

All critical facilities in the study area are at risk for hail and lightning damage, but recent history does not include mention of significant previous damage to these facilities. Critical facilities with generators for auxiliary power are better prepared in the event of power outages caused by thunderstorms and associated wind, hail and lightning.

Social Vulnerability

The NRI data for social vulnerability to lightning and hail are shown in **Figure 5.28** and **Figure 5.29, respectively**.

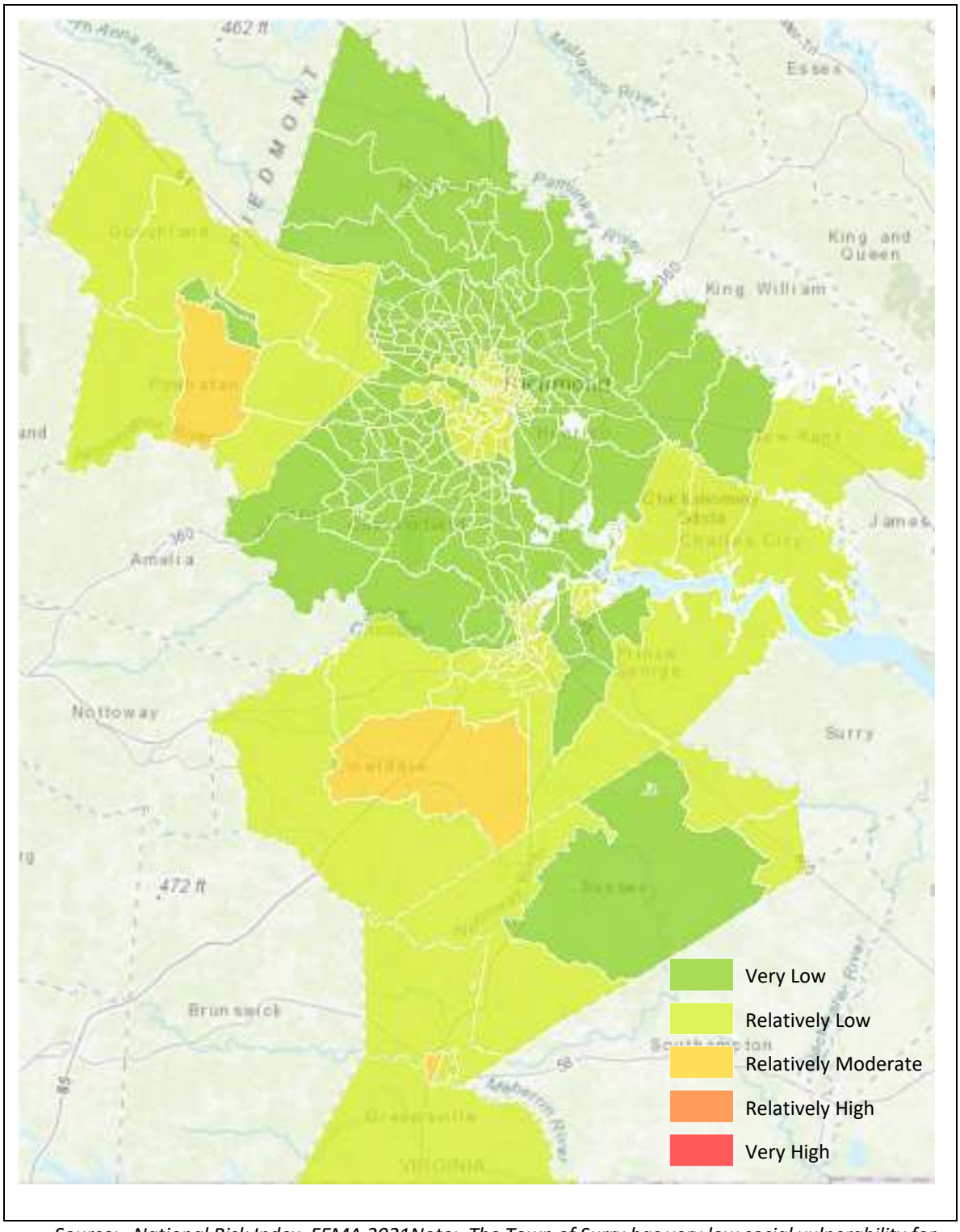
Figure 5.28: National Risk Index Rating, Lightning



Source: National Risk Index, FEMA 2021

Note: The Town of Surry has relatively moderate social vulnerability for lightning.

Figure 5.29: National Risk Index Rating, Hail



Source: National Risk Index, FEMA 2021Note: The Town of Surry has very low social vulnerability for lightning.

Future Vulnerability, Land Use and Climate Change

Future vulnerability to hail and lightning damage may change if the nature of the hazard changes as a result of climate change. If the frequency and severity of thunderstorms

increases as expected, with commensurate increases in lightning strikes and hail size and storm longevity, damage patterns could change, and human vulnerability may increase.

Mass evacuation is not expected in association with thunderstorms, lightning or hail.

5.11 Droughts and Extreme Heat

Hazard Profile

A drought can be characterized in several different ways depending on the nature of the impacts. The most common form of drought is agricultural. Agricultural droughts are characterized by unusually dry conditions during the growing season. Meteorological drought is an extended period of time (six or more months) with precipitation of less than 75% of normal precipitation. Severity of droughts often depends on the community's reliance on a specific water source. The probability of a drought is difficult to predict given the number of variables involved.

A heat wave is defined as a prolonged period of excessive heat, often combined with excessive humidity. Extreme heat is defined as temperatures that hover 10 degrees or more above the average high temperature for the region and last for several weeks. A heat wave combined with a drought is particularly dangerous.

Magnitude or Severity

Many problems can arise at the onset of a drought, some of which include diminished water supplies and quality, undernourishment of livestock and wildlife, crop damage, and possible wildfires. Secondary impacts from droughts pose problems to farmers with reductions in income, while food prices and lumber prices could drastically increase.

High summer temperatures can exacerbate the severity of a drought. When soils are wet, a significant portion of the sun's energy goes toward evaporation of the ground moisture. However, when drought conditions eliminate soil moisture, the sun's energy heats the ground surface and temperatures can soar, further drying the soil.

Table 5.30 provides a summary of drought categories and impacts produced by the U.S. Drought Monitor. The U.S. Drought Monitor classification uses both science and subjectivity to create a drought severity classification table for each dryness level. Notice that water restrictions are usually initiated as "voluntary" and can evolve to "mandatory."

Table 5.30: Drought Severity Classification and Possible Impacts		
Category	**Description**	**Possible Impacts**
D0	Abnormally dry	Going into a drought: short-term dryness slows planting, growth of crops or pastures; fire risk above average. Coming out of a drought: some lingering water deficits; pastures or crops not fully recovered.
D1	Moderate drought	Some damage to crops, pastures; fire risk high; streams, reservoirs, or wells low; some water shortages develop or are imminent; voluntary water use restrictions requested.
D2	Severe drought	Crop or pasture losses likely; fire risk very high; water shortages common; water restrictions imposed.
D3	Extreme drought	Major crop/pasture losses; extreme fire danger; widespread water shortages or restrictions.

Source: U.S. Drought Monitor

The impact of excessive heat is most prevalent in urban areas, where urban heat-island effects prevent inner-city buildings from releasing heat built up during the daylight hours. Secondary impacts of excessive heat are severe strain on the electrical power system and potential brownouts or blackouts.

Extreme heat also impacts the human body. When combined with high relative humidity that slows evaporation, extreme heat limits the body's ability to efficiently cool itself. Overexposure may result in first dehydration and heat cramps, and then heat exhaustion or heat stroke, which could lead to death. Heat stroke is caused by prolonged exposure to high temperatures or by physical activity. Sweating usually stops and body temperature becomes too high.

For excessive heat, the NWS uses heat index thresholds as criteria for the issuance of heat advisories and excessive heat warnings. NWS heat advisory bulletins inform citizens of forecasted extreme heat conditions. The bulletins are based on projected or observed heat index values and include:

- Excessive Heat Outlook when there is a potential for an excessive heat event within three to seven days.
- Excessive Heat Watch when conditions are favorable for an excessive heat event within 12 to 48 hours, but some uncertainty exists regarding occurrence and timing.
- Excessive Heat Warning/Advisory when an excessive heat event is expected within 36 hours.

These products are usually issued when confidence is high that the event will occur. A warning implies that conditions could pose a threat to life or property, while an advisory is issued for less serious conditions that may cause discomfort or inconvenience but could still lead to threat to life and property if caution is not taken.

Hazard History

There have been a number of significant droughts recorded in Virginia since 1900. An extended period of abnormally dry weather occurred during a period of four years, from 1998 to 2002. This period saw rainfall levels well below normal and caused many communities throughout the state to institute water restrictions.

Table 5.31 includes descriptions of major droughts that have occurred in the Richmond-Crater region. Drought conditions generally occur over a region or larger area rather than in a single jurisdiction. The NCEI database lists no significant drought or extreme heat events since 2016.

Table 5.31 History of Drought Events and Damages, 1976–2020

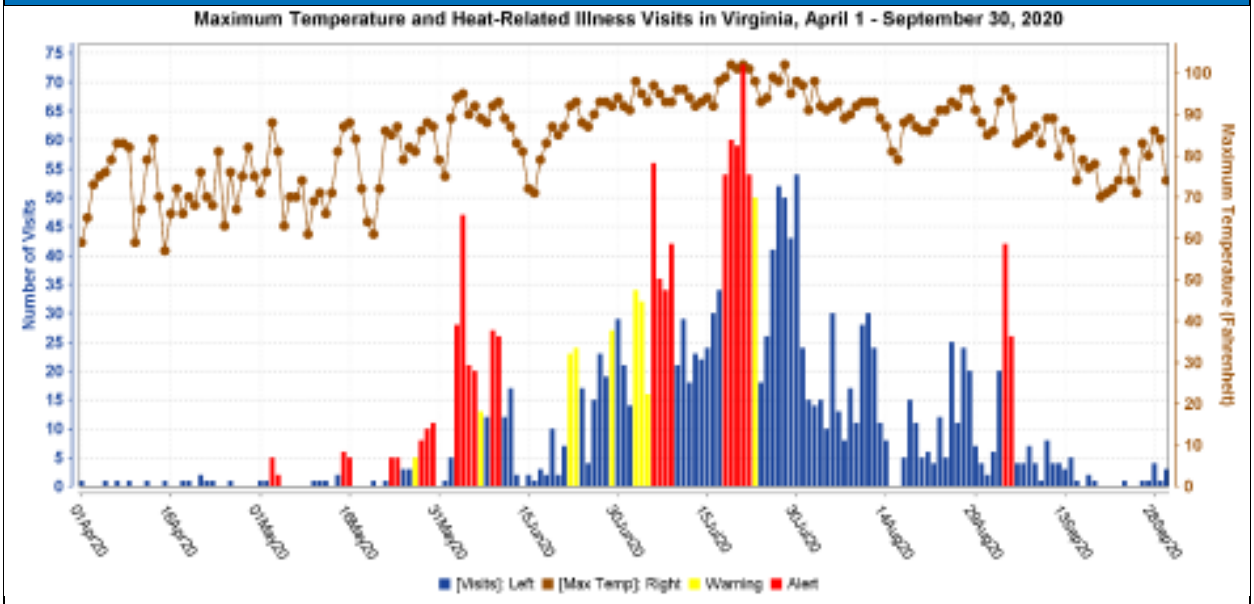
Date	Damages
November 1976 – September 1977	The region experienced ten months of below average precipitation. The drought began in November 1976 when rainfall totaled only 50% to 75% of normal. During the rest of the winter, storms tracked across the Gulf. During the spring and summer storms tracked across the Great Lakes. These weather patterns created significant droughts throughout most of Virginia.
1993	Hot, dry weather affected 23 counties and was responsible for an estimated $75 million in crop damages.
June – November 1998	A heat wave over the Southeast produced warm and dry conditions over much of Virginia. Unusually dry conditions persisted through much of the fall. The drought produced approximately $38.8 million in crop damages over portions of central and south-central Virginia.
December 2001 – November 2004	Beginning in the winter of 2001, the Mid-Atlantic began to show long-term drought conditions. The NWS issued reports of moisture-starved cold fronts that would continue throughout the winter. Stream levels were below normal with record lows observed at gauges for the York, James, and Roanoke River basins. By November 2002, the U.S. Secretary of Agriculture had approved 45 counties for primary disaster designation, while 36 requests remained pending.
2007	Unusually dry conditions persisted through a significant portion of the year through much of southern and central Virginia. Virginia as a whole experienced its tenth driest year on record.
2010	The summer of 2010 was hot and dry. Most of the state suffered from moderate to severe drought conditions, and some jurisdictions were placed under water restrictions.
July 21, 2011	This was one of the hottest July's in the last 75 years, breaking multiple records. According to the NCEI data, all counties were recorded as having excessive heat waves and drought throughout the entire month.
2012-2013	La Nina conditions produced extreme and exceptional drought conditions throughout much of the US, Canada, and Mexico. Peak drought conditions in July resulted in more than 80% of the country with at least abnormally dry conditions. For this event, much of Virginia was classified as either abnormally dry or as experiencing moderate to severe drought conditions.

The NCEI database contains only one extreme heat event for the study area. Between July 21 and July 23, 2011, high temperatures ranged from 96 to 103 degrees during the afternoons, with heat index values ranging from 110 to 119. Overnight lows only fell into the lower 70s to lower 80s. Zero fatalities or injuries and no damages were noted. In an online blog note from July 2021, the Virginia Department of Health (VDH) wrote that, "According to the Office of the Chief Medical Examiner, between 2018 and 2020 there were 28 heat-related deaths in Virginia."[16] Although the geographic location is not provided, these data do not match up with the NCEI data for the state, so NCDI-reported data should not be considered complete.

The VDH receives data on visits to emergency departments and urgent care centers in Virginia for purposes of public health surveillance. These data are analyzed through a syndromic surveillance system, known as ESSENCE, to monitor the health of the community and identify emerging trends of public health concern. In response to extreme heat, the Office of Epidemiology, Division of Surveillance and Investigation conducts surveillance for heat-related illness. While the data depicted in **Figure 5.30** are not readily available by jurisdiction, the statewide data provide insights about significant extreme heat dates, the maximum temperatures and the number of hospital visits for heat-related illness.

[16] https://www.vdh.virginia.gov/blog/2021/07/02/virginia-department-of-health-reminds-residents-to-be-aware-of-the-risks-of-heat-related-illness-enjoy-the-outdoors-this-holiday-weekend-but-make-sure-to-stay-hydrated-use-sunscreen-and-take/

Figure 5.30: Maximum Temperatures and Heat-Related Illness Visits in Virginia, 2016-2020



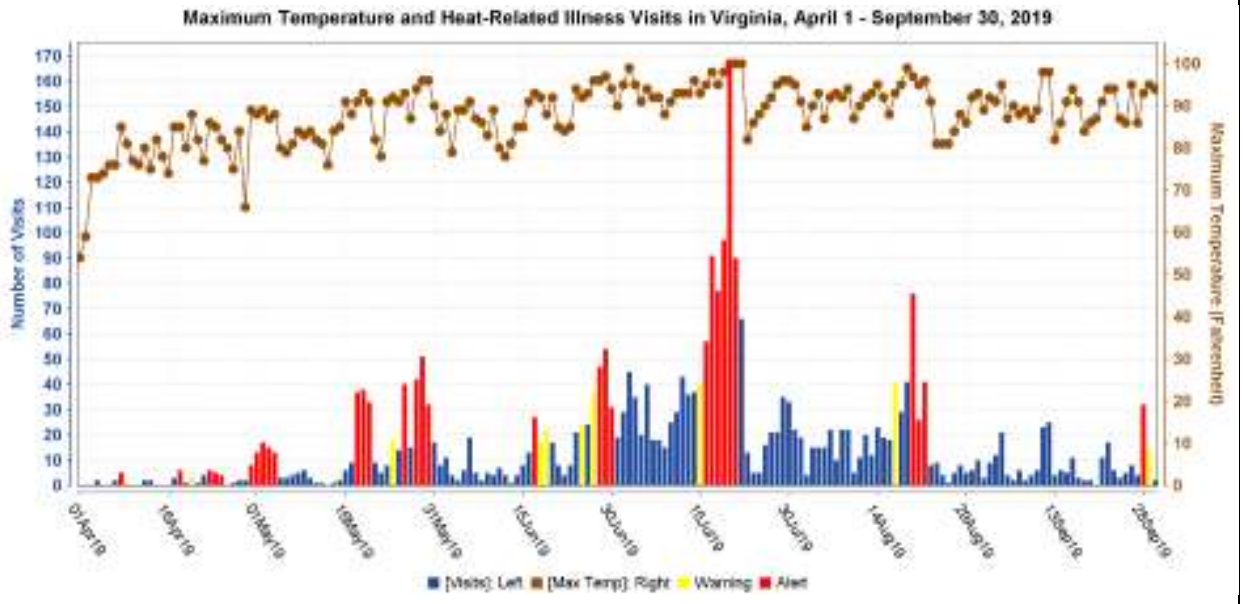
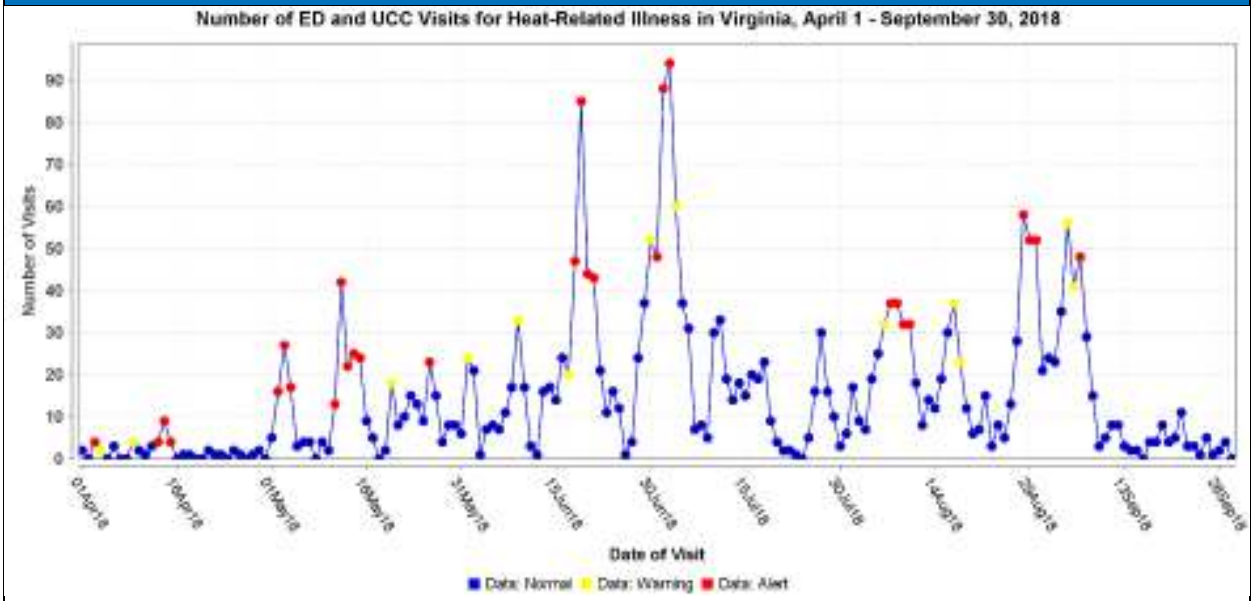


Figure 5.30: Maximum Temperatures and Heat-Related Illness Visits in Virginia, 2016-2020



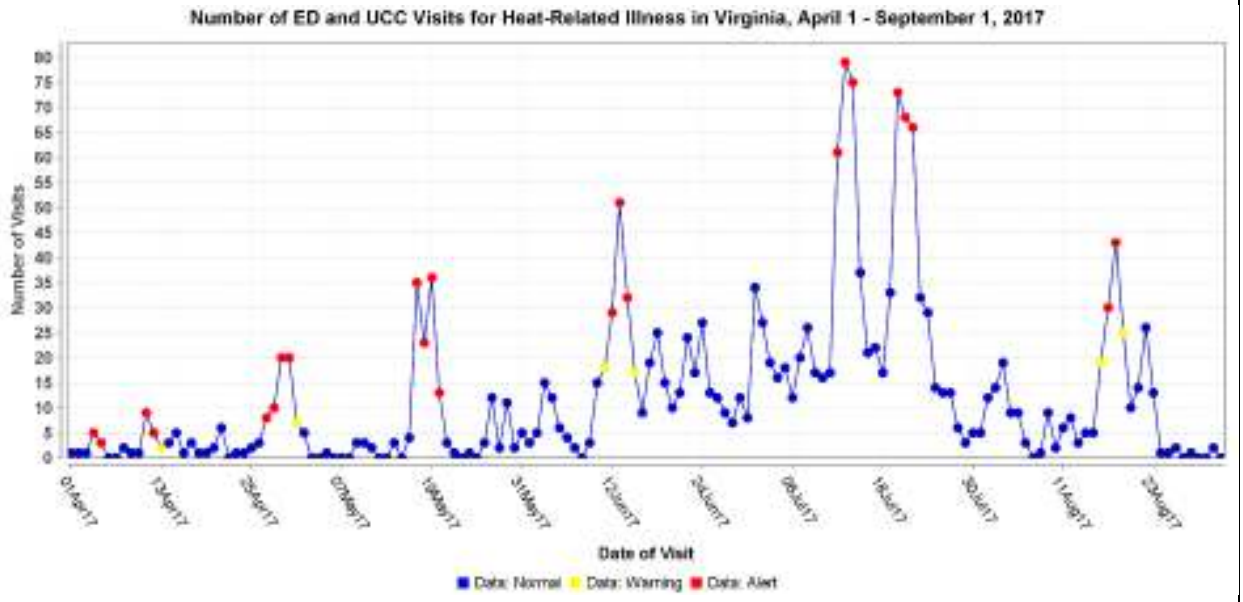
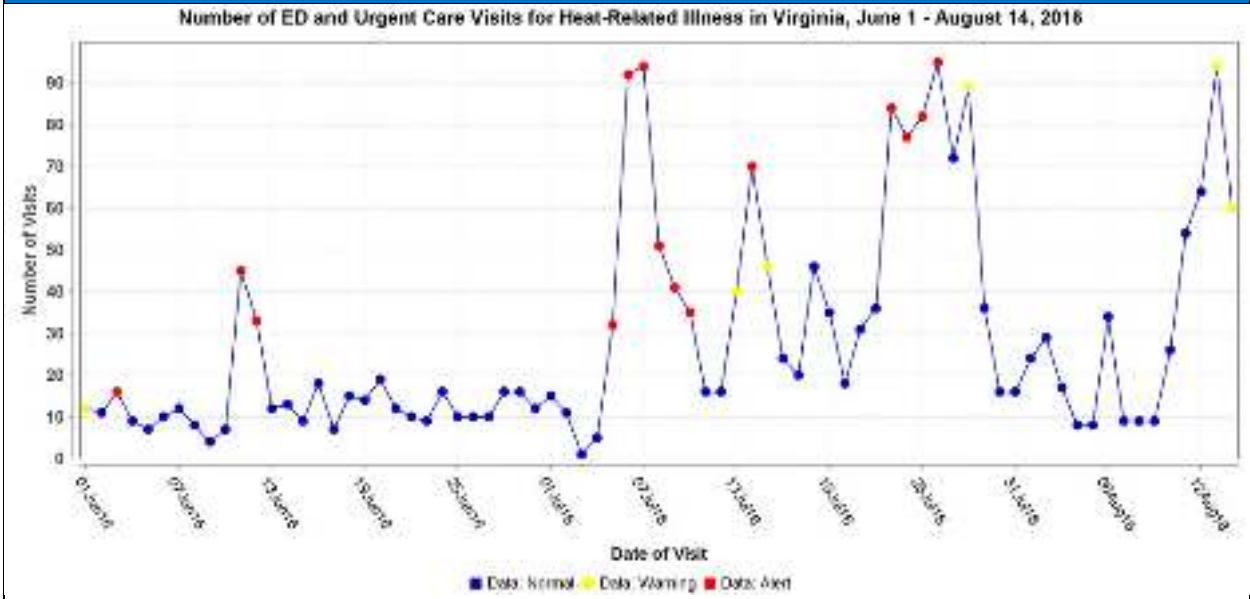


Figure 5.30: Maximum Temperatures and Heat-Related Illness Visits in Virginia, 2016-2020



Source: Virginia Department of Health, accessed online https://www.vdh.virginia.gov/surveillance-and-investigation/syndromic-surveillance/weather-surveillance/.

Vulnerability Analysis

Based on historical frequency of occurrence using NCEI, an annual determination of drought events can be made. **Table 5.32** indicates that drought events of some significance affect jurisdictions in the region. The annualized event occurrence and damages are shown for the study area.

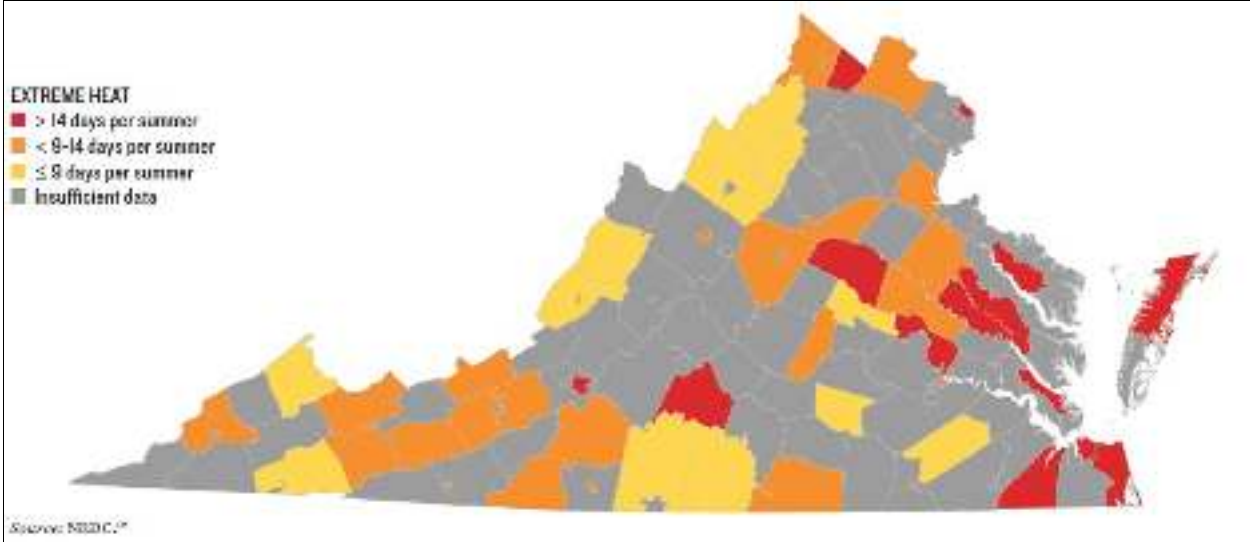
Table 5.32: Annualized Drought Events and Losses, 1993 – 2020

Jurisdiction	Annualized Number of Events	Annualized Property Losses	Annualized Crop Losses
Charles City County	0.14	-	$111,948
Chesterfield County	0.21	-	-
City of Colonial Heights	-	-	-
Dinwiddie County (inc. Town of McKenney)	-	-	$342,918
City of Emporia	-	-	-
Goochland County	-	-	$103,992
Greensville County (inc. Town of Jarratt)	-	-	-

Table 5.32: Annualized Drought Events and Losses, 1993 – 2020			
Jurisdiction	**Annualized Number of Events**	**Annualized Property Losses**	**Annualized Crop Losses**
Hanover County (inc. Town of Ashland)	0.21	-	$426,633
Henrico County	0.18	-	$207,982
City of Hopewell	0.21	-	-
New Kent County	0.21	-	$59,142
City of Petersburg	0.43	-	-
Powhatan County	0.11	-	$ 322,325
Prince George County	0.21	-	$190,100
City of Richmond	0.43	-	-
Surry County (inc. Town of Surry)	-	-	-
Sussex County (inc. Towns of Stony Creek, Wakefield, Waverly)	0.11	-	-
Totals	**0.40**	**$0**	**$1,765,040**

An examination of vulnerability to extreme heat by jurisdiction necessitates the use of data other than NCEI data, which are incomplete. **Figure 5.31** shows the average number of extreme summer heat days per year in Virginia, by county, between 2007 and 2016, from an NRDC report on Climate Change and Health in Virginia. While the data are insufficient in much of the study area, a definite urban heat island effect for metro Richmond is evident.

Figure 5.31: Average Number of Extreme Summer Heat Days per Year in Virginia



Source: NRDC, Climate Change and Health in Virginia, Issue Brief, April 2018. Accessed online: https://www.nrdc.org/sites/default/files/climate-change-health-impacts-virginia-ib.pdf

If a significant drought event were to occur, it could bring economic, social, and environmental impacts to the study area. Commonly, one of the most significant economic effects to a community is agricultural impact. Other economic effects could be felt by businesses that rely on adequate water levels for their day-to-day business, such as carwashes and Laundromats.

Droughts can also create conditions that lead to occurrence or worsening of other natural hazard events such as wildfires. The likelihood of flash flooding and sinkholes is increased if a period of severe drought is followed by a period of extreme precipitation. Low-flow conditions also decrease the quantity and pressure of water available to fight fires, while the dry conditions increase the likelihood that fires will occur.

Environmental drought impacts include those on both human and animal habitats and hydrologic units. During periods of drought, the amount of available water decreases in lakes, streams, aquifers, soil, wetlands, springs, and other surface and subsurface water sources. This decrease in water availability can affect water quality such as oxygen levels, bacteria, turbidity, temperature increase, and pH changes. Changes in any of these levels can have a significant effect on the aquatic habitat of numerous plants and animals found throughout the study area.

Low water flow can result in decreased sewage flows and subsequent increases in contaminants in the water supply. Decrease in the availability of water also decreases

drinking water supply and the food supply as food sources become scarcer. This disruption can work its way up the food chain within a habitat. Loss of biodiversity and increases in mortality can lead to increases in disease in endangered species.

Precipitation at reliable, predictable times in the growing cycle of any crop is essential for the success of that crop, as every crop has a predictable growing season. During dry periods, including droughts, evapotranspiration from plant leaves can contribute to the loss of moisture in the soil, further impacting vegetation and crops. **Table 5.33** provides an overview of the agricultural products that could be affected by a drought. These numbers are based on the 2017 Census of Agriculture conducted by the U.S. Department of Agriculture. The numbers show all of the counties with significant agricultural sectors that could be impacted by droughts. Hanover County, in particular, has almost $50 million in products sold, most of which were crops.

Table 5.33: Value of Agricultural Products Potentially Affected by Drought

Jurisdiction	Number of Farms 2017 (% Change from 2012)	Total Value of Agricultural Products Sold	Total Acres Operated in Farms
Charles City County	77 (-2.0%)	$16,186,000	31,392
Chesterfield County	210 (13.0%)	$4,511,000	18,013
Dinwiddie County	358 (-25.0%)	$25,705,000	92,841
Goochland County	355 (40.0%)	$11,740,000	56,739
Greensville County	150 (-1.0%)	$19,448,000	54,544
Hanover County	567 (-33.0%)	$49,254,000	89,186
Henrico County	99 (-18.0%)	$7,286,000	9,820
New Kent County	138 (1.0%)	$5,128,000	18,335
Powhatan County	263 (13.0%)	$11,249,000	34,585
Prince George County	164 (-3.0%)	$9,284,000	39,630
Surry County	111 (-16.0%)	$23,899,000	42,062
Sussex County	124 (1.0%)	$42,178,000	66,257
Total	**2,616 (-30.0%)**	**$225,868,000**	**553,404**

Source: United States Department of Agriculture, Virginia Agricultural Statistics Service. 2017 Census of Agriculture

Except for potential water supply issues associated with a prolonged drought, droughts have little impact on critical facilities.

The data show recurrence of drought conditions, of varying magnitude, on a relatively regular basis. With records dating back to 1993, the NCEI database indicates that drought events of some significance occur regularly in the region. Based on historical data, it is reasonable to assume that drought events will continue to impact the region with some regularity. Annual regional crop losses associated with drought events just slightly exceeds $2 million.

Social Vulnerability

The main concern in periods of extreme heat is the potential public health impact, such as heat exhaustion or heat stroke. Individuals of concern include those living in residences without air conditioning, or in areas where electric service is unavailable due to system-wide blackouts. The elderly, small children, the chronically ill, livestock and pets are most vulnerable to extreme heat. **Figure 5.32** shows the relative social vulnerability to heat waves based on the National Risk Index data.

The NRI data for social vulnerability to drought are shown in **Figure 5.33**. Historical occurrence data were taken from the University of Nebraska-Lincoln National Drought Mitigation Center, U.S. Drought Monitor. The period of record was January 2000 to December 2017. Portions of Dinwiddie County and Hanover County appear to be the most socially vulnerable communities to the impacts of drought.

Future Vulnerability, Land Use and Climate Change

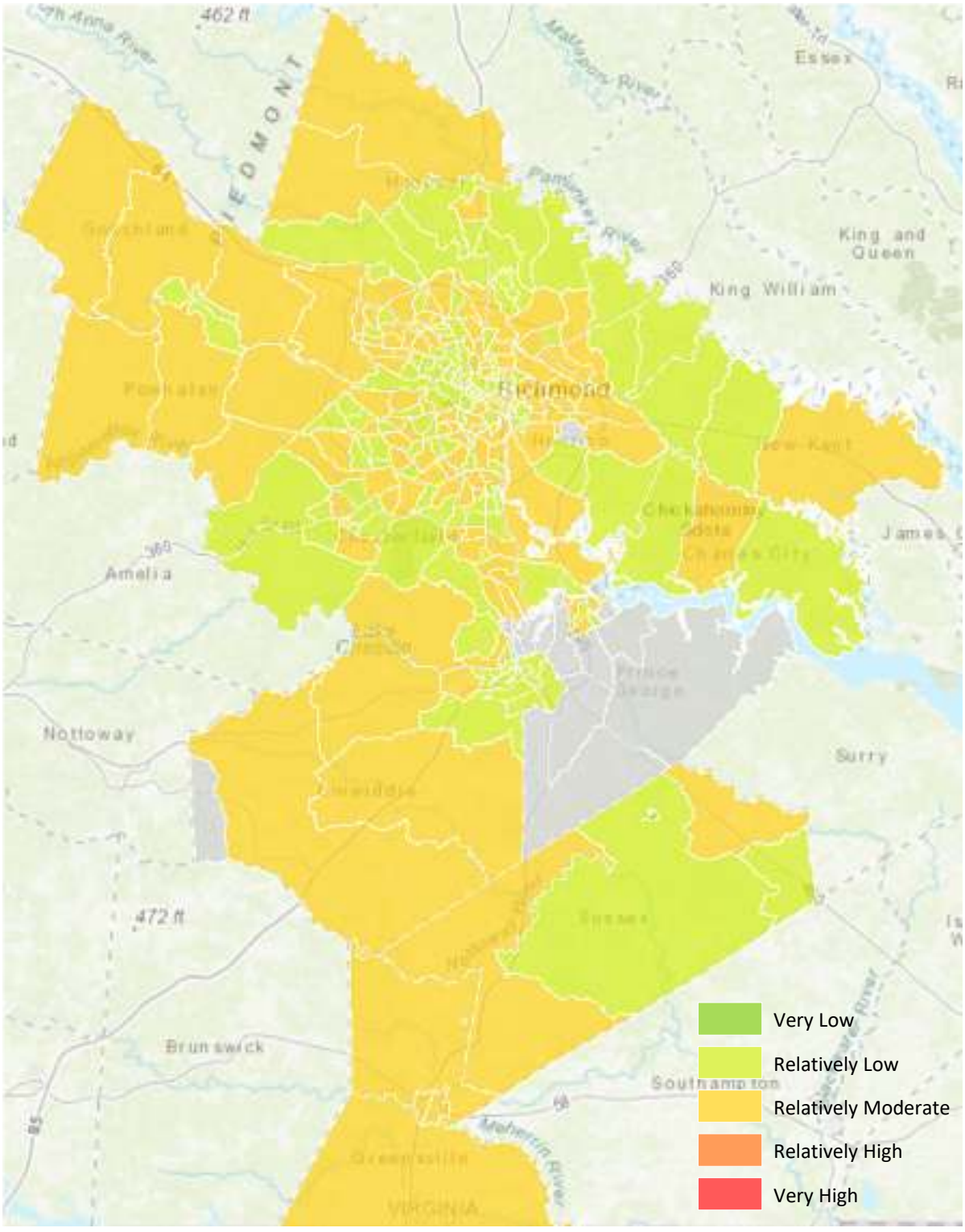
The VASEM 2021 report predicts that as this century comes to a close, agriculture will be impacted by more intense precipitation but also longer periods of drought. The cumulative effect will particularly be bad for crops near the warm end of their geographic range.

The risk of heat-related illnesses and deaths in Virginia will grow as climate change fuels more intense and frequent heat waves. NRDC analysis indicates that daily summer highs at Richmond International Airport averaged 88.6 degrees Fahrenheit in the past decade, compared with 85.6 degrees Fahrenheit in the 1960s.[17]

Neither droughts nor extreme heat are expected to cause mass evacuations.

[17] NRDC: *Climate Change and Health in Virginia*, Issue Brief, April 2018. Accessed online: https://www.nrdc.org/sites/default/files/climate-change-health-impacts-virginia-ib.pdf

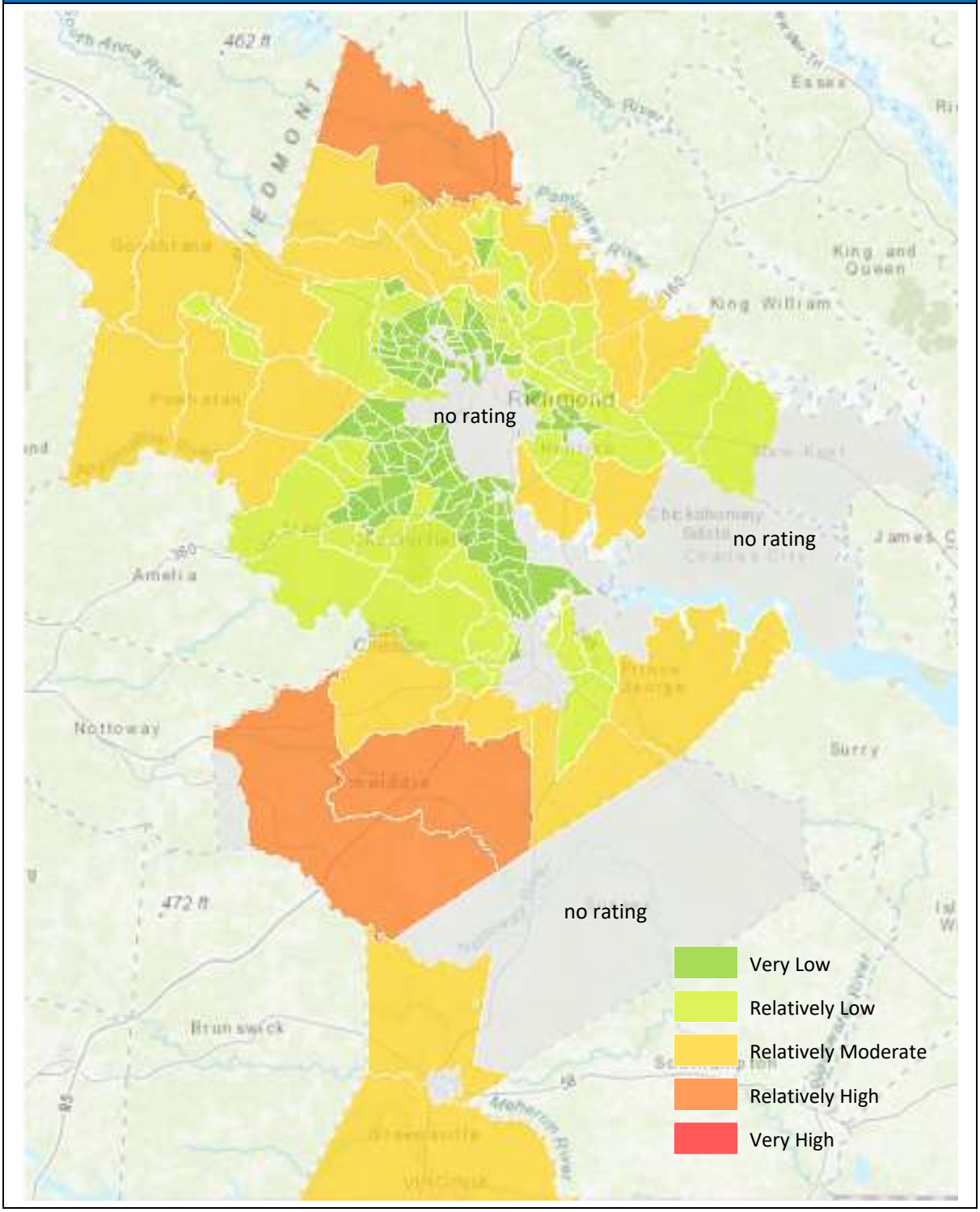
Figure 5.32: National Risk Index Rating, Heat Wave



Source: National Risk Index, FEMA 2021

Note: The Town of Surry has relatively moderate social vulnerability for heat wave.

Figure 5.33: National Risk Index Rating, Drought



Source: National Risk Index, FEMA 2021
Note: The Town of Surry has no NRI social vulnerability rating for drought.

5.12 Earthquakes

Hazard Profile

An earthquake is the motion or trembling of the ground produced by sudden displacement of rock in the Earth's crust. Naturally occurring earthquakes result from crustal strain, volcanism, landslides or the collapse of caverns but can also be triggered by mine blasts or collapse or nuclear testing. Earthquakes can affect hundreds of thousands of square miles; cause damage to property measured in the tens of billions of dollars; result in loss of life and injury to hundreds of thousands of persons; and disrupt the social and economic functioning of the affected area.

Most property damage and earthquake-related deaths are caused by the failure and collapse of structures due to ground shaking. The level of damage depends upon the amplitude and duration of the shaking, which are directly related to the earthquake size, distance from the fault, site and regional geology and soil.

Earthquakes are caused by the sudden release of accumulated energy, resulting in the rupture of rocks along fault planes in the Earth's lithosphere. The areas of greatest tectonic activity occur at the boundaries of the Earth's slowly moving tectonic plates, as these locations are subjected to the greatest strain from plates traveling in various directions and speeds. Deformation along plate boundaries causes strain in the rock and the consequent buildup of stored energy. When the built-up stress exceeds the rocks' strength, a rupture occurs. The rock on both sides of the fracture is snapped, releasing the stored energy and producing seismic waves, generating an earthquake.

Impacts from earthquakes can be severe and cause significant damage. Ground shaking can lead to the collapse of buildings and bridges, and disrupt utilities. Death, injuries, and extensive property damage are possible from earthquakes. Some secondary hazards caused by earthquakes may include fire, hazardous material release, landslides, flash flooding, avalanches, tsunamis, and dam failure.

Magnitude or Severity

Smaller earthquakes occur much more frequently than larger earthquakes. These smaller earthquakes are generally not felt by people and cause little or no damage. Very large earthquakes can cause tremendous damage and may be followed by a series of aftershocks occurring in the region for weeks after the event. Aftershocks generally have a smaller magnitude than the main shock, but may still be powerful enough to cause additional damage.

Earthquakes can be measured in terms of their magnitude or intensity. Magnitude is the amount of energy that is released by an earthquake. There are a number of ways that magnitude can be measured but probably the most familiar is the Richter Scale (**Table 5.34**). The Richter magnitude scale was developed in 1935 by Charles F. Richter of the California Institute of Technology, as a mathematical device to compare the size of earthquakes. The magnitude of an earthquake is determined from the logarithm of the amplitude of seismic waves recorded by seismographs. Adjustments are included for

variation in the distance between the various seismographs and the epicenter of the earthquakes.[18] On the Richter Scale, magnitude is expressed as a dimensionless number from 0.0 to 10.0. For example, a magnitude 5.3 quake might be computed for a moderate earthquake, and a strong earthquake might be rated as magnitude 6.3. Because of the logarithmic basis of the scale, each whole number increase in magnitude represents a tenfold increase in measured amplitude; as an estimate of energy, each whole number step in the magnitude scale corresponds to the release of about 31 times more energy than the amount associated with the preceding whole number value.

Even though the original calculations developed by Richter to estimate earthquake magnitude have gone out of favor, newer formulae still retain the familiar Richter reporting methodology as shown in Table 5.34. Currently, the moment magnitude scale (MMS) is the primary reporting method used by the U.S. Geological Survey.[19]

Table 5.34: The Richter Scale

Richter Magnitudes	Earthquake Effects
Less than 3.5	Generally not felt but recorded.
3.5–5.4	Often felt, but rarely causes damage.
Under 6.0	At most, slight damage to well-designed buildings. Can cause major damage to poorly constructed buildings over small regions.
6.1–6.9	Can be destructive in areas up to about 100 kilometers across where people live.
7.0–7.9	Major earthquake. Can cause serious damage over larger areas.
8 or greater	Great earthquake. Can cause serious damage in areas several hundred kilometers across.

The effect of an earthquake on people and structures on the Earth's surface is called the intensity. The intensity scale consists of a series of certain key responses such as people awakening, movement of furniture, damage to chimneys, and finally, total destruction. Although numerous intensity scales have been developed in the last several hundred years to evaluate the effects of earthquakes, the one currently used in the United States is the Modified Mercalli Intensity Scale (**Table 5.35**). It was developed in 1931 by American seismologists Harry Wood and Frank Neumann. This scale, composed of 12 increasing levels of intensity that range from imperceptible shaking to catastrophic destruction, is designated by Roman numerals as shown in Table 5.35. The scale does not have a mathematical basis; instead, it is an arbitrary ranking based on observed effects.[20]

[18] USGS, accessed online at: https://earthquake.usgs.gov/learn/glossary/?term%3Drichter%2520scale&sa=D&source=docs&ust=1645377818946701&usg=AOvVaw08xBaSg2rM9bLm1i43j_D5

[19] Virginia Department of Energy, accessed online at: https://energy.virginia.gov/geology/Earthquakes.shtml

[20] USGS, accessed online at: https://www.usgs.gov/natural-hazards/earthquake-hazards/science/modified-mercalli-intensity-scale?qt-science_center_objects=0#qt-science_center_objects

The lower numbers of the intensity scale deal indicate the manner in which people perceive the earthquake. The higher numbers of the scale are based on observed structural damage. Structural engineers usually contribute information for assigning intensity values of VIII or above.

Table 5.35: Modified Mercalli Intensity Scale for Earthquakes

Scale	Intensity	Earthquake Effects	Corresponding Richter Scale Magnitude
I	Instrumental	Detected only on seismographs	
II	Feeble	Some people feel it	<4.2
III	Slight	Felt by people resting; like a truck rumbling by	
IV	Moderate	Felt by people walking	
V	Slightly Strong	Sleepers awake; church bells ring	<4.8
VI	Strong	Trees sway; suspended objects swing; objects fall off shelves	<5.4
VII	Very Strong	Mild alarm; walls crack; plaster falls	<6.1
VIII	Destructive	Moving cars uncontrollable; masonry fractures; poorly constructed buildings damaged	
IX	Ruinous	Some houses collapse; ground cracks; pipes break open	<6.9
X	Disastrous	Ground cracks profusely; many buildings destroyed; liquefaction and landslides widespread	<7.3
XI	Very Disastrous	Most buildings and bridges collapse; roads, railways, pipes and cables destroyed; general triggering of other hazards	<8.1
XII	Catastrophic	Total destruction; trees fall; ground rises and falls in waves	>8.1

Earthquakes in the central and eastern U.S., although less frequent than in the western U.S., are typically felt over a much broader region. East of the Rockies, an earthquake can be felt over an area as much as ten times larger than a similar magnitude earthquake on the west coast. A magnitude 4.0 eastern U.S. earthquake typically can be felt at many places as far as 60 miles from where it occurred, and it infrequently causes damage near its source.[21] A magnitude 5.5 eastern U.S. earthquake usually can be felt as far as 300 miles from where it occurred, and sometimes causes damage out to 25 miles.

Hazard History

Earthquakes everywhere occur on faults within bedrock, usually several miles deep. Most bedrock beneath central Virginia was assembled as continents collided to form a supercontinent about 500-300 million years ago, raising the Appalachian Mountains. Most

[21] Virginia Tech Global Seismological Lab, accessed online at: http://www.magma.geos.vt.edu/vtso/cvsz.html

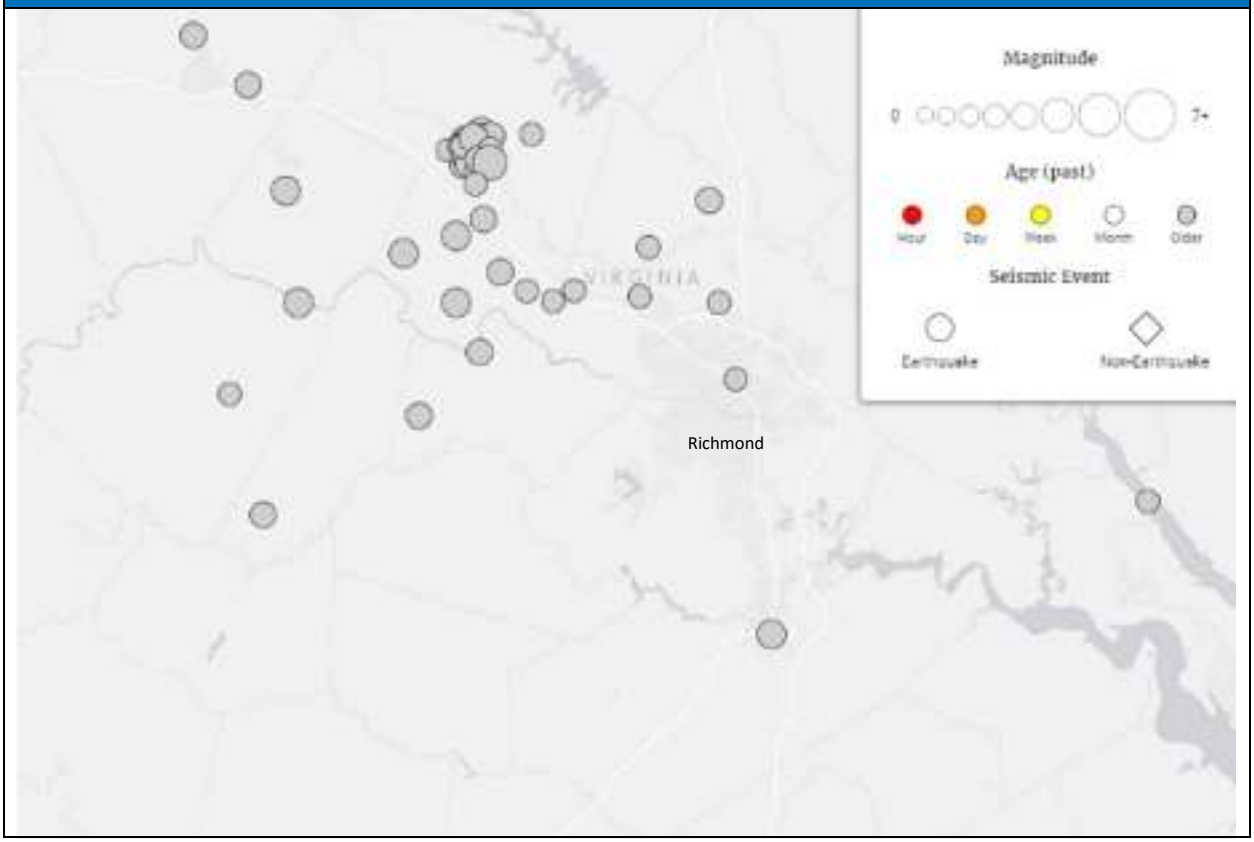
of the rest of the bedrock formed when the supercontinent rifted apart about 200 million years ago to form what are now the northeastern U.S., the Atlantic Ocean, and Europe.[22]

At well-studied plate boundaries like the San Andreas fault system in California, scientists can often determine the name of the specific fault that is responsible for an earthquake. In contrast, east of the Rocky Mountains this is rarely the case. The Central Virginia Seismic Zone is far from the nearest plate boundary, which are in the center of the Atlantic Ocean. The seismic zone is laced with known faults, but numerous smaller or deeply buried faults remain undetected. Even the known faults are poorly located at earthquake depths. Accordingly, few, if any, earthquakes in the seismic zone can be linked to named faults. It is difficult to determine if a known fault is still active and could slip and cause an earthquake. As in most other areas east of the Rockies, the best guide to earthquake hazards in the seismic zone is the earthquakes themselves.[23]

Earthquake activity in Virginia has generally been, with a few exceptions, low-magnitude but persistent. The first documented earthquake in Virginia took place in 1774 near Petersburg.[24] Virginia has had more than 160 earthquakes since 1977, of which 16% were felt. This averages to approximately one earthquake every month, with two felt each year.[25] **Figure 5.34** shows the significant earthquakes (magnitude greater than 2.5) that have impacted Virginia from 1774 to 2020. There have been eight noteworthy earthquakes centered in the region; however, surface faulting that generated these earthquakes remain unidentified.

[22] Virginia Tech Global Seismology Lab, accessed online at: http://www.magma.geos.vt.edu/vtso/cvsz.html
[23] Virginia Tech Global Seismology Lab, accessed online at: http://www.magma.geos.vt.edu/vtso/cvsz.html
[24] Virginia Department of Energy, accessed online at: https://energy.virginia.gov/geology/Earthquakes.shtml
[25] Virginia Tech Global Seismology Lab, accessed online at: http://www.geol.vt.edu/outreach/vtso/quake.html

Figure 5.34: Earthquake History in the Greater Richmond-Crater Region, 1774 - 2020



Source: USGS Earthquake Mapping Tool, accessed online 2021 at: https://earthquake.usgs177.gov/earthquakes/

Of the eight noteworthy earthquakes that have been recorded in the region, one was centered near the City of Petersburg, two near Goochland County, and one near Powhatan County. Historical earthquake occurrences, which have affected the region and are summarized in the following paragraphs, are based on available records from the Virginia Tech Seismological Observatory, Seismicity of the United States (USGS Paper 1527), the U.S. Geological Survey Earthquakes in Virginia and Vicinity 1774 – 2004 (USGS Open File Report 2006-1017), and the Virginia Department of Energy (DGMR Publication 185).[26]

The first major historical record for an earthquake (estimated Magnitude 4.5) occurred on February 21, 1774, near the City of Petersburg and Prince George County. The earthquake was felt in much of Virginia and southward into North Carolina. Many houses were moved considerably off their foundations in the cities of Petersburg and Blandford. The shock was described as "severe" in Richmond and terrified residents about 50 miles north in the City

[26] Virginia Department of Energy, accessed online at: https://energy.virginia.gov/geology/documents/FEMAHistoryReport.zip

of Fredericksburg but caused no damage in those areas. The total felt area covered about 57,900 square miles.

On August 27, 1833, an earthquake near Goochland County (estimated Magnitude 4.5) was felt from Norfolk to Lexington and from Baltimore, Maryland, to Raleigh, North Carolina – about 52,110 square miles. In Charlottesville, Fredericksburg, Lynchburg, and Norfolk, windows rattled violently, loose objects shook, and walls of buildings were visibly agitated.

Although it did not occur within the region, an earthquake (estimated Magnitude 4.3) was observed on November 2, 1852, with the epicenter in Buckingham County, Virginia. Chimney damage was reported in Buckingham and the earthquake was reported to be the strongest in Fredericksburg and Richmond, and the Town of Scottsville.

Centered near Goochland County, a series of shocks (estimated Magnitude 4.8) in quick succession were felt throughout the eastern two-thirds of Virginia and a portion of North Carolina on December 23, 1875. The highest intensities from this earthquake occurred mainly in towns near the James River shoreline in Goochland and Powhatan Counties, and in Louisa County. In Richmond and Henrico Counties, the most severe damage was sustained in the downtown business and residential areas adjacent to the James River. Damage included bricks knocked from chimneys, fallen plaster, an overturned stove, and several broken windows. Waves "suddenly rose several feet" at the James River dock in Richmond, causing boats to "part their cables" and drift below the wharf. At Manakin, about 20 kilometers west of Richmond, shingles were shaken from a roof and many lamps and chimneys were broken. The total felt area was about 50,180 square miles.

On February 11, 1907, an earthquake reaching magnitude 4.0 on the Richter Scale affected the community of Arvonia in Buckingham County. The earthquake was also felt strongly from Powhatan to Albemarle Counties.

The December 9, 2003, an earthquake occurred in Powhatan County (estimated Magnitude 4.5). The quake was a complex event consisting of two sub-events occurring 12 seconds apart and causing slight damage nearest the epicenter. The quakes were felt in much of Maryland and Virginia; in north-central North Carolina; and in a few areas of Delaware, New Jersey, New York, Pennsylvania, and West Virginia.

A 5.8 magnitude quake centered near Mineral, Virginia (Louisa County) occurred at 1:51 pm EDT on August 23, 2011. The earthquake was reportedly felt as far north as Canada, as far south as Georgia and as far west as Chicago. Effects of the earthquake were reported to the USGS through its online survey[27] from over 8,434 zip codes and ranged from weak intensity to very strong. In terms of damage, particularly hard-hit were brick and unreinforced structures and infrastructure near the quake's epicenter. In addition to cracks and buckling, some buildings were knocked off of their foundations. Minor injuries were reported as a result of the damage and debris. The earthquake forced the North Anna Power Station nuclear power plant offline pending an all-clear from a Nuclear Regulatory Commission review. Aftershocks of a lesser magnitude continued to plague the area for

[27] USGS, accessed online at: https://earthquake.usgs.gov/data/dyfi/

several weeks after the event. The strongest aftershock measured 4.5 and occurred on August 25 at 1:08 am EDT. Louisa County received over $6.6 million in individual assistance as well as $1.6 million in low-interest loans to individuals and businesses through the Small Business Administration (source: *2018 Commonwealth of Virginia Hazard Mitigation Plan*).

A magnitude 3.1 quake occurred May 22, 2014, 3.1 to 15 kilometers east-northeast of Cumberland, in Powhatan County. Reports of the quake were received by over 2,000 people in the central Virginia area. The earthquake depth was 9.0 kilometers.

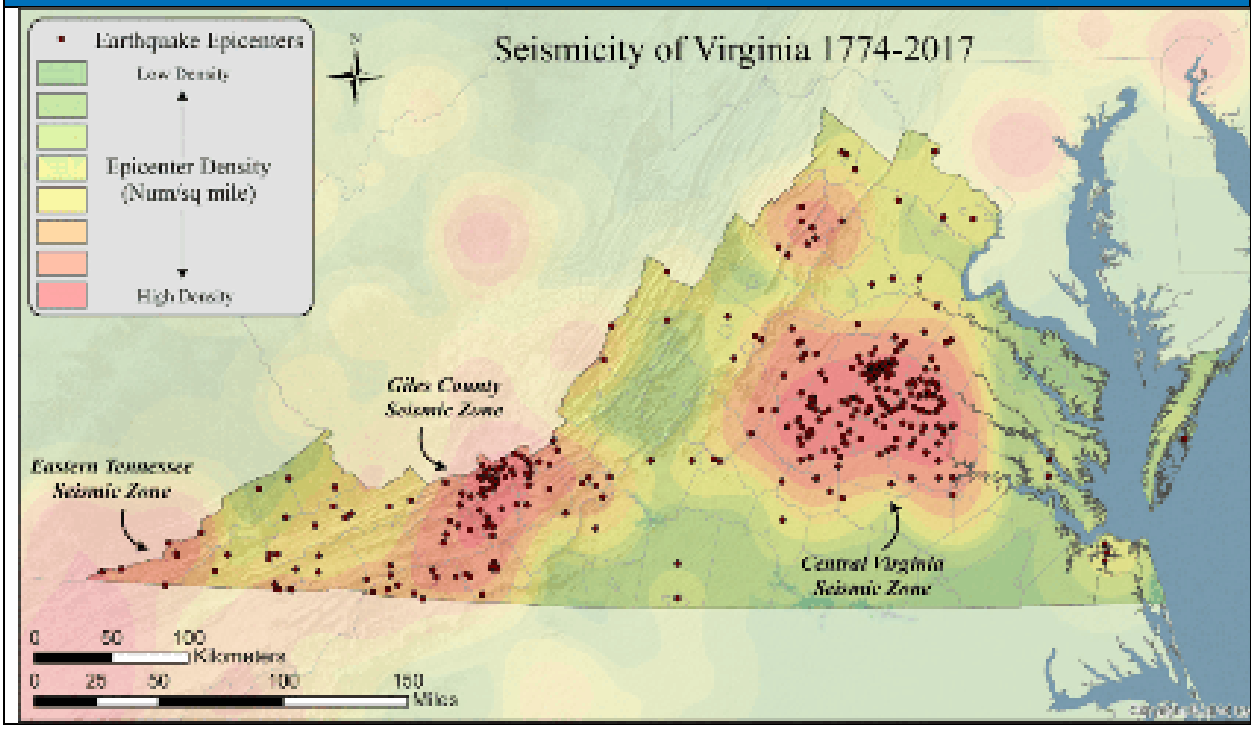
Vulnerability Analysis

Earthquakes are high-impact, low-probability events. With the few historical incidents throughout the region and limited data, the probability is low. **Figure 5.36** show the relative seismic hazard throughout the study area, highlighting the Central Virginia Seismic Zone.

Since the 2011 earthquake in Louisa County, Virginia, scientists have worked to create an all-inclusive database of the state's fault lines based on all data available, particularly earthquake epicenters. The Central Virginia Seismic Zone coincides with much of the northern region of the Richmond-Crater study area. The 2011 earthquake is the largest historical earthquake within the Central Virginia Seismic Zone and the largest earthquake to have occurred in Virginia in historical time. [28]

[28] Kelly, Wendy; A. Witt; M. Heller; and M. Chapman. August 2017. Virginia Division of Geology and Mineral Resources Publication 185 - Seismic History Of Virginia, August 2017.

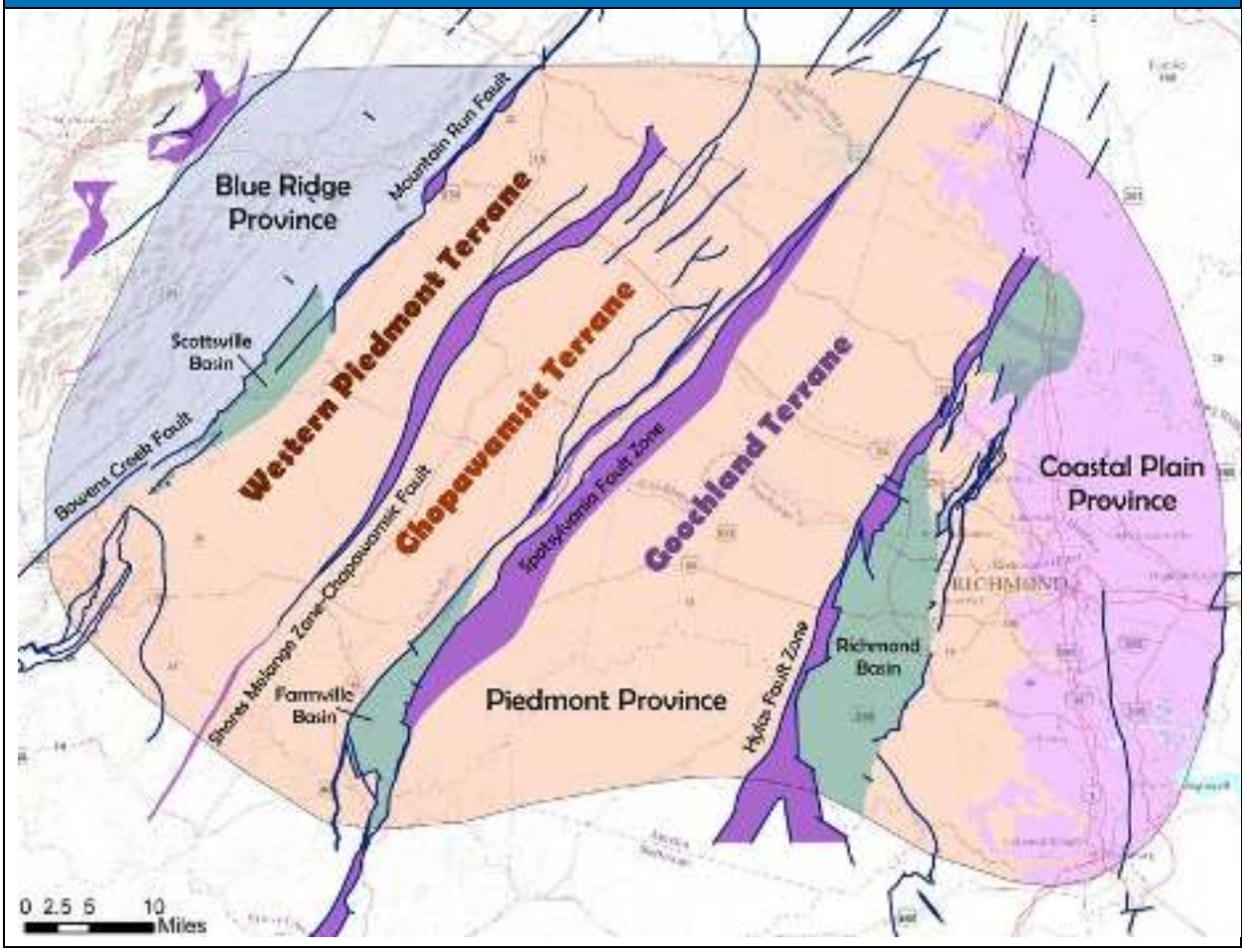
Figure 5.36: Seismicity of Virginia, 1774-2017



Source: Kelly, Wendy; A. Witt; M. Heller; and M. Chapman. August 2017. Virginia Division of Geology and Mineral Resources Publication 185 - Seismic History Of Virginia, August 2017.

Fault lines and zones in the study area are delineated in **Figure 5.37**, which shows the major faults (navy blue lines running southwest to northeast) and tectonic terranes within the Central Virginia Seismic Zone. Note the fault lines southwest and southeast of Richmond.

Figure 5.37: Major Faults and Tectonic Terranes within the Central Virginia Seismic Zone



Source: Kelly, Wendy; A. Witt; M. Heller; and M. Chapman. August 2017. Virginia Division of Geology and Mineral Resources Publication 185 - Seismic History Of Virginia, August 2017.

The Hazus earthquake model estimates damages and loss to buildings, lifelines, and essential facilities from customized-scenario and probabilistic earthquakes. Hazus was used to generate damage and loss estimates for the probabilistic ground motions associated with each of eight return periods (100-, 250-, 500-, 750-, 1,000-, 2,000-, and 2,500-year return periods), and then annualized to show the relative risk to each community in the study area.

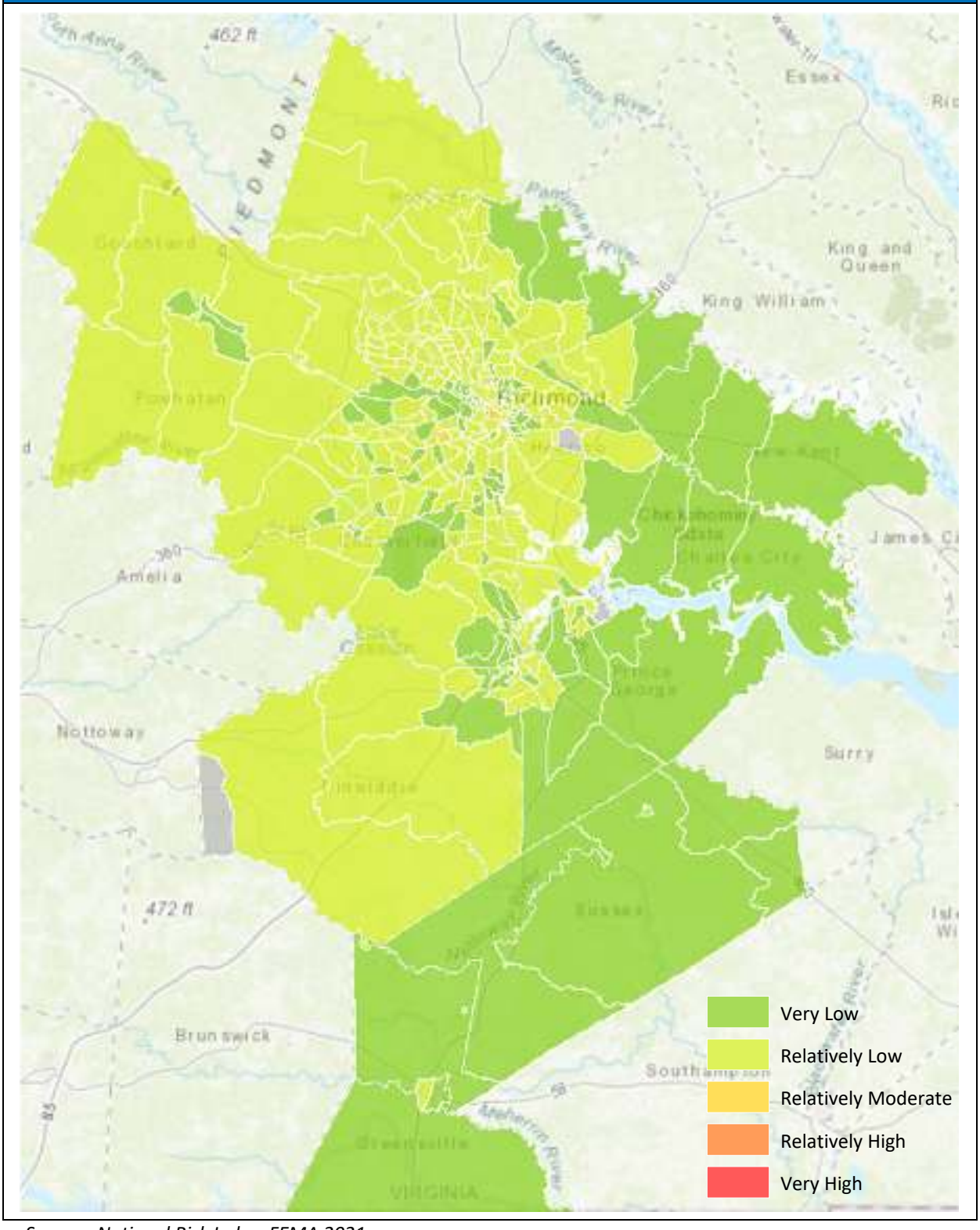
Table 5.36 shows results from the Hazus analysis for the jurisdictions in the region. These figures include direct economic losses for buildings, including non-structural damage, contents/inventory, and income losses from relocation, lost wages and lost rental income. Based on this analysis, Henrico County experiences the greatest losses on an annualized basis in the region, followed closely by Chesterfield County and the City of Richmond.

Table 5.36: Annualized Earthquake Losses	
Jurisdiction	**Annualized Total Damages**
Charles City County	$10,000
Chesterfield County	$1,032,000
City of Colonial Heights	$32,000
Dinwiddie County (inc. Town of McKenney)	$45,000
City of Emporia	$8,000
Goochland County	$132,000
Greensville County (inc. Town of Jarratt)	$9,000
Hanover County (inc. Town of Ashland)	$415,000
Henrico County	$1,384,000
City of Hopewell	$37,000
New Kent County	$27,000
City of Petersburg	$74,000
Powhatan County	$136,000
Prince George County	$46,000
City of Richmond	$763,000
Surry County (inc. Town of Surry)	$6,000
Sussex County (inc. Towns of Stony Creek, Wakefield, Waverly)	$11,000
Total	**$4,167,000**

Social Vulnerability

The NRI data for social vulnerability to earthquake are shown in **Figure 5.38**. The map reflects the history of earthquakes in Virginia, with few damages and slightly higher overall vulnerability near the Central Virginia Seismic Zone. There are two areas of relatively moderate social vulnerability in Richmond: the first is the downtown area where 195 and 95 converge; and the other is centered on Carnation Street, north of Midlothian Park and south of Jahnke Road.

Figure 5.38: National Risk Index Rating, Earthquake



Source: National Risk Index, FEMA 2021

Note: The Town of Surry has very low social vulnerability for earthquake.

Future Vulnerability, Land Use and Climate Change

While scientists have observed some correlation between climate change on rising temperatures, melting glaciers and isostatic rebound, a causal connection to subsequent earthquakes is less documented, especially for the eastern United States. Earthquakes and weather have a few *possible* correlations that are still under investigation and should be considered more theoretical than scientific:

1. glacier melt and isostatic rebound causing earthquakes;

2. changing surface stress loads from increased surface water causing microseismicity or tiny earthquakes with magnitudes less than zero, and changes in water quantity stored in large dams inducing seismicity;

3. longer duration droughts and/or groundwater withdrawals that change stress loads on the Earth's crust causing earthquakes; and,

4. injection wells that lubricate faults and induce seismicity.[29]

While it is conceivable that a massive earthquake in the study area or in a large metropolitan area nearby, such as Hampton Roads or northern Virginia, could cause a mass evacuation if damage is severe, this likelihood is not supported by the history of earthquake damage in these regions of Virginia.

5.13 Landslides

Hazard Profile

A landslide is the downslope transport of a mass of soil and rock material and refers to a number of different varieties of ground movement landforms and processes. The primary driving force for a landslide is gravity, but other factors may contribute to the failure of a slope. Landslides are usually triggered by heavy rainfall, rapid snow melt, oversteepening of slopes by stream incision, or earthquakes, while certain man-made changes to the land, such as slope modification or drainage alteration, can greatly increase the likelihood of landslides. Sometimes a landslide may move slowly down a slope, but often the movement can occur without warning and be extremely fast. Soil creep and slumping cause property damage gradually, whereas rockslides and debris flows can sweep away people and property instantaneously. In the United States, landslides annually cause up to $2 billion in damages and take between twenty-five and fifty lives.[30]

Landslides occur in many manifestations and are usually classified according to the type of material involved and the mode of downslope movement. The material can range from loose

[29] Buis, Alan. NASA: Global Climate Change: Vital Signs of the Planet. *Can Climate Affect Earthquakes, or are the Connections Shaky?* Feature dated October 29, 2019, accessed online at: https://climate.nasa.gov/news/2926/can-climate-affect-earthquakes-or-are-the-connections-shaky/

[30] Virginia Department of Energy, accessed online at: https://energy.virginia.gov/geology/Landslides.shtml&sa=D&source=docs&ust=1645377818936537&usg=AOvVaw2DI9rmYtgmQSFtoaok6Sgl

earth to blocks of solid rock. These materials may then move downslope by falling, sliding or flowing. The following are some of the more important types of mass movement:

Rockfalls entail large blocks of bedrock breaking off a cliff face and tumbling downslope;

Rockslides occur when a detached section of bedrock slides down an inclined surface, frequently along a bedding plane;

Earthslides involve masses of soil moving down a slip face, usually on top of the bedrock;

Creep is the slow, continuous, imperceptible downslope movement of soil and rock particles;

Rotational Slides or Slumps result from the rotation of a cohesive unit of soil or rock down a slip surface, leaving a curved scarp; and

Debris flows develop on steep slopes as a result of heavy rainfall that saturates the soil, which under the extra weight and lubrication breaks loose and becomes a slurry that takes everything with it, including large trees and houses. Channeled debris flows can reach speeds approaching a hundred miles an hour and strike without warning.

Landslides are most common in the mountainous terrain of Virginia because of the presence of steep slopes and highly fractured bedrock over shallow soils. The lower-relief areas of the Piedmont and Coastal Plain also have landslides, but they are often smaller and generated by human disturbance, such as making an oversteepened road cut. The most disastrous landslide events have been associated with heavy rainfall along the steep slopes of the Blue Ridge Mountains and the Appalachians. Areas that are prone to mass movement include areas where landslides have occurred in the past; steep slopes with an angle greater than 30 degrees; and oversteepened cuts and fills, particularly due to home and road building. Research in North Carolina has revealed that about fifty-six percent of recent landslides happened on slopes that had been altered in some way by development.

Landslides are capable of destroying buildings, rupturing gas, water, and sewer mains, and knocking out power and telephone lines while blocking transportation routes. Urban development can increase the damages caused by a landslide. Damages sustained by roads and highways during a landslide can result in long-term loss of use of certain transportation routes and contribute to increased traffic and emergency response times in the affected region. The soil movement that occurs during a landslide can destabilize structural supports for pipelines potentially resulting in pipeline ruptures and decreased or loss of service in a region.

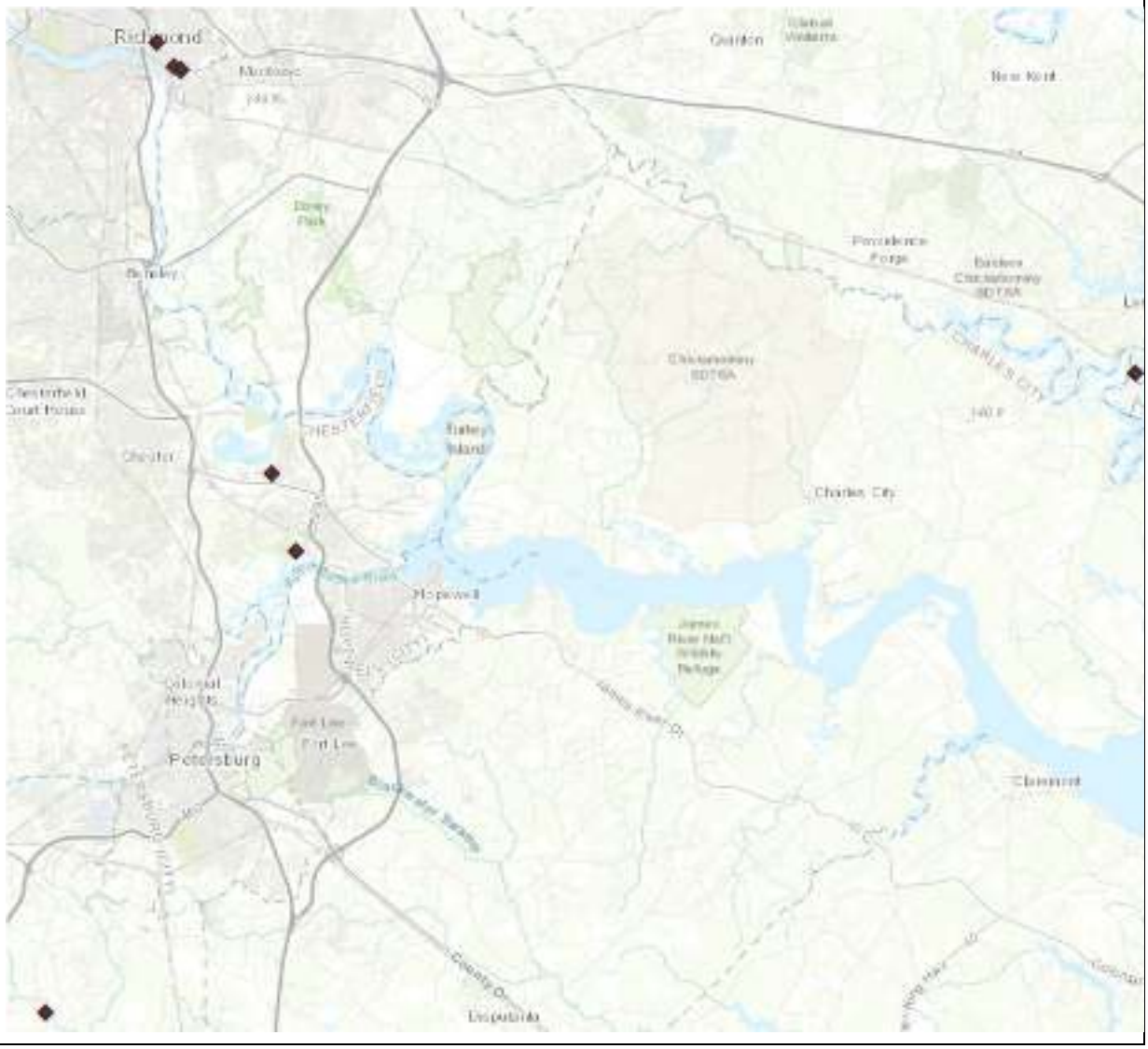
Magnitude or Severity

The severity of a landslide is dependent on many factors including the slope and width of the area involved, the speed of the earth movement, and any structures or infrastructure directly in the path of the slide. Impacts of a landslide can range from a minor inconvenience to a life-threatening situation when automobiles and buildings are involved.

Hazard History

Analysis of the hazards in the Richmond-Crater study area is limited by the availability of data and reporting of incidents; however, scientists at the Virginia Department of Energy maintain a statewide database of landslide locations. **Figure 5.39** shows the locations of landslides since 2004 on a map of the southeastern part of the region where the landslides occurred.

Figure 5.39: Locations of Recorded Landslides, 2004 – 2021



Source: Virginia Department of Energy, 2021

Table 5.37 provides additional detail on the landslides shown above. While details are preliminary, State geologists suggest that evidence shows in the Richmond-Crater and Virginia Peninsula regions, there is a higher incidence of landslide initiation near the

contact between two geological formations, the Eastover and the Yorktown Formations, to pervasive geological units in the Virginia Coastal Plain. Slopes can be further destabilized due to excess runoff from development, including storm water drains and gutters.

Table 5.37: Landslides in Richmond-Crater Area, 2004 - 2021

Jurisdiction	Notes	Movement Date	Noted Impacts, If Any
City of Richmond	Chimborazo Hill Landslide – Translational debris slide was active and very rapid (>3 meters/minute) when observed. May have been active as early as the 1900's; more tension cracks evident in 2011 photography. Groundwater was present soil & bedrock seep.	8/30/2004	Home condemned, park and road severely damaged.
	 Chimborazo Hill Landslide photograph, *Virginia Minerals,* VA DMME, Vol. 48, November 2005.		
	This debris flow was rapid (>1.8 meters/hour).	8/30/2004	None reported.
	This debris slide was rapid (>1.8 meters/hour).	8/30/2004	None reported.
	Jefferson Park Landslide	8/30/2004	Covered Marshall Street
Chesterfield County	Homes were built on sand fill used to level a steep bluff that was once the edge of an open cut mine. Landslide is currently inactive. Debris slide was rotational on a cut slope.	1998 and 2016	Landslide is undermining foundations of houses.
	Large rotational slide in sandy sediment. Lower portions have scarping of up to 6 feet. Back rotated trees in slide. Slide likely undermined by stream. Sliding surface may be 1-3 foot thick clay lens within Cretaceous. Across from slide, clay lens is exposed in bank and groundwater noted at base of clay.	Not available	Damaged a walking trail.
Dinwiddie County	This debris slide was rotational.	Not available	Unverified

New Kent County	Claytor Landslide - homeowner says movement started during Hurricane Irene (2011). Headscarp is 5 feet from porch steps, two 10-foot sections of seawall at base of slope have been either toppled or covered by sediment from previous landslides. This is a series of concave erosional scarps along the riverbank.	2011 and March 5, 2019	Most recent scarp is threatening house.
	 Translational debris slide in New Kent County, VA DMME, 2021.		

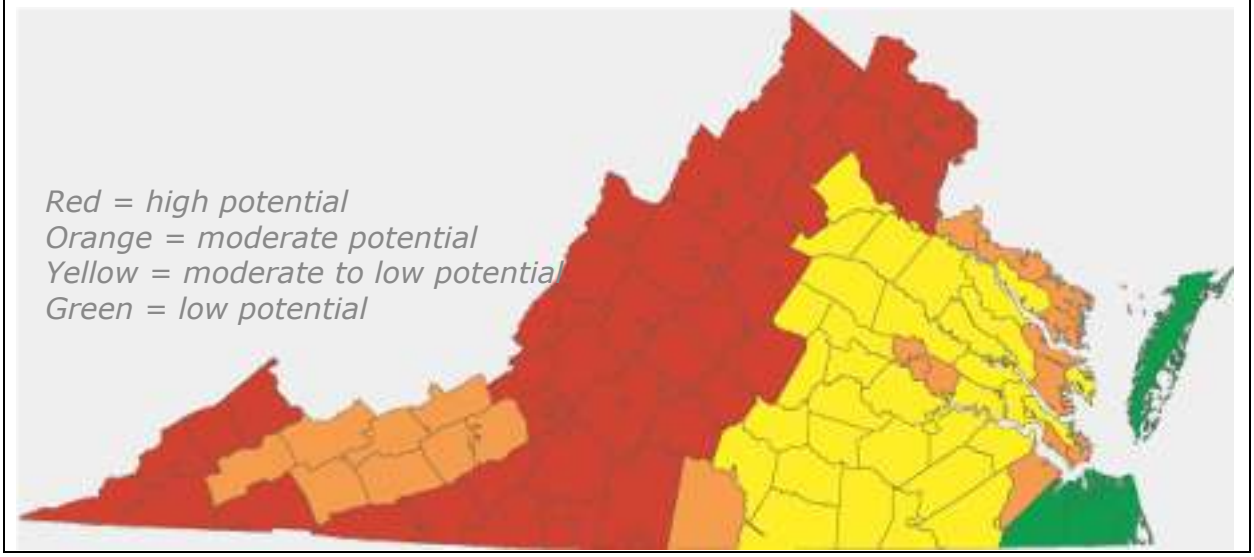
Source: Virginia Department of Energy, 2021

Local officials from the City of Richmond reported that a number of areas in the city were affected by landslides triggered by the rains of Tropical Storm Gaston in August 2004. The Church Hill and Riverside Drive sections of Richmond experienced 14 inches of rain in eight hours. Church Hill features unstable geologic formations which were destabilized by the heavy rainfall. One home in Church Hill was severely impacted by the Chimborazo Hill Landslide and was ultimately condemned and purchased by the City. Nearby tennis courts were also impacted. The Riverside Drive area features steep embankments along the south shore of the James River and abandoned granite quarries. During Gaston localized landslides also occurred near Forest Hill Park.

Vulnerability Analysis

Landslide events in the region are considered a low-probability event, with very localized impacts when and where they occur. The Virginia Department of Energy provided the map in **Figure 5.40** that shows counties in Virginia and related susceptibility to landslides. Because damages are rarely quantified or are extremely limited in nature, average annual damages from landslides are not very useful. Occurrence intervals are similarly flawed because of the short period of record. The Commonwealth's highest regional vulnerability is in the mountainous region west of this plan's study area. With the exception of the City of Richmond and Henrico County, the Richmond-Crater region is classified as having moderate to low potential for landslide. Richmond and Henrico County are classified as having moderate potential.

Figure 5.40: Susceptibility to Landslides by Virginia County/City

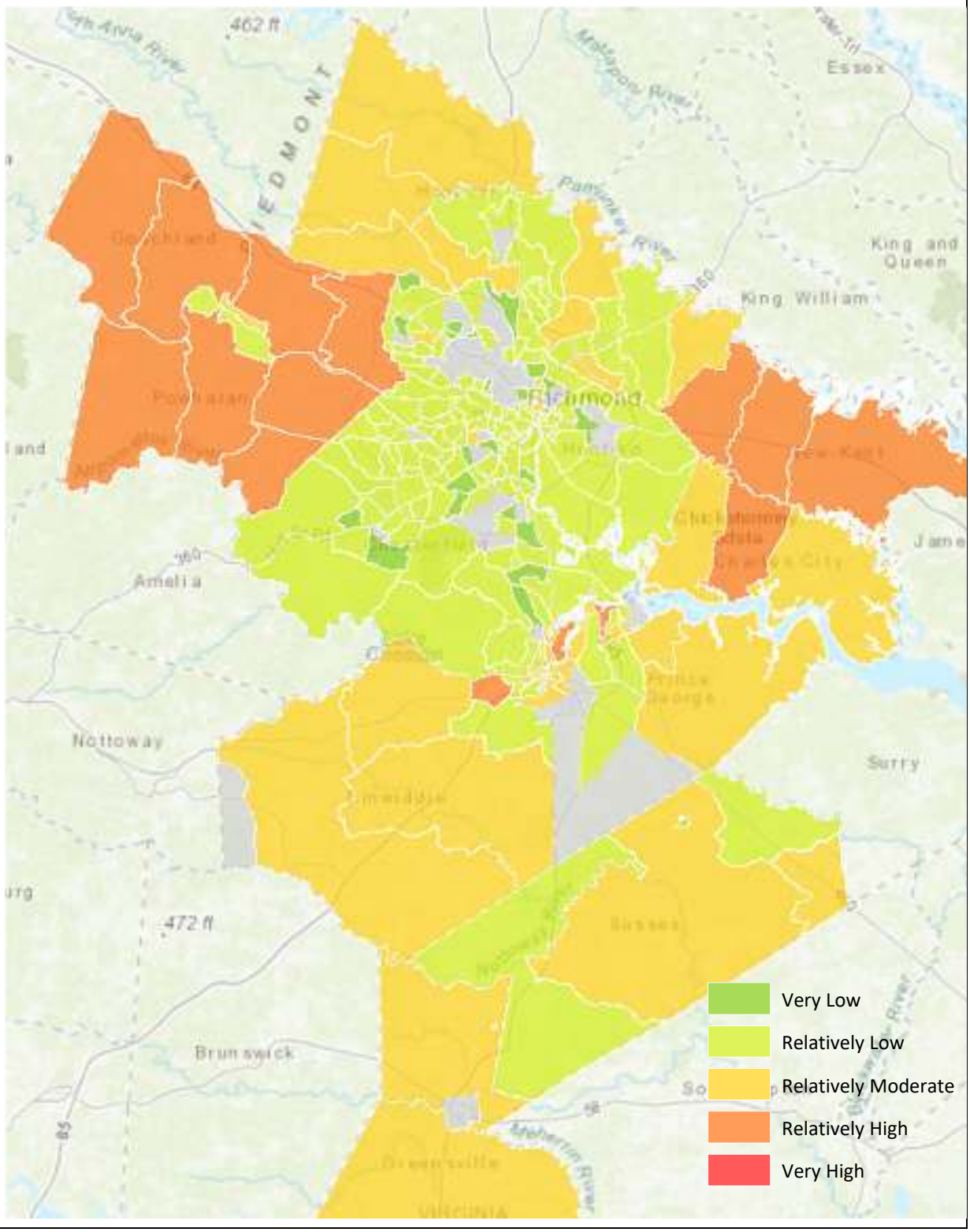


Source: Virginia Department of Energy, provided 2021

Social Vulnerability

The NRI data for social vulnerability to landslides are shown in **Figure 5.41**. The USGS Landslide Hazard Map was used as an input for hazard susceptibility, creating a raster that classified all of the conterminous United States as having either "some" or "negligible" landslide susceptibility based on slope and relief. This method may not adequately capture the unique geological conditions that are suspected as contributors to landslides in the study region. Nevertheless, the social vulnerability shown in Figure 5.41 is a starting point for discussions regarding factors that could affect a household's vulnerability to landslide.

Figure 5.41: National Risk Index for Landslide



Source: National Risk Index, FEMA 2021

Note: The Town of Surry has relatively moderate social vulnerability for landslide south of Route 10, and relatively high social vulnerability for landslide north of Route 10.

Future Vulnerability, Land Use and Climate Change

As noted in the previous section, landslides have occurred in the City of Richmond following periods of heavy precipitation but have generally been limited in geographic scope and/or damage extent. The primary area of concern noted by city officials is Government Road.

Current building code requirements restrict fill materials used to fill a building site prior to new construction; however, homes built on debris fill, or on oversteepened slopes (such as along a river bluff) may be more vulnerable to landslides in the future, especially on or near slopes near the contact between the Yorktown and Eastover convergence. The Virginia Department of Energy is interested in identifying and mapping at-risk areas in the region.

Climate change has the potential to worsen the risk associated with landslides in the study area. Precipitation patterns are expected to become more intense, prolonged and frequent as a result of a warming climate. There is a risk that these precipitation events could destabilize fragile slopes in the region, leading to more frequent and damaging landslides.

Based on the hazard's history in the region, mass evacuations caused by landslides are not expected.

5.14 Shoreline Erosion

Hazard Profile

Shoreline or coastal erosion is a process whereby large storms, flooding, strong wave action, sea level rise, and human activities, such as inappropriate land use, alterations, and shore protection structures, wear away beaches, banks and bluffs. Erosion undermines banks and can destroys homes, businesses, and public infrastructure.

Magnitude or Severity

The extent or severity of erosion may vary from year to year and is related to a number of factors: composition of the shoreline (rock, sand, clay, marsh, or human-made structures), fetch, orientation to prevailing wind direction, and relative sea level rise. The degree of recession at a particular site may also be dependent upon intensity of the wave action and exposure to tidal currents, character of the sediments and degree of vegetative cover, supply of sand moving along the shoreline, gradient or slope from fastland to shoreline to nearshore bottom.

While coastal erosion can destroy infrastructure like roads, septic tanks, and even structures such as homes and businesses, the most common damage in the Richmond-Crater region is loss of trees, denuded shores, wetland loss and sediment introduced into the Chesapeake Bay system.

While tidal surge events can cause nominal increases in the rate of erosion, large-scale storm events generating an extensive surge will cause a rapid acceleration in coastal erosion rates. Accelerated erosion in areas with no natural or man-made protective features

is more likely to increase severe impacts to infrastructure. Through loss of land and undercutting, infrastructure such as pipelines, piers, roadways, and other structures can be significantly damaged or destroyed.

Hazard History

The shoreline areas of the region are consistently undergoing coastal erosion. However, severe storms that increase wave activity (hurricanes, tropical storms, and nor'easters), sea level rise, and shoreline development can increase both short-term and long-term erosion along the region's shorelines. The banks of the James River have historically experienced varying rates of shoreline erosion from storm events and that change has been studied over time, particularly for Prince George, Charles City and Surry Counties.

The *Prince George County Shoreline Management Plan*[31], prepared by the Virginia Institute of Marine Science (VIMS) at the College of William & Mary in November 2016, breaks the county's portion of the James River into four reaches. Researchers calculated End Point Rate (EPR) by determining the distance between the oldest and most recent shoreline in the data and dividing it by the number of years between them. This method provides an accurate net rate of change over the long term and is relatively easy to apply to most shorelines since it only requires two dates. This method does not, however, use the intervening shorelines so it may not account for changes in accretion or erosion rates that may occur through time. The study documented very low erosion to very low accretion for the four reaches in Prince George County as shown in **Table 5.38**. The shoreline management plan concluded that "nearly 75% of the shoreline in Prince George County can be managed simply by enhancing the riparian buffer or the marsh if present."

The *Charles City County Shoreline Management Plan*[32], similarly prepared by VIMS in February 2015, concluded that "nearly 85% of the county's shoreline could be managed by enhancing the riparian buffer or marsh if present."

VIMS prepared *Shoreline Evolution: Surry County, Virginia James River Shorelines Data Summary Report*[33] in September 2011, which provides rates of shoreline change for the reaches shown in Table 5.38. Hog Island shoreline has the highest rates of documented change in the study area.

While VIMS has collected data regarding shoreline condition for other counties in the study area, they have not calculated rates of shoreline change or prepared shoreline management plans. **Figure 5.42** graphically shows shoreline change data compiled by VIMS for the 1937/38 shoreline, the 2009 shoreline and the 2017 shoreline. Areas showing a significant difference between the shorelines of the past and the present indicate areas of historic erosion. The map viewer online can be used to zoom in on areas of interest at:

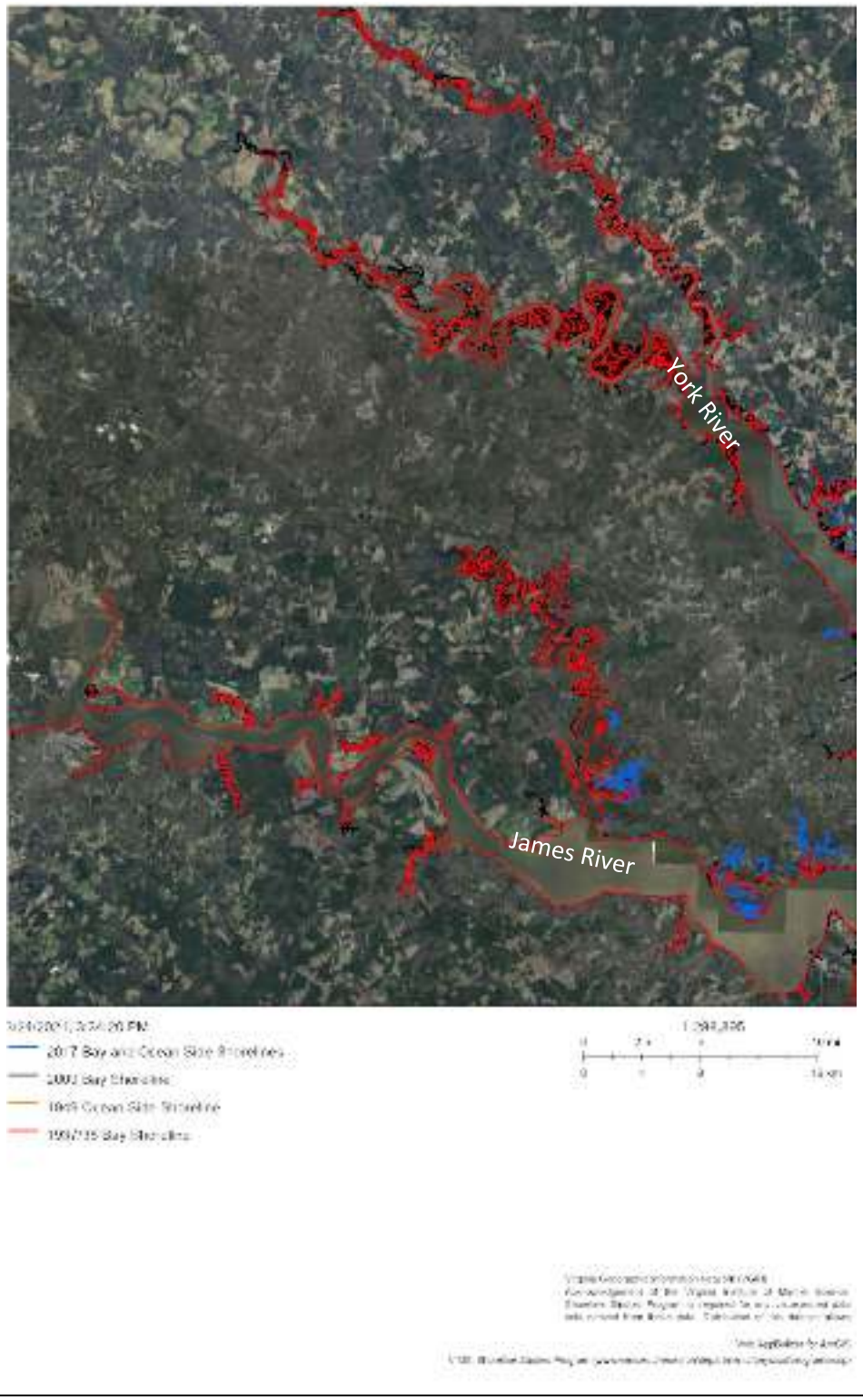
[31] Accessible online at: https://www.vims.edu/research/departments/physical/programs/ssp/_docs/PrinceGeorge_Shore%20Man_2016-lr.pdf
[32] Accessible online at: https://scholarworks.wm.edu/cgi/viewcontent.cgi?article=1255&context=reports
[33] https://scholarworks.wm.edu/cgi/viewcontent.cgi?article=1575&context=reports

https://www.vims.edu/research/departments/physical/programs/ssp/shoreline_evolution/gis_maps/index.php.

Table 5.38: Rates of Shoreline Change in the Richmond-Crater Region (1937 – 2009)			
Jurisdiction	**Reach Name**	**Average End Point Rate of Change (Ft/Yr)**	**Category**
Prince George County	Reach 1: Appomattox River – Harrison Creek to James River	-0.4	Very Low Erosion
	Reach 2: James River – City Point to Coggins Point	0.0	Very Low Accretion
	Reach 3: James River – Coggins Point to Windmill Point	-0.1	Very Low Erosion
	Reach 4: James River – Windmill Point to Kennon Marsh	-0.4	Very Low Erosion
	Reach 5: James River – Kennon Marsh to Upper Chippokes Creek	-0.4	Very Low Erosion
	Reach 6: Upper Chippokes Creek	-0.8	Very Low Erosion
Charles City County	James River Turkey Island Creek to Epps Island	-0.1	Very Low Erosion
	James River Epps Island to Herring Creek	-0.3	Very Low Erosion
	Herring Creek	-0.4	Very Low Erosion
	James River Herring Creek to Queens Creek	-0.5	Very Low Erosion
	Queens Creek	-0.3	Very Low Erosion
	James River Queens Creek to Kennon Creek	-0.4	Very Low Erosion
	James River Kennon Creek to Tomahund Creek	-0.1	Very Low Erosion
	Chickahominy River	-0.6	Very Low Erosion
Surry County	A - Upper Chippokes Creek	-1.4	Not classified
	B - James River	0.0	
	C – James River	-0.1	
	D – James River	-0.6	
	E – Swanns Point	-0.6	
	F – Grays Creek	-0.7	
	G - James River	-0.1	
	H – James River	0.2	

Table 5.38: Rates of Shoreline Change in the Richmond-Crater Region (1937 – 2009)			
Jurisdiction	**Reach Name**	**Average End Point Rate of Change (Ft/Yr)**	**Category**
	I – James River, Cobham Bay	0.0	
	J – James River	-0.4	
	K – James River, Hog Island	-1.8	
	L – James River, Hog Island	-1.2	
	M – James River	-1.1	
	N – Lawnes Creek	-0.7	
Source: VIMS, Center for Coastal Resources Management, Virginia's Coastal Zone Locality Portals and individual Shoreline Management Plans, accessed online at: https://www.vims.edu/ccrm/ccrmp/portals/index.php			

Figure 5.42: Regional Shoreline Change, 1937/38 - 2017



Source: VIMS, 2021

Vulnerability Analysis

Shoreline erosion is likely to continue along some of the region's shorelines, especially in areas that have experienced historic erosion as shown in the figure above. In addition, the condition of the shoreline, wave climate, tide range, storm surge occurrence and rates of sea level rise are all factors in determining vulnerability of shoreline reaches to future erosion. Shorelines without best management practices (BMPs) for protection such as groin fields, healthy marshes, living shorelines or revetments may be more vulnerable, and shorelines with nearby buildings are of highest importance for mitigation. VIMS provides a Shoreline Assessment Mapper that displays site-specific coastal resource data across the coastal plain portion of the study area: http://cmap2.vims.edu/SAM/ShorelineAssessmentMapper.html

VIMS provides a site-specific set of BMPs throughout the study region, specifically for property owners interested in improving their shoreline's resistance to the damaging effects of erosion. The self-guided decision tools are interactive and lead users through questions about shoreline conditions to help choose the most effective erosion control strategies based on surrounding shoreline conditions. Access the main tool online at: https://cmap2.vims.edu/LivingShoreline/DecisionSupportTool/ShorelineDST.html

Social Vulnerability

Any measurement of social vulnerability to shoreline or coastal erosion requires considerably more knowledge about the location of vulnerable structures in each locality. Mitigation Action MH-4 in the 2018 Commonwealth of Virginia Hazard Mitigation Plan proposes VDEM involvement in assisting localities, state agencies, and PDCs with identification of vulnerable structures and application for funding to implement soil stabilization projects to reduce risk to structures or infrastructure from erosion. Future revisions to the plan may be able to more precisely define socially vulnerable areas of the study region for shoreline or coastal erosion using information developed under this or a similar effort.

Future Vulnerability, Land Use and Climate Change

The Commonwealth's Stormwater Management program and enabling statutes help to manage future land use, and reduce stream channel erosion, water pollution, depletion of groundwater resources and more frequent localized flooding to protect property value and natural resources throughout the region.

While waves are the primary force in determining the prevailing shoreline processes in the short-term of months or individual storms, sea level rise is the primary driver of shoreline change over the long-term. Documented sea level rise in the study area is expected to accelerate and will continue to impact shoreline morphology in the future. Shoreline management plans cited above contain recommended projects and conceptual designs for erosion mitigation.

Shoreline or coastal erosion are not expected to contribute to a mass evacuation for the study area or surrounding areas.

5.15 Sinkholes

Hazard Profile

Sinkholes are basin-like, funnel-shaped, or vertical-sided depressions in the land surface. In Virginia, the formation and modification of sinkholes is a natural process in areas underlain by limestone and other soluble rock. In general, sinkholes form by the subsidence of unconsolidated materials or soils into voids created by the dissolution of the underlying soluble bedrock. The rock exposed in a collapsed sinkhole is usually weathered and rounded, but some sinkholes contain freshly broken rock along their steep sides. Freshly broken rock may indicate that the sinkhole has formed by the collapse of a cave (naturally occurring) or a mine (man-made). Where sinkholes and caves have formed by the dissolution of soluble rock, such as limestone, dolomite, and gypsum, surface water is uncommon, and streams may sink into the ground. This type of topography is referred to as karst terrain. In karst terrain, sinkholes are input points where surface water enters the groundwater system. Signs of karst-related sinkhole formation may include:

- Slumping or falling fence posts;
- Wilting vegetation;
- Discolored well water;
- Structural cracks in walls, floors or foundations; and
- Cracks in soil/subsidence.

There are three types of potential problems associated with the existence or formation of sinkholes: subsidence (including catastrophic collapse and damage to infrastructure), flooding, and pollution. Sinkholes are the result of differential subsidence of the land surface. The term subsidence is commonly used to imply a gradual sinking, but it also can refer to an instantaneous or catastrophic collapse.

The location and rate at which sinkholes form can be affected by human activities. Sinkholes result from various mechanisms, including consolidation from loading, consolidation from dewatering, hydraulic compaction, settling as materials are removed by groundwater flow, raveling of materials into a void, and instantaneous collapse into a void. Although the formation of sinkholes is a natural process in karst terrains, man-made modifications to the hydrology of these areas commonly results in the acceleration of this process. The lowering of the water table in unconsolidated materials or soils, especially near the soil-bedrock interface, can result in the draining of voids caused by the dissolution of bedrock or the removal of soil by groundwater flow.

Patterns of pumping from high-yield wells over extended periods of time can result in large, rapid drawdowns of the water table. Where such drawdowns occur in unconsolidated materials, sinkhole collapse can be catastrophic, and subsidence can be extensive over the area subject to the drawdown. Disposal of stormwater in sinkholes or shallow dry wells can induce subsidence. The collapse of soil or rock above a void created by underground mining activities is another mode of sinkhole formation.

Sinkhole flooding can develop from a number of natural conditions, but two man-made conditions are the most common causes in Virginia: the plugging of natural sinkhole drains by sediment, and the overwhelming of natural sinkhole drains by increases in runoff from impermeable surfaces. Inadequate erosion control during construction can result in the plugging of natural sinkhole drains by sediment-laden runoff. The accompanying restriction of subsurface drainage causes an increase in ponding or flooding. Increased runoff from roads, parking lots, and structures is the most significant cause of sinkhole flooding. Much of the precipitation that would have percolated through a vegetated soil cover is introduced rapidly into surface and subsurface (input through sinkholes) drainage networks.

The potential impacts of land subsidence depend on the type of subsidence that occurs (regional or localized, gradual or sudden) and the location in which the subsidence occurs. The impacts of subsidence occurring in non-urban areas are likely to be less damaging than subsidence that occurs in heavily populated locations. The amount of structural damage depends on the type of construction, the structure location and orientation with respect to the subsidence location, and the characteristics of the subsidence event (sag or pit).

Potential impacts from land subsidence could include damage to residential, commercial, and industrial structures; damage to underground and above-ground utilities; damage to transportation infrastructure, including roads, bridges, and railroad tracks; as well as damage to or loss of crops.

Magnitude or Severity

Depending on size, sinkholes can cause damage to bridges, roads, railroads, storm drains, sanitary sewers, canals, levees, and private and public buildings. Karst topography can impact aquifers, introducing the potential for groundwater contamination. The greatest impact occurs when polluted surface waters enter karst aquifers. This problem is universal among all populated areas located in karst terrain. The groundwater problems associated with karst can be accelerated by: (1) expanding urbanization, (2) misuse and improper disposal of environmentally hazardous chemicals, (3) shortage of suitable repositories for toxic waste (both household and industrial), and (4) ineffective public education on waste disposal and the sensitivity of the karstic groundwater system.

Mine collapses have resulted in losses of homes, roadways, utilities, and other infrastructure. Subsidence is often exacerbated by the extensive pumping of groundwater associated with underground mining. Abandoned coal mines occur in Henrico, Chesterfield, and Goochland Counties in the Richmond coal basin.[34]

In addition to areas of karst and underground or abandoned mine sites, aging or crumbling infrastructure is another potential source of sudden sinkholes. This can occur anywhere, and magnitude and severity are difficult to predict because each case is unique and based on the site-specific conditions of the soil, groundwater, infrastructure and other factors.

[34] For additional information, see: https://energy.virginia.gov/coal/mined-land-repurposing/Abandoned-Mine-Land.shtml&sa=D&source=docs&ust=1645377818936136&usg=AOvVaw1d-de58AG4LD6i_gLTSbss

Hazard History

Dramatic collapses of land that swallow homes or persons have happened in Virginia but are generally rare. According to the *2018 Virginia State Hazard Mitigation Plan*, there have been no Federally-declared disasters or NCEI recorded events for karst-related events in the Commonwealth. Land subsidence is very site-specific. A comprehensive long-term record of past events in Virginia is not available; however, several documented occurrences are included in **Table 5.39**.

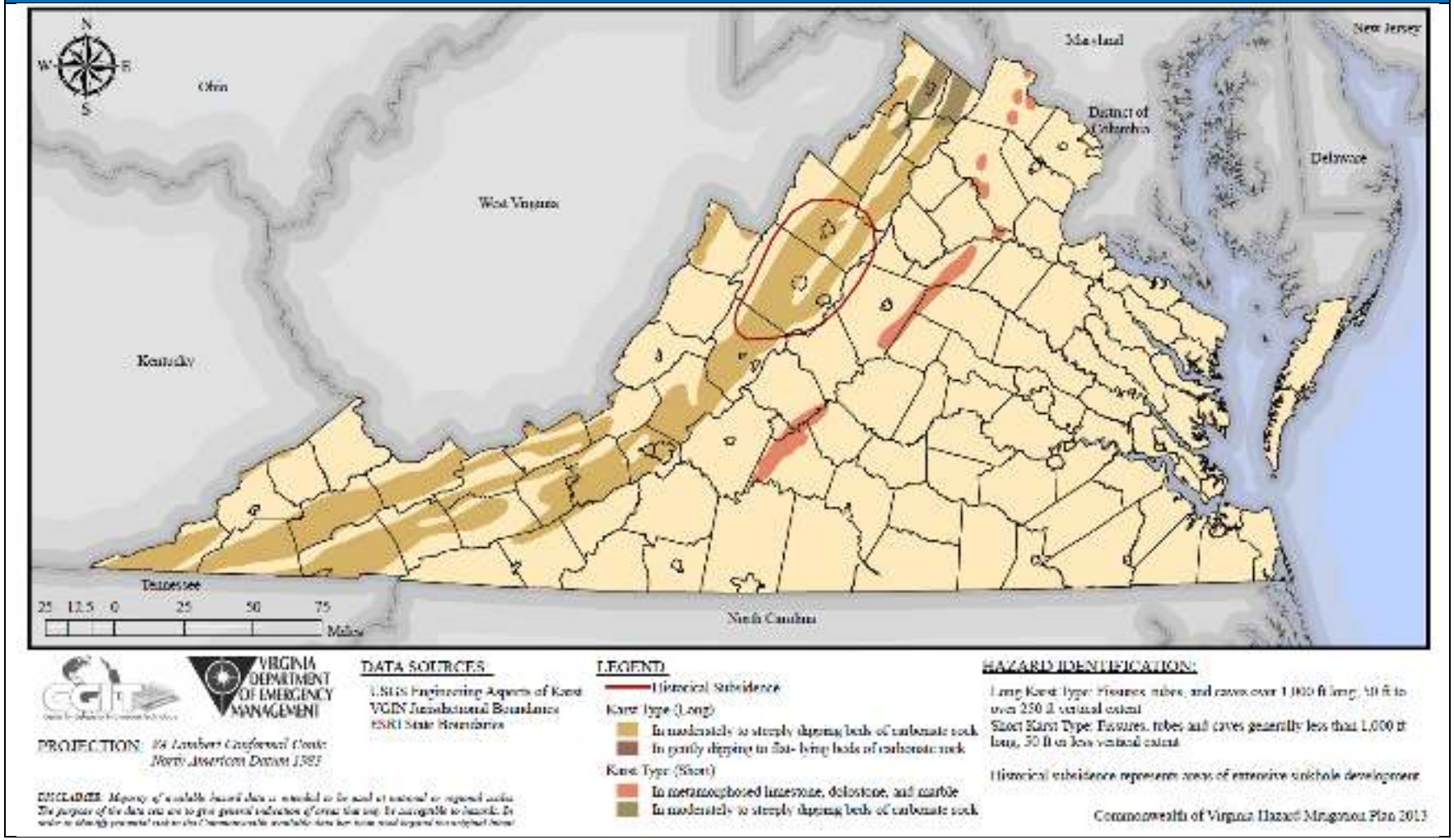
Table 5.39: Notable Sinkholes, 2010 – 2020

Date	Damages
December 2008	**Chesterfield County:** Sinkholes discovered at a home off Coalboro Road were declared an emergency by DMME and suspected to be part of the Richmond Coalfield Mine. Source: NBC12 On Your Side online.
January 4, 2010	**City of Richmond:** The ramp from I-95 North to Broad Street in downtown Richmond was closed because of a sinkhole. Reports say that what started as a pothole quickly became a gaping hole in which the ground collapsed, with about 5 feet of earth underneath it washed away. Source: WWBT-TV NBC 12
August 2010	**Chesterfield County:** Sinkholes in the Scottingham neighborhood were reported around storm drain infrastructure. Source: WWBT-TV NBC 12
March 2011	**City of Richmond:** A sinkhole closed the intersection of Grove and Stafford Avenues in Richmond. Source: *Richmond Times-Dispatch*
September 5, 2012	**Chesterfield County:** VDOT closed part of State Route 10 near Rivers Bend for an extended period because of a sinkhole. Source: *Richmond Times-Dispatch* online
April 17, 2017	**Henrico County:** A sinkhole on a baseball field near Holman Middle School in Glen Allen caused the field to be closed for repairs for a short time. Source: WRIC 8News online
~ January 2018	**Henrico County:** Sinkhole opened up and slowly increased in size, behind a new residential structure. Sinkhole had standing water after precipitation. Source: WTVR Ch 6 online.
June 2018	**Richmond:** Sinkholes reported at Hull & 19th St, 35th & East Marshall St, and North 22nd St (utility issue). Source: WRIC news online.
May 7, 2019	**Henrico County:** A deep sinkhole opened in a residential backyard, threatening the oil tank and structure. Water could be heard at the bottom of the hole. County speculated it could be an abandoned septic system. Source: WTVR CBS 6 online.
September 2019	**Henrico County:** A family was forced to move out of their condo when a sinkhole opened up and threatened to collapse the building's foundation. Source: https://independentamericancommunities.com/2019/09/17/no-word-on-what-caused-hole-beneath-henrico-county-condo/
October 21, 2019	**Henrico County:** A water main break caused a sinkhole to form that covered an entire lane of unspecified roadway. Source: WBAL TV11 online.

Vulnerability Analysis

In Virginia, the principal area affected by sinkholes is the Valley and Ridge province, an extensive karst terrain underlain by limestone and dolomite, but the narrow marble belts in the Piedmont and some shelly beds in the Coastal Plain are also pocked with sinkholes. A majority of the karst regions in Virginia follow Interstate-81, as seen in **Figure 5.43**.

Figure 5.43: Karst Areas in the Commonwealth of Virginia



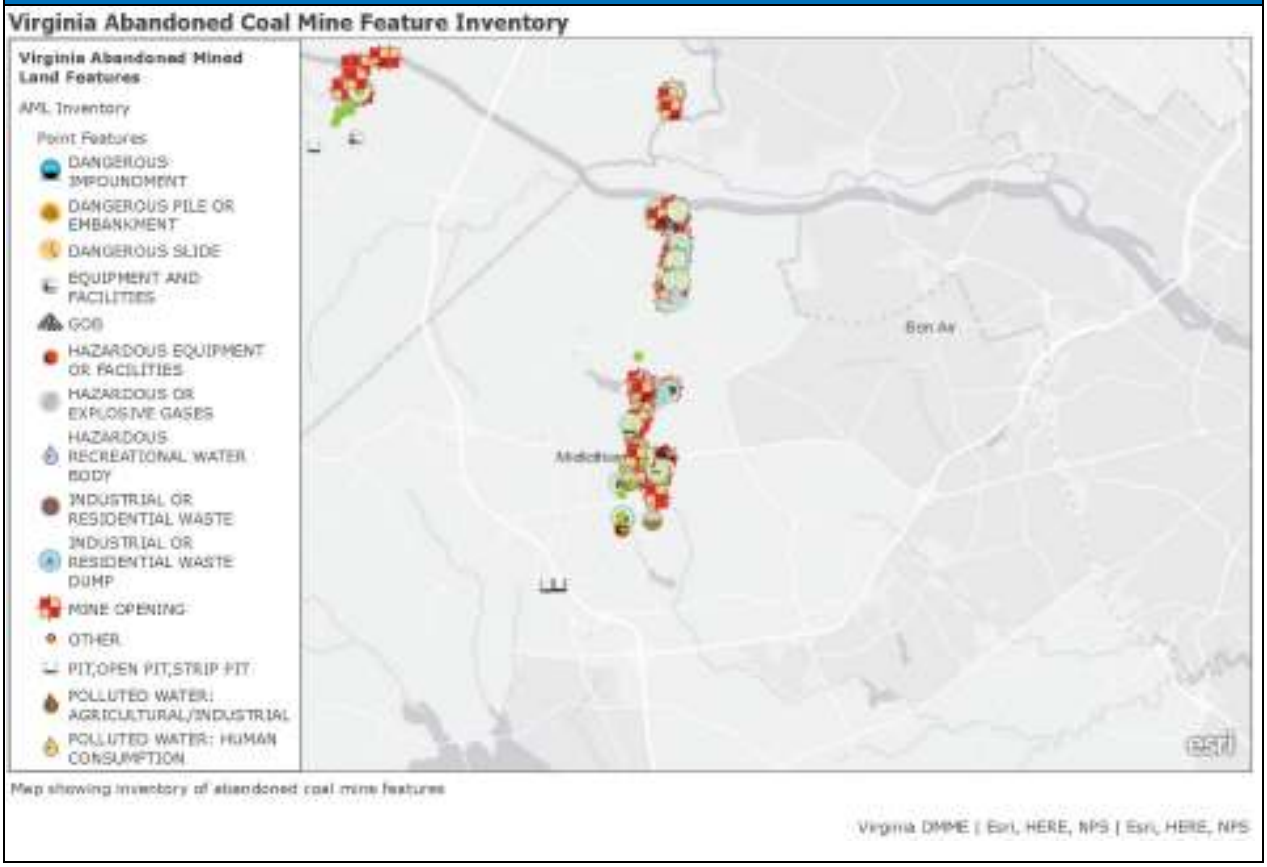
Source: 2013 Virginia State Hazard Mitigation Plan

Abandoned coal mines are present in the Richmond-Crater region and, as stated previously, areas over underground mine workings are susceptible to sinkhole formation. Maps of abandoned coal mine features in the region are shown in **Figures 5.44a through 5.44c,** courtesy of the Virginia Department of Energy. For site specific information, go to: https://vadmme.maps.arcgis.com/home/index.html.

Figure 5.44a: Abandoned Coal Mine Features, James River Northwest of Richmond

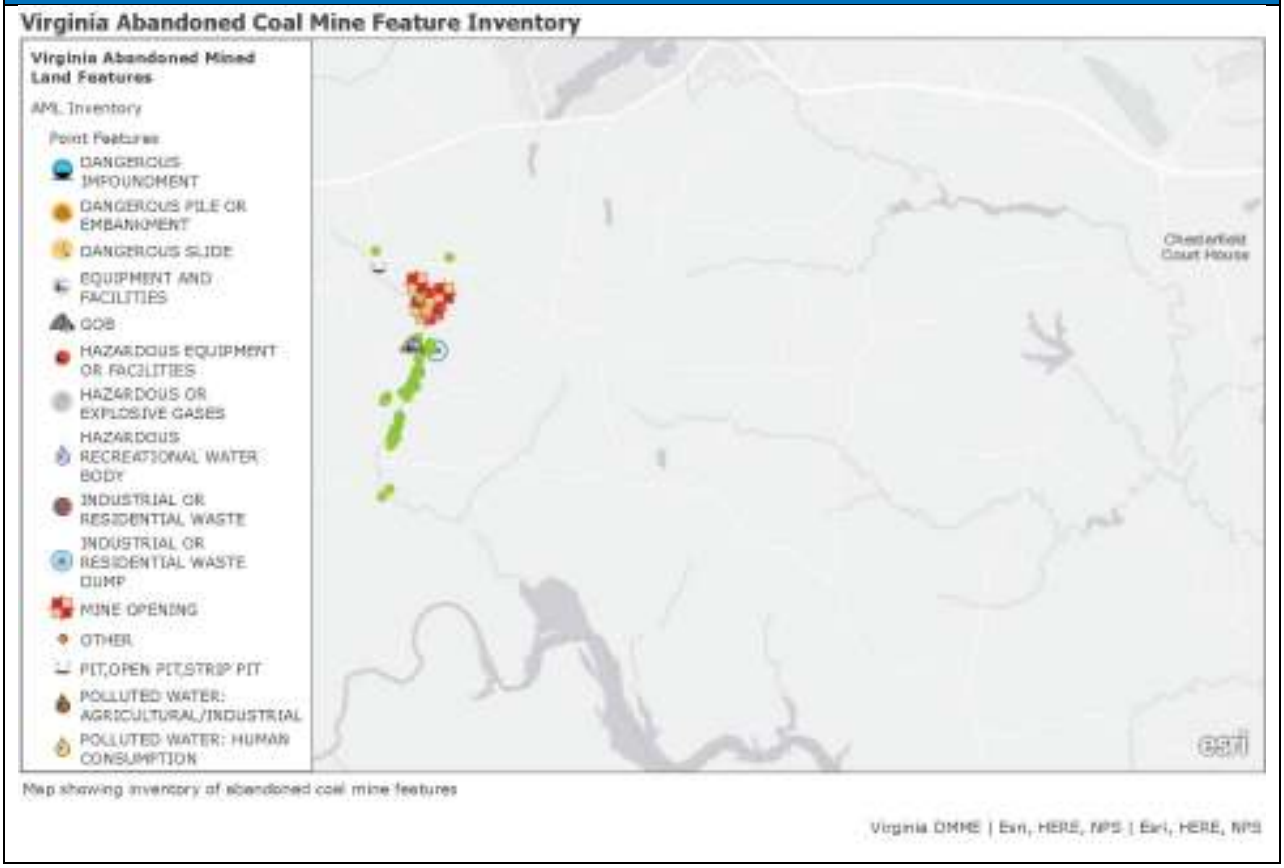
Source: Virginia Department of Energy, 2021

Figure 5.44b: Abandoned Coal Mine Features, James River, West of Richmond



Source: Virginia Department of Energy, 2021

Figure 5.44c: Abandoned Coal Mine Features, Chesterfield County



Source: Virginia Department of Energy, 2021

Existing soil types in the region are not generally conducive to creating natural sinkholes. There are no known sources of data for determining relative sinkhole probability within the region, except for the maps in Figures 5.44a through 5.44c above. Based on previous instances, likely the result of aging infrastructure, and the fact that abandoned mines exist, there is at least a low probability of future sinkhole occurrences in the region.

Limited data prevent a detailed vulnerability analysis at the jurisdictional level. Those jurisdictions with underground infrastructure in need of replacement or repair and those sitting on top of abandoned mine locations are at an elevated risk from sinkholes as compared to those without such risk factors. Potential damage and loss due to sinkholes or land subsidence is nearly impossible to assess because the nature of the damage is site- and event-specific.

Social Vulnerability

Locations of abandoned coal mine features in the study area were compared to the NRI baseline social vulnerability map to determine if any areas of moderate or high social vulnerability coincided with areas at risk of sinkholes. Figure 5.44a above shows the only areas identified as having elevated vulnerability. The areas with moderate and high social

vulnerability that correlate with mine features are all in or near retirement, independent or assisted living facilities in Henrico County: Hermitage at Cedarfield, Gayton Terrace Assisted Living, Lynmoore, and Lakewood Manor Independent Living.

Future Vulnerability, Land Use and Climate Change

As noted in the previous section, sinkholes have occurred in the Richmond-Crater region, often following periods of heavy precipitation. The phenomena are generally limited in geographic scope and/or damage extent.

Climate change has the potential to worsen the risk associated with sinkholes in the study area. Precipitation patterns are expected to become more intense, prolonged and frequent as a result of a warming climate. More severe precipitation events may accelerate the relevant factors in sinkhole formation for the region (*e.g.,* dissolution of overlying sediments or rock, differential subsidence, vulnerability of aging infrastructure), possibly leading to more frequent and damaging sinkholes.

Based on the hazard's history in the region, mass evacuations caused by sinkholes are not expected.

5.16 Radon Exposure

Hazard Profile

Radon is a colorless, odorless naturally occurring gas that forms by the radioactive decay of uranium, thorium, or radium, found in certain types of rocks, soil, and groundwater. Radon is found naturally in the atmosphere in trace amounts, where it disperses rapidly and is generally not a health issue. Radon exposure becomes dangerous in confined areas, where the gas can accumulate, and the inert gas can be inhaled into the lungs where it adheres to lung tissue.

Under the earth's surface, radon may be transported as a soil gas or dissolved in ground water. It can enter a building via cracks in solid floors, construction joints, cracks in walls, gaps in suspended floors, gaps around service pipes and drains, cavities inside walls or through the water supply. Well water used for bathing or washing can potentially carry radon, especially if faucets are aerated. Due to less ventilation, radon concentrations in buildings are typically higher in the winter. Any home, school or workplace may have a radon problem, whether it is new or old, well-sealed or drafty, or with or without a basement. The EPA estimates that nearly one out of every 15 homes in the U.S. has elevated annual average levels of indoor radon,[35] and that nearly one in five schoolrooms has a short-term radon level above the actionable level.[36]

The concentration of radon in buildings is highly variable and is based on the underlying rocks or sediments, weather and construction methods. The amount of radon emitted by a particular soil is controlled by the underlying rock type, the concentration of uranium,

[35] *US EPA's Map of Radon Zones, Virginia.* Radon Division, Office of Radiation and Indoor Air, September 1993.
[36] US EPA Radon in Schools, accessed 4/23/21 online at: https://www.epa.gov/radon/radon-schools

thorium, or radium in the rock or sediment, and the permeability of the rock, sediment and soil. [37]

Magnitude or Severity

The EPA recommends taking action to reduce radon in homes, schools or other buildings that have a radon level at or above 4 picocuries per liter (pCi/L) of air (a "picocurie" is a common unit for measuring the amount of radioactivity). That level of risk is more than 10 times the average outdoor level, more than receiving the equivalent radiation of 200 chest x-rays per year, and almost five times the average non-smoker's risk. A radon level of 40 pCi/L is more than the risk of a 2 pack-a-day smoker.

The EPA indicates that radon is estimated to cause about 21,000 lung cancer deaths per year in the United States.[38] When a person breathes in radon, radioactive particles from radon gas can get trapped in the lungs, emitting radiation. Over time, these radioactive particles increase the risk of lung cancer. People who smoke and are exposed to radon are at a greater risk of developing lung cancer. Damage may be undetected for years before health problems appear.

The chances of getting lung cancer from radon depend primarily on:

- How much radon is in one's home–the location where you spend most of your time (e.g., the main living and sleeping areas);
- The amount of time spent in the home;
- Whether one is a smoker or has ever smoked;
- Whether one burns wood, coal, or other substances that add particles to the indoor air; and
- Combinations of these factors that multiply the impacts.

Lung cancer may start with a nagging cough, shortness of breath or wheezing. Other symptoms such as coughing up blood, chest pain or weight loss may also present. There are no medical tests to test the body for radon exposure, but doctors can check for signs of lung cancer and homes can be easily tested for radon levels.

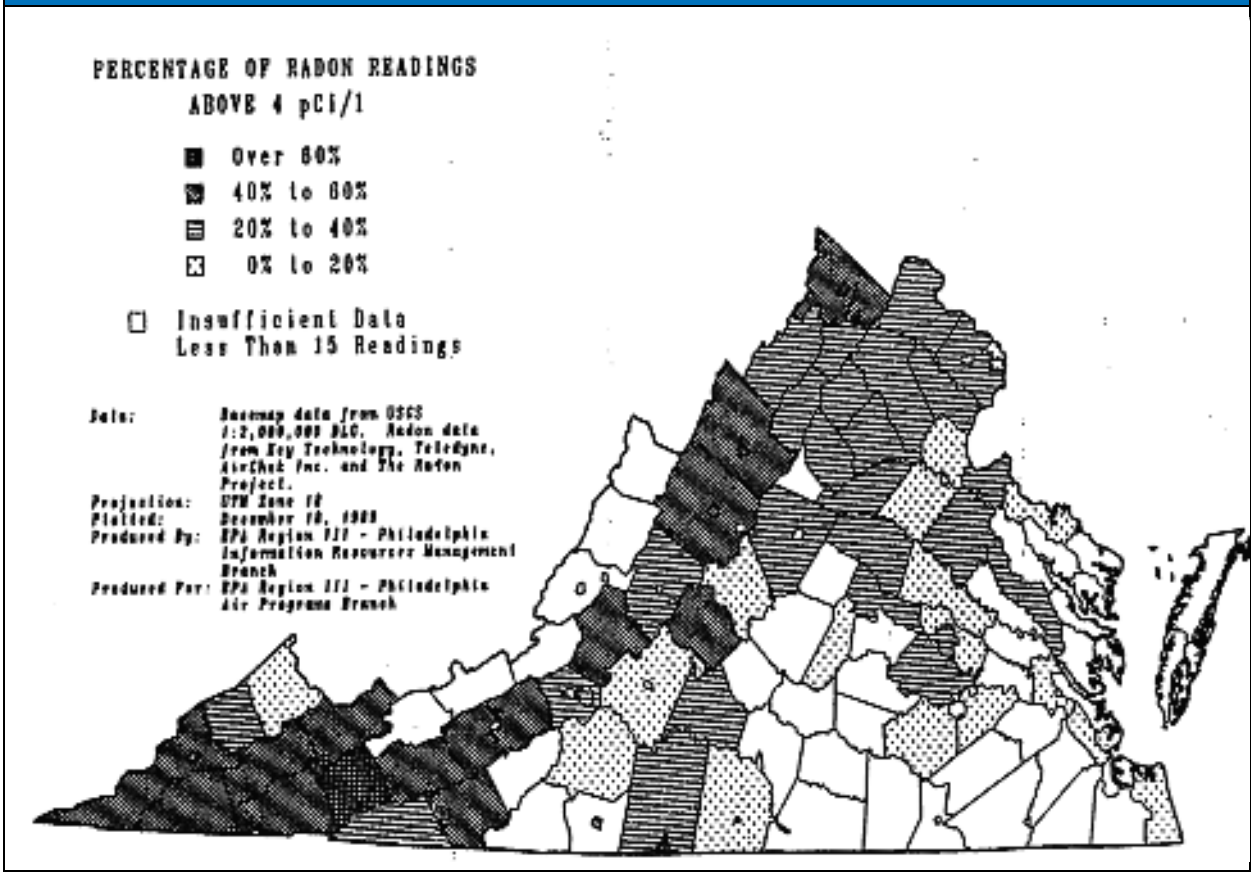
Hazard History

Radon exposure from ground sources happens over a long period of time, often remaining undetected, thus historical "events" are rarely quantifiable. Section 307 and 209 of the 1988 Indoor Radon Abatement Act directed the EPA to identify areas of the United States that have the potential to produce elevated levels of radon. As part of this study, two data sources were analyzed in Virginia: 1) indoor radon data from 1,156 random homes were sampled in the winter of 1991-1992 (results shown in **Table 5.40**); and 2) non-random commercial data compiled by EPA Region 3 were examined as shown in **Figure 5.45**. Additional data from 1990-2017 from a private vendor, Air Chek, are also included in Table

[37] Born, Rebecca Skye. *Radon in Yorktown Formation Sediments and Petersburg Granite, Eastern Virginia.* Undergraduate Thesis, College of William & Mary, April 1994.
[38] US EPA, *A Citizen's Guide to Radon: The Guide to Protecting Yourself and Your Family from Radon,* EPA 402/K-12/002, 2016.

5.40 for jurisdictions with more than 50 test results. Alpha-Energy Laboratories non-random data from the region since 2001 are also included in Table 5.40.

Figure 5.45: Vendor Screening, Indoor Radon Data for Virginia



Source: US EPA's Map of Radon Zones, Virginia. Radon Division, Office of Radiation and Indoor Air, September 1993.

Table 5.40: Screening Indoor Radon Data											
Jurisdiction	**1991-1992, Residential**				**1990-2017, Air Chek**			**Alpha Energy Laboratories January 2001 to June 2020**			
	Number of Tests	**Mean (pCi/L)**	**% >4 pCi/L**	**%>20 pCi/L**	**Number of Tests**	**Mean (pCi/L)**	**% ≥4 pCi/L**	**Number of Tests**	**Mean (pCi/L)**	**% >4 pCi/L**	**%>10 pCi/L**
Charles City County	1	1.1	0	0				6	1.08	0	0
Chesterfield County	59	3.1	17	3	1,319	3.5	26	2089	4.13	18.0	8.8
City of Colonial Heights	5	2.4	20	0				33	3.29	21.2	6.1
Dinwiddie County	6	13.9	17	17				38	4.07	21.1	15.8
City of Emporia	2	0.5	0	0				None reported	n/a	n/a	n/a
Goochland County	3	3.1	33	0				285	3.51	23.2	6.0
Greensville County	2	0.5	0	0				16	1.60	6.3	0
Hanover County	13	0.9	0	0	195	4.9	19	327	2.37	17.1	1.2
Henrico County	30	1.7	7	0				1544	3.23	15.2	5.7
City of Hopewell	5	0.6	0	0				29	3.01	13.8	6.9

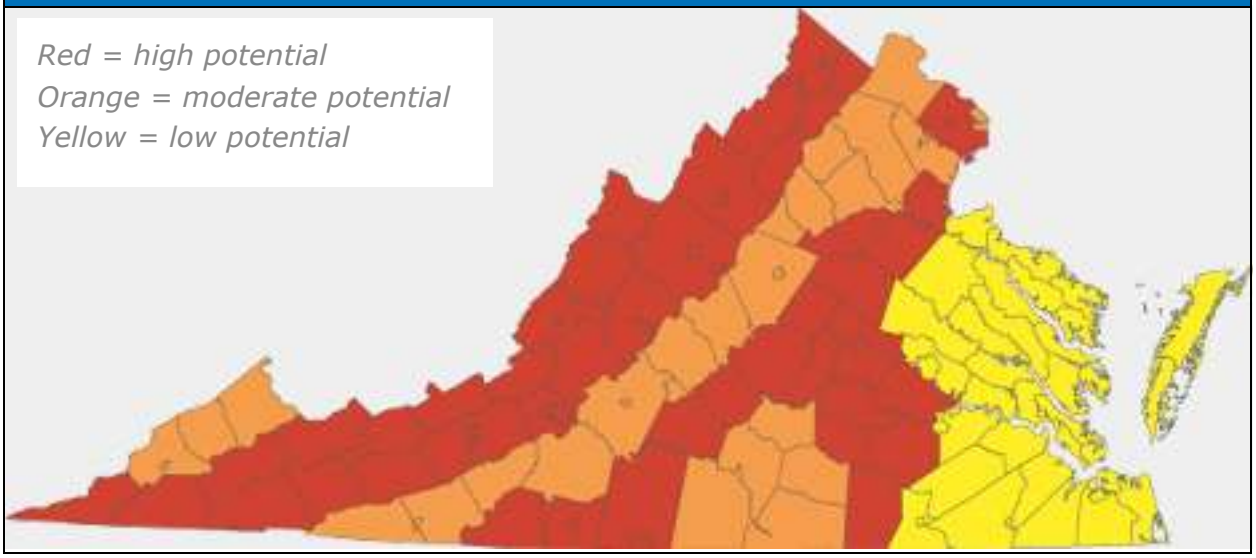
New Kent County	6	2.1	17	0				44	3.62	13.6	9.1
City of Petersburg	5	1.1	0	0				61	1.99	6.1	1.6
Powhatan County	3	0.4	0	0				162	2.98	17.2	4.3
Prince George County	3	0.3	0	0				29	2.61	17.2	3.5
City of Richmond	73	1.4	7	0	611	2.5	18	800	3.28	20.4	5.4
Surry County	1	0.6	0	0				5	1.00	0	0
Sussex County	2	0.7	0	0				3	1.00	0	0
Source: US EPA's Map of Radon Zones, Virginia. Radon Division, Office of Radiation and Indoor Air, September 1993.					*Source: Radon in Virginia Real Estate Transactions, Virginia Department of Health, ~2017*			*Source: Non-random test results by private business.* https://getresults.doctorhomeair.com/fmi/webd/Alpha_ResultsInArea			

Vulnerability Analysis

The types and distribution of lithologic units and other geologic features in an assessment area are of primary importance in determining radon potential. Rock types that are most likely to cause indoor radon problems include carbonaceous black shales, glauconite bearing sandstones, certain kinds of fluvial sandstones and fluvial sediments, phosphorites, chalk, karst-producing carbonate rocks, certain kinds of glacial deposits, bauxite, uranium-rich granitic rocks, metamorphic rocks of granitic composition, silica-rich volcanic rocks, many sheared or faulted rocks, some coals, and certain kinds of contact metamorphosed rocks. Rock types least likely to cause radon problems include marine quartz sands, non carbonaceous shales and siltstones, certain kinds of clays, silica-poor metamorphic and igneous rocks, and basalts. Uranium and radium are commonly found in heavy minerals, iron-oxide coatings on rock and soil grains, and organic materials in soils and sediments. Less common are uranium associated with phosphate and carbonate complexes in rocks and soils, and uranium minerals.

Figure 5.46 provides the EPA's map of Radon Zones for Virginia, released in 1993. The map is based on an assessment of five factors that are known to be important indicators of radon potential: indoor radon measurements, geology, aerial radioactivity, soil parameters and foundation types.

Figure 5.46: EPA Map of Radon Zones, Virginia



Source: U.S. EPA 1993 Map of Radon Zones in Virginia, modified by Virginia Department of Energy

The Coastal Plain of Virginia, including Hanover, Henrico, Charles City, New Kent, Prince George, Surry, Sussex, Greensville Counties and the Cities of Emporia, Richmond, Colonial Heights and Petersburg, are ranked low in geologic radon potential. In general, the upper Tertiary to Quaternary-aged sediments of the Coastal Plain have low radon potential. However, recent studies of radon potential in the sediments and marine fossils of the Yorktown Formation, a 4- to 5-million-year-old widespread geological unit in the Coastal Plain, could be a source for elevated levels of indoor radon. The Yorktown Formation is a marine unit, meaning the sediments that it is made of were once deposited underwater when sea-level was much higher than it is today. As a marine unit, it holds whale bones that are mixed into the sand/clays. The bones that accumulate in the Yorktown Formation are perhaps able to enrich themselves under certain geochemical conditions with heavy metals that might be in the water. Since the Yorktown Formation is so widespread and close to the earth's surface throughout the Virginia Coastal Plain, it is the only geologic unit that has been investigated thus far for radon potential in the Coastal Plain. These hypotheses are part of ongoing research at the College of William and Mary.[39] Future updates to this plan should include results of such research, particularly if the findings point to changes in the relative vulnerability presented above. The westernmost edge of the Yorktown Formation intersects the study area as shown in **Figure 5.47** below.

The rest of the study area lies within the Piedmont, including Goochland, Powhatan, Chesterfield, and Dinwiddie Counties and the City of Hopewell. Here the Goochland

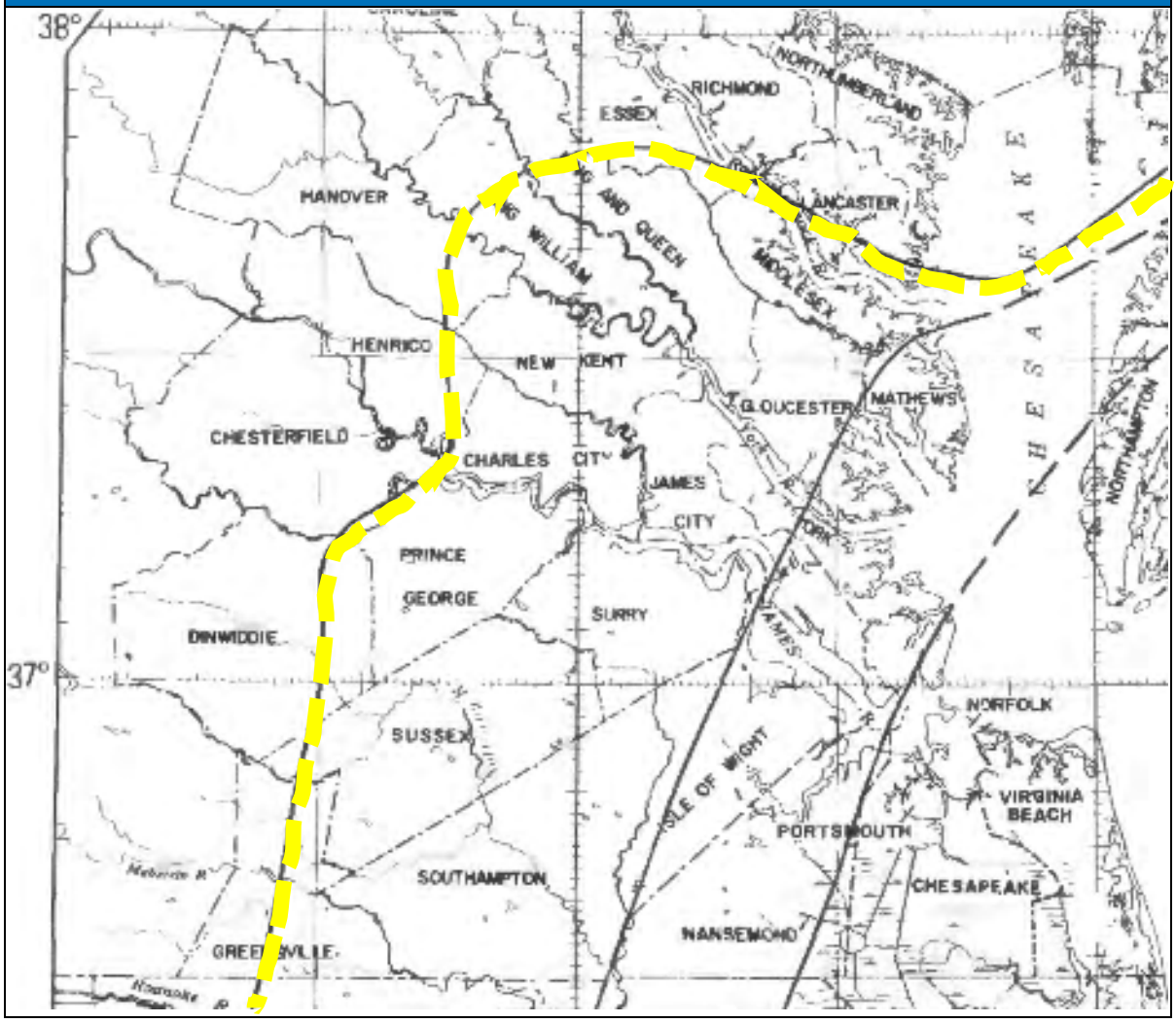
[39] Email exchanges with Anne Witt, Geohazards Specialist, Virginia Department of Mines, Minerals and Energy, spring 2021.

terrane and Inner Piedmont have been ranked high in radon potential, with numerous well-documented uranium and radon occurrences.

In 1994, an undergraduate student at the College of William & Mary studied radon emittance from the Petersburg Granite, a large body of intrusive igneous rock, extending from Hanover County to the southern border of Dinwiddie County[40]. The Petersburg Granite was selected for her study as a possible source of radon because the mineral zircon was found in the granite, which can have uranium and thorium incorporated into its crystal structure. Outcrops of the granite in Pocahontas State Park were studied using alpha-track radon detectors to determine concentrations of the gas being emitted as a decay product. Radon concentrations in a series of eight wells, tested over four time periods each, indicated radon concentrations in the ground ranging from 140 pCi/L to 3,536 pCi/L. The student concluded that these concentrations are high, and that homes built on the Petersburg Granite should be tested for radon. The general location of the Petersburg Granite, or Petersburg batholith, is shown in stippled red in **Figure 5.48**.

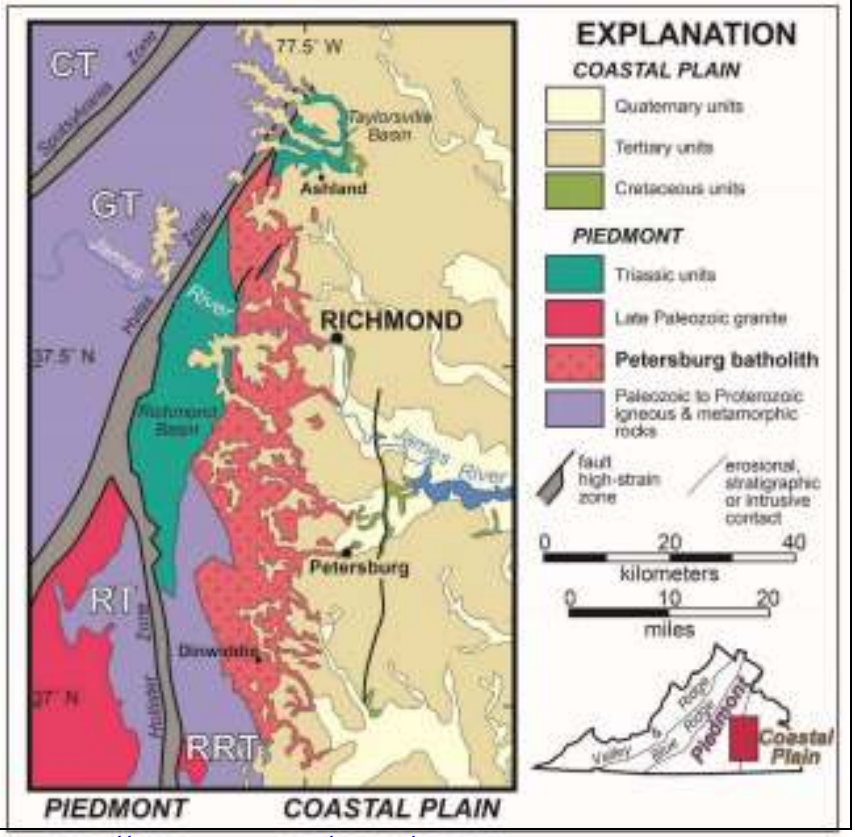
[40] Born, Rebecca Skye. *Radon in Yorktown Formation Sediments and Petersburg Granite, Eastern Virginia.* Undergraduate Thesis, College of William & Mary, April 1994.

Figure 5.47: Westernmost Extent of the Yorktown Formation (yellow line)



Source: Ward, Lauck W. and Blake W. Blackwelder. Stratigraphic Revision of Upper Miocene and Lower Pliocene Beds of the Chesapeake Group, Middle Atlantic Coastal Plain. Geological Survey Bulletin 1482-D, U.S. Department of the Interior, 1980.

Figure 5.48: Generalized Geologic Map of the Petersburg Batholith



Source: Online blog https://wmblogs.wm.edu/cmbail/power-washing-paleozoic-petersburg-pluton/ and as modified from Owens, B.E., Carter, M., and Bailey, C.M., 2017, Geology of the Petersburg batholith, eastern Piedmont, Virginia, in Bailey, C.M., and Jaye, S., eds., From the Blue Ridge to the Beach: Geological Field Excursions across Virginia: Geological Society of America Field Guide 47, p. 123–133.

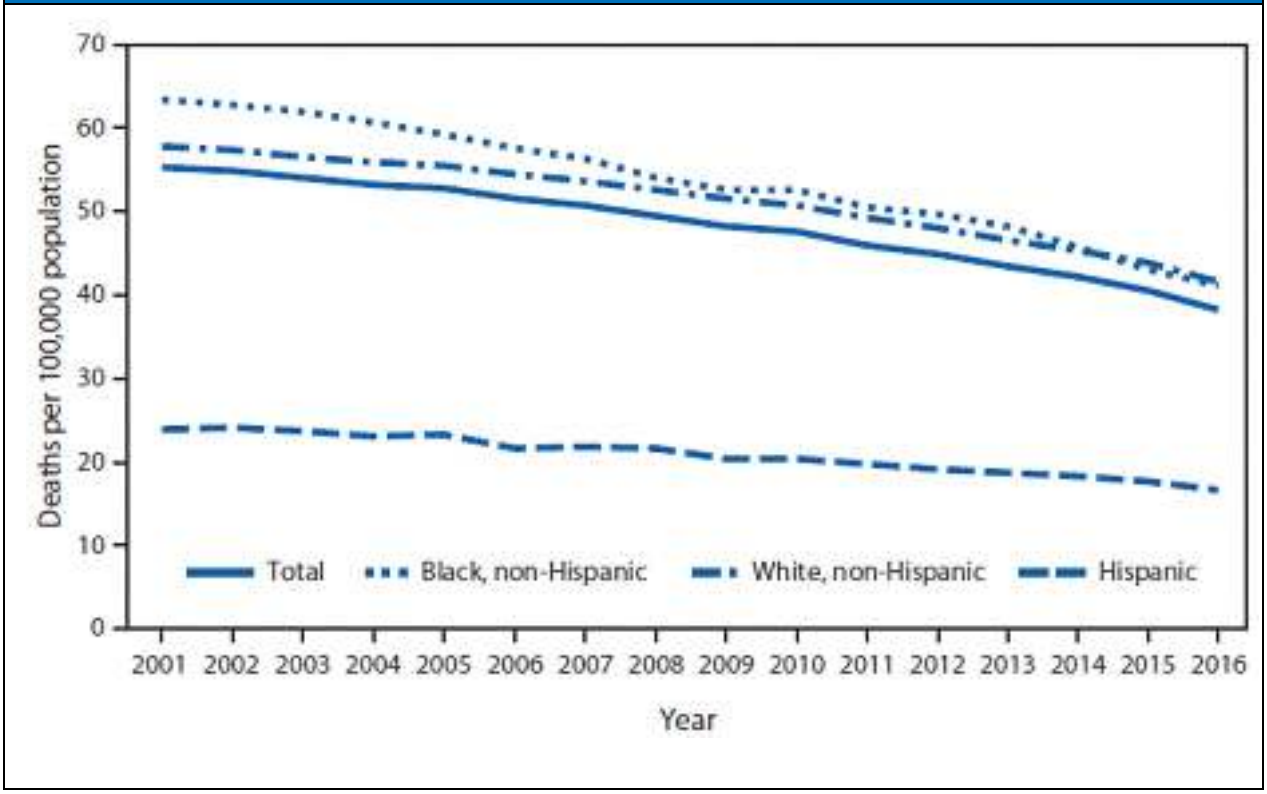
Radon testing in Virginia has been sporadic and not necessarily reported to any single data repository. Thus, the only way to know if any structure or group of structures has a radon problem is to test. Testing of residential structures is easy and inexpensive. Low-cost test kits are available through the mail and at home improvement stores. Qualified testers can also do long-term residential testing and set up systems for testing larger non-residential buildings. Mitigation or treatment of structures with high radon concentrations is also possible, relatively inexpensive and can be very effective if done properly. Testing is most important for structures in the red or orange zones indicated in Figure 5.46 above, and especially important for structures in which inhabitants spend their time in parts of the structure below ground or in contact with the ground. Future updates to this plan may include identification of specific structure

types, for example structures with basements, in the highest radon potential counties to further define vulnerability, especially if the EPA's 1993 map of radon zones is updated based on more testing or other new scientific information.

Social Vulnerability

Unlike many other hazards in this plan, structures are not physically damaged by radon exposure; instead, human lives are directly at risk. CDC QuickStats show that death rates from lung cancer declined between 2001 and 2016, but also indicate a disparity based on race/ethnicity (see **Figure 5.49**). During this period, the lung cancer death rates for the total population (deaths per 100,000 population) declined from 55.3 to 38.3, as well as for each racial/ethnic group shown. The death rate for the non-Hispanic Black population decreased from 63.3 to 41.2, for the non-Hispanic white population from 57.7 to 41.5, and for the Hispanic population from 23.9 to 16.6. Throughout this period, the Hispanic population had the lowest death rate.

Figure 5.49: Age-Adjusted Death Rates from Lung Cancer, by Race/Ethnicity, United States, 2001-2016

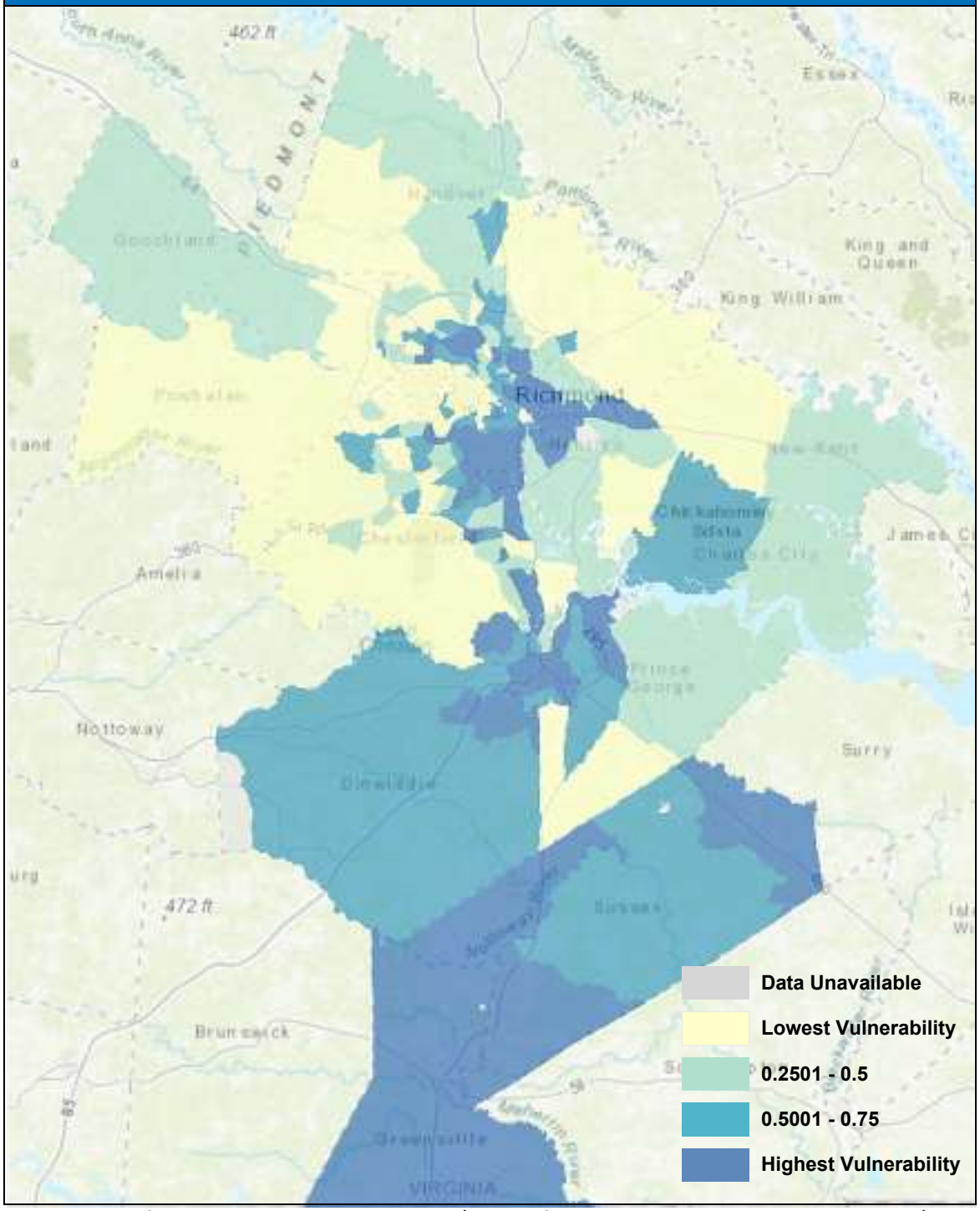


** Deaths per 100,000 population age-adjusted to the 2000 U.S. standard population.*
Source: Centers for Disease Control and Prevention, accessed online 4/22/22 at:
https://www.cdc.gov/mmwr/volumes/67/wr/mm6730a8.htm

The Centers for Disease Control and Prevention Agency for Toxic Substances and Disease Registry (ATSDR) created a Social Vulnerability Index geared toward preparing for and responding to exposure to dangerous chemicals (and other natural hazards, as well). This index is better suited to examining the social vulnerability related to radon, although many of the inputs are the same. Overall vulnerability for this index is based on: socioeconomic status (below poverty, unemployed, income, no high school diploma); household composition and disability (aged 65 or older, aged 17 or younger, civilian with disability, single-parent households); minority status and language; and housing type and transportation (multi-unit structures, mobile homes, crowding, no vehicle, group quarters). **Figure 5.50** provides the CDC ATSDR 2018 data for the study region. Perhaps once more information is collected regarding the underlying geology of the region and the relationship to radon, this map can be further refined in the future to more accurately isolate the social vulnerability to radon. Structures with basements could also be identified to further enhance the analysis.

The CDC ATSDR map below shows the highest social vulnerability is in the southernmost region of the study area, north into Petersburg and Colonial Heights, and in the central and eastern parts of Richmond.

Figure 5.50: CDC ATSDR Social Vulnerability Index



Source: Centers for Disease Control and Prevention/ Agency for Toxic Substances and Disease Registry/ Geospatial Research, Analysis, and Services Program. CDC/ATSDR Social Vulnerability Index 2018 Database State.

Note: The Town of Surry has medium/high social vulnerability through the CDC index.

Future Vulnerability, Land Use and Climate Change

According to Memorial Sloan Kettering Cancer Center, major scientific organizations believe that radon contributes to approximately 12% of lung cancers annually in the United States. It is the second leading cause of lung cancer.[41] With 5,820 new cases of lung and bronchus cancer expected in Virginia in 2021[42], this translates to approximately 700 of those new cases being caused by radon exposure.

Radon levels are localized down to the household level and additional testing is needed to verify EPA zones for the study area. There are no federal or state laws that require radon testing prior to a real estate transaction, but some contracts do include radon testing or mitigation contingency clauses at the buyer's request.

Virginia Code at Section 15.2-2280 currently gives all red zone (Zone 1) counties and cities the option of requiring passive radon resistant construction features, but as of 2021 none of the study area Zone 1 communities had adopted the ordinance into their building codes.

In 1993, the Virginia General Assembly passed legislation that requires all schools in the Commonwealth to be tested for radon after July 1, 1994 and includes any new school buildings and additions built after that date. Each school is required to maintain files of their radon test results.

In the early 1990s the Virginia Department of Education purchased long-term radon test kits that were used to test all Virginia public school K-12 classrooms that were in contact with the ground at that time. Long term tests are generally more accurate than short term tests because they sample anywhere from 90 to 365 days. Short term tests usually sample for only 2 to 7 days. Since radon levels can fluctuate over time, the longer the test duration, the more accurate the results will be. The EPA school testing protocol recommends testing during the heating season which runs roughly from late October through the end of March. A VDH review of the original testing data from the long-term tests done at that time indicated that some of these test results were not valid or usable due to:

- School classrooms not being identified on the test report;
- Testing periods that were outside of the preferred heating season; and
- Improper testing of unoccupied areas such as boiler and storage rooms.

In general, radon test results for the vast majority of school classrooms in Virginia are below the EPA action level of 4.0 pCi/L for indoor air. For the few classrooms that have shown elevated radon levels, the problem was usually solved by making adjustments to the school's HVAC system. However, in some cases the HVAC adjustments did not work, and a radon mitigation system was installed to reduce the radon to acceptable

[41] Memorial Sloan Kettering Cancer Center https://www.mskcc.org/news/5-myths-about-radon-and-lung, accessed online 4/22/21

[42] American Cancer Society, Cancer Statistics Center accessed online 4/22/21 at: https://cancerstatisticscenter.cancer.org/#!/state/Virginia

levels. Future updates to this plan may include evaluation of data for study area schools, as available.

With regard to future climate change, changes in the environment and human behavior may alter the risks associated with radon for individual buildings. According to the EPA, the primary factors that influence radon entry into buildings include: 1) radon content of the soil; 2) pressure differential between the interior of a structure and the soil; 3) air exchange rate for the building; 4) moisture content surrounding the structure; and 5) presence and size of entry pathways. Climate change can affect these same factors and, therefore, may cause direct or indirect changes in indoor air quality within a structure. In addition, certain changing human behavioral factors driven by climate change may further impact air quality. Examples of how climate change may impact indoor air quality include:

1. Increased Air Conditioning and Decreased Fan Usage: air conditioning used as a result of rising temperatures contributes to "closed house conditions" and reduced stratification of radon between floors;

2. Activity Patterns and Spatial Radon Variation: rising outdoor temperatures may result in increased use of basements where radon concentrations are generally higher;

3. Weatherization and Energy Efficiency: although undetermined, tightening structures for energy efficiency may increase radon concentrations for structures with indoor radon sources;

4. Weather-Related Influences: increased wind can change pressure differentials between structure levels and the outside, and increased precipitation rates or totals may change hydrologic conditions causing a rise in the water table and force vapors from the vadose zone, or unsaturated zone, into a less dense media, such as a basement.

5. High Density Housing: concrete construction used in high density housing (constructed to reduce greenhouse emissions) may be an increasing source of elevated radon exposure for some occupants. 43

Radon exposure is not expected to be associated with any types of mass evacuation.

5.17 Infectious Diseases

Hazard Profile

Both influenza pandemics and communicable diseases can affect large numbers of people in a short period of time. An influenza pandemic is an epidemic of an influenza virus that spreads on a worldwide scale and infects a large proportion of the human

[43] Field, William R., Contractor Report prepared for U.S. EPA. *Climate Change and Indoor Air Quality*, June 10, 2010.

population. In contrast to the regular seasonal epidemics of influenza, these pandemics occur irregularly. Pandemics can cause high levels of mortality.

Influenza pandemics occur when a new strain of influenza virus is transmitted to humans from another animal species. These novel strains are unaffected by any immunity people may have to older strains of human influenza and can therefore spread extremely rapidly and infect very large numbers of people.

The CDC uses a Pandemic Intervals Framework (PIF) to describe the progression of an influenza pandemic (**Table 5.41**). This framework is used to guide influenza pandemic planning and provides recommendations for risk assessment, decision-making, and action in the United States. These intervals provide a common method to describe pandemic activity which can inform public health actions. The duration of each pandemic interval might vary depending on the characteristics of the virus and the public health response.

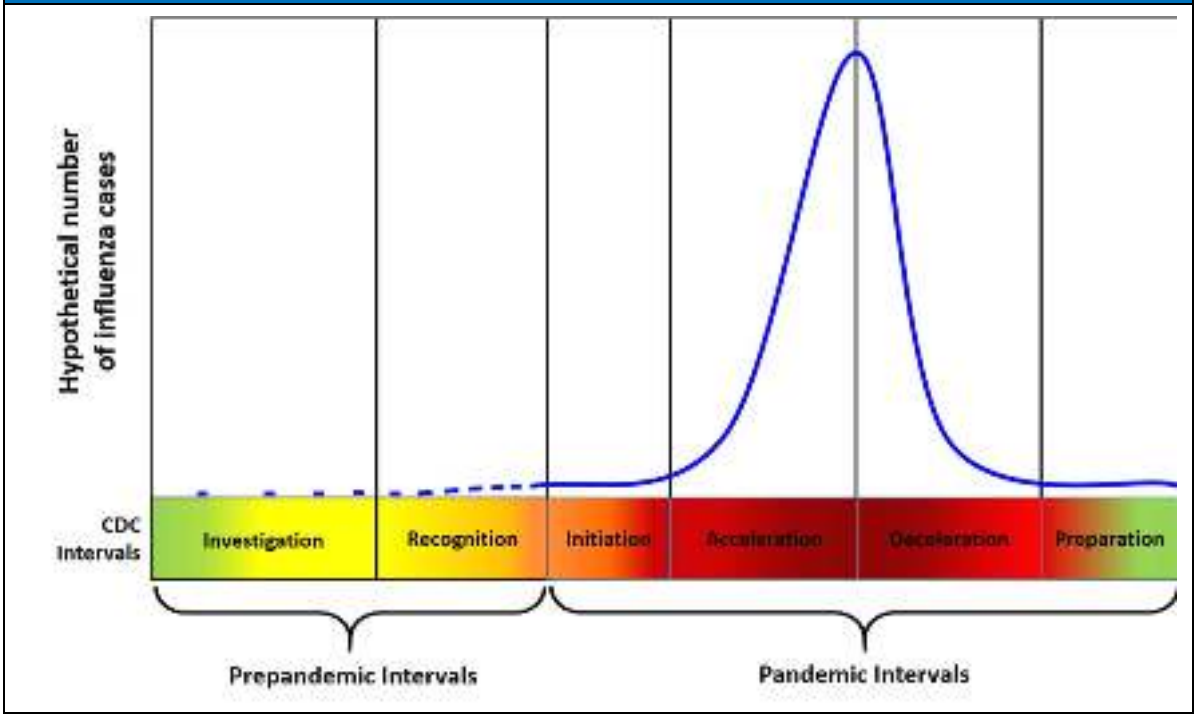
Table 5.41: CDC Pandemic Intervals Framework

Interval	Description
1) Investigation of cases of novel influenza A virus infection in humans	When novel influenza A viruses are identified in people, public health actions focus on targeted monitoring and investigation. This can trigger a risk assessment of that virus
2) Recognition of increased potential for ongoing transmission of a novel influenza A virus	When increasing numbers of human cases of novel influenza A illness are identified and the virus has the potential to spread from person-to-person, public health actions focus on control of the outbreak, including treatment of sick persons.
3) Initiation of a pandemic wave	A pandemic occurs when people are easily infected with a novel influenza A virus that has the ability to spread in a sustained manner from person-to-person.
4) Acceleration of a pandemic wave	The acceleration (or "speeding up") is the upward epidemiological curve as the new virus infects susceptible people. Public health actions at this time may focus on the use of appropriate non-pharmaceutical interventions in the community (e.g., school and child-care facility closures, social distancing), as well the use of medications (e.g., antivirals) and vaccines, if available. These actions combined can reduce the spread of the disease and prevent illness or death.
5) Deceleration of a pandemic wave	The deceleration (or "slowing down") happens when pandemic influenza cases consistently decrease in the United States. Public health actions include continued vaccination, monitoring of pandemic influenza A virus circulation and illness, and reducing the use of non-pharmaceutical interventions in the community (e.g., school closures).
6) Preparation for future pandemic waves	When pandemic influenza has subsided, public health actions include continued monitoring of pandemic influenza A virus activity and preparing for potential additional waves of infection. It is possible that a 2nd pandemic wave could have higher severity than the initial wave. An influenza pandemic is declared ended when enough data shows that the influenza virus, worldwide, is similar to a seasonal influenza virus in how it spreads and the severity of the illness it can cause.

Source: https://www.cdc.gov/flu/pandemic-resources/national-strategy/intervals-framework.html

Figure 5.51 provides a graphical illustration of the intervals for a hypothetical virus pandemic.

Figure 5.51: Preparedness and response framework for novel influenza A virus pandemics: CDC intervals



Source: CDC, online at https://www.cdc.gov/flu/pandemic-resources/national-strategy/intervals-framework.html

A pandemic is characterized by human-to-human spread of the virus over a very wide area, crossing international boundaries and affecting a large number of people. While many countries may not be affected early on in a pandemic, the CDC collaborates with the World Health Organization (WHO) and other international agencies to monitor and assess influenza viruses and illness. These organizations send strong signals to the public when research indicates a pandemic is imminent in their country, region, state or locality, and that the time to finalize the communication and implementation of planned mitigation measures is short.

Previous pandemics have been characterized by waves of activity spread over months and separated by oceans. Once the level of disease activity drops, a critical communications task is balancing this information with the possibility of another wave. Pandemic waves can be separated by months and an immediate "at-ease" signal may be premature. Pandemic waves can also be specific to a country or a subregion or state

within a country, making local messaging a critical component in controlling the spread of the virus.

A modern global economy that is focused on international trade and shipping, business and leisure travel to other countries can help spread an early-phase pandemic across the globe far more quickly than in past centuries. While quarantines and travel restrictions may help restrict the spread in later intervals, the damage wrought by virus carriers early on is irreversible.

Communicable diseases are illnesses spread by bacteria or viruses that are spread from one person to another through contact with bodily fluids, blood products, contaminated surfaces, insect bites or through the air. Examples include HIV, hepatitis A, B, and C, Salmonella, measles, and blood-borne illnesses. Mitigation of spread may include testing, vaccination, and educating the public on methods of transmission.

Hazard History

Flu pandemics have occurred throughout history. There have been about three influenza pandemics in each century for the last 300 years. Since 1918, five significant events stand out, each with different characteristics.

1918 – 1919: Spanish Flu

Illness from the 1918 flu pandemic, also known as the Spanish flu, came on quickly. Some people felt fine in the morning but died by nightfall. People who caught the Spanish Flu but did not die from it often died from complications caused by bacteria, such as pneumonia. Approximately 20% to 40% of the worldwide population became ill, and an estimated 50 million people died, including early 675,000 people in the United States. Unlike earlier pandemics and seasonal flu outbreaks, the 1918 pandemic flu saw high mortality rates among healthy adults. In fact, the illness and mortality rates were highest among adults 20 to 50 years old. The reasons for this remain unknown.

1957 – 1958

In February 1957, a new flu virus was identified in the Far East. Immunity to this strain was rare in people younger than 65. A pandemic was predicted. To prepare, health officials closely monitored flu outbreaks. Vaccine production began in late May 1957 and was available in limited supply by August 1957.

In the summer of 1957, the virus came to the United States quietly with a series of small outbreaks. When children returned to school in the fall, they spread the disease in classrooms and brought it home to their families. Infection rates peaked among school children, young adults, and pregnant women in October 1957. By December 1957, the worst seemed to be over. However, a dangerous "second wave" of illness came in January and February of 1958.

Most influenza–and pneumonia–related deaths occurred between September 1957 and March 1958. Although the 1957 pandemic was not as devastating as the 1918 pandemic, about 69,800 people in the United States died. The elderly had the highest rates of death.

1968 – 1969: Hong Kong Flu Virus

In early 1968, a new flu virus was detected in Hong Kong. The first cases in the United States were detected as early as September 1968. Illness was not widespread in the United States until December 1968. Deaths from this virus peaked in December 1968 and January 1969. Those over the age of 65 were most likely to die. The number of deaths between September 1968 and March 1969 was 33,800, making it the mildest flu pandemic in the 20th century. The same virus returned in 1970 and 1972.

Several reasons may explain why fewer people in the United States died as a result of this virus:

The Hong Kong flu virus was similar in some ways to the 1957 pandemic flu virus. This might have provided some immunity against the Hong Kong flu virus.

The Hong Kong flu virus hit in December of 1968, when school children were on vacation. This caused a decline in flu cases because children were not at school to infect one another. This also prevented it from spreading into their homes.

Improved medical care and antibiotics that are more effective for secondary bacterial infections were available for those who became ill.

2009 – 2010: H1N1 (Swine Flu)

In the spring of 2009, a new flu virus spread quickly across the United States and the world. The first U.S. case of H1N1 (swine flu) was diagnosed on April 15, 2009. By April 21, the Centers for Disease Control and Prevention (CDC) was working to develop a vaccine for this new virus. On April 26, the U.S. government declared H1N1 a public health emergency.

By June, 18,000 cases of H1N1 had been reported in the United States. A total of 74 countries were affected by the pandemic. H1N1 vaccine supply was limited in the beginning. People at the highest risk of complications got the vaccine first.

By November 2009, 48 states had reported cases of H1N1, mostly in young people. That same month, over 61 million vaccine doses were ready. Reports of flu activity began to decline in parts of the country, which gave the medical community a chance to vaccinate more people. An estimated 80 million people were vaccinated against H1N1, which minimized the impact of the illness.

The CDC estimates that 43 million to 89 million people had H1N1 between April 2009 and April 2010. They estimate between 8,870 and 18,300 H1N1 related deaths.

On August 10, 2010, the WHO declared an end to the global H1N1 flu pandemic

March 2020 - 2022: COVID-19 or SARS-CoV-2

In early 2020, a novel, infectious respiratory disease began to spread worldwide and eventually impacted all aspects of life throughout the world for over a year. Scientists determined that COVID-19 spread by droplets or aerosols from the nose and mouth when an infected person coughed, sneezed or exhaled. Airborne transmission also happened in indoor spaces without good ventilation, especially with infected people breathing heavily, like when singing or exercising. Infected people were able to spread the disease before having symptoms or feeling sick, and asymptomatic people could also spread the disease without ever exhibiting a single symptom. Several variants circulated globally as the virus mutated over time. In the case of COVID-19, the variants were determined to be more contagious.

Symptoms of COVID-19 could appear 2 to 14 days after exposure and include fever, cough, shortness of breath, chills, headache, muscle pain, sore throat, fatigue, congestion, or loss of taste or smell. Other less common symptoms included gastrointestinal symptoms like nausea, vomiting, or diarrhea. Even after recovering from the virus, many people experienced lingering symptoms such as fatigue, cough or joint pain. The elderly, those living in group settings (*e.g.,* nursing homes, jails) and people of any age with serious underlying medical conditions such as lung disease or diabetes, were at highest risk for developing complications from COVID-19. Fully effective and dependable treatments for the virus were limited.

Mitigation of COVID-19 depended on wearing protective masks, distancing from others who were able to transmit disease, washing hands to prevent disease spread, contact tracing to warn those who may have had exposure, and rapid development of testing measures to determine COVID-positive populations. Despite public health campaigns to prevent spread, the disease sickened millions and killed over 965,000 in the United States alone (https://covid.cdc.gov/covid-data-tracker/#datatracker-home, 3/15/22). As of March 15, 2022, the VDH reported 1,656,000 total cases, 48,188 hospitalizations and 19,356 deaths in Virginia. The virus also impacted the Richmond-Crater region as shown in **Table 5.42**.

Table 5.42: COVID-19 Regional Impacts

Jurisdiction	Cases	Hospitalizations	Deaths
Charles City County	1,146	51	27
Chesterfield County	71,667	1,345	738
City of Colonial Heights	4,796	111	94
Dinwiddie County (inc. Town of McKenney)	5,262	165	84

Table 5.42: COVID-19 Regional Impacts			
Jurisdiction	**Cases**	**Hospitalizations**	**Deaths**
City of Emporia	1,147	59	53
Goochland County	3,884	90	46
Greensville County (inc. Town of Jarratt)	3,313	78	37
Hanover County (inc. Town of Ashland)	21,520	463	269
Henrico County	63,707	1,387	890
City of Hopewell	6,096	164	119
New Kent County	4,576	99	32
City of Petersburg	8,279	251	139
Powhatan County	4,951	97	55
Prince George County	8,222	145	67
City of Richmond	43,954	1,051	478
Surry County	1,082	58	19
Sussex County (inc. Towns of Stony Creek, Wakefield, Waverly)	2,409	73	39
Totals	**256,011**	**5,687**	**3186**

Source: https://www.vdh.virginia.gov/coronavirus/covid-19-in-virginia/, accessed online March 15, 2022

In addition to the pandemic history described above, several pandemic flu threats have occurred that did not prove as dangerous as the events described above. When the 1976 swine flu was identified at Fort Dix, New Jersey it was called the "killer flu." Experts were concerned because they thought the virus was similar to the 1918 Spanish flu. To prevent a major pandemic, the United States launched a vaccination campaign. In fact, the virus—later named "swine flu"—never moved outside the Fort Dix area. Later, research on the virus showed that it would not have been as deadly as the 1918 flu if it had spread.

In 1997, at least a few hundred people caught H5N1 (avian flu) in Hong Kong. Like the 1918 pandemic, most severe illness affected young adults. Eighteen people were hospitalized. Six of those people died. This avian flu was unlike other viruses because it passed directly from chickens to people. Avian flu viruses usually spread from chickens to pigs before passing to humans. To prevent the virus from spreading, all chickens in Hong Kong—approximately 1.5 million— were slaughtered. Because this flu did not spread easily from person to person, no human infections were found after the chickens were killed.

In 1999, a new avian flu virus appeared. The new virus caused illness in two children in Hong Kong.

In the Central Virginia Health District, the VDH indicates that Hepatitis B and C, Salmonella and Campylobacteriosis are the most commonly reported communicable diseases during the period 2013 to 2018, the most recent data available. **Table 5.43** summarizes the VDH data for the region during this period. Hepatitis B and C are viruses that cause an infection that attacks the liver and leads to inflammation. The infection is spread by blood products such as unclean needles, and most people have no symptoms. Campylobacteriosis is an infection by the Campylobacter bacterium, a common bacterial infection of humans, often a foodborne illness. The bacteria produce an inflammatory diarrhea or dysentery syndrome, mostly including cramps, fever and pain. The salmonella bacteria have a similar food-related source and causes upset stomach, diarrhea, fever, and pain and cramping in the belly.

Table 5.43 Communicable Disease in the Virginia's Central Health District		
Year	**Top Four Diseases**	**Number Of Cases**
2013	Hepatitis C, chronic	1308
	Hepatitis B, chronic	263
	Salmonellosis	166
	Campylobacteriosis	116
2014	Hepatitis C, chronic	1269
	Hepatitis B, chronic	237
	Salmonellosis	212
	Campylobacteriosis	146
2015	Hepatitis C, chronic	1715
	Hepatitis B, chronic	250
	Salmonellosis	221
	Campylobacteriosis	183
2016	Hepatitis C, chronic	2560
	Hepatitis B, chronic	256
	Salmonellosis	219
	Campylobacteriosis	196
2017	Hepatitis C, chronic	2545
	Hepatitis B, chronic	230
	Campylobacteriosis	225
	Salmonellosis	220
2018	Hepatitis C, chronic	2374
	Salmonellosis	255
	Hepatitis B, chronic	249
	Campylobacteriosis	221

Source: VDH, https://www.vdh.virginia.gov/data/communicable-diseases/ accessed 4/15/21 and confirmed to be most recent 3/15/2022

Vulnerability Analysis

Based on historical experience and the fact that at the time of this planning process an ongoing pandemic threatens public health, the region is expected to experience waves of pandemic flu and communicable disease outbreak in the future.

An outbreak of widespread disease may burden local medical facilities in terms of capacity for treatment, may burden the region's health departments, emergency responders and other essential workers with additional staff responsibilities, and may burden local funeral homes with higher demand for services, but would not be expected to damage the built environment or community infrastructure in any significant way. Experience with COVID-19 has shown that economic impacts and job losses may affect housing starts, and the number of people remaining at home for work and schooling can increase demand for home renovation services. These impacts are somewhat temporary and may be further ameliorated by Federal stimulus dollars distributed as a result of a public health disaster, and eviction prohibitions issued at various government levels.

Social Vulnerability

Analysis of the impacts of COVID-19 on populations of varying economic, social and ethnic backgrounds is ongoing at the time of this study. Understanding how the virus spread requires examination of the specific geographic circumstances of where people are required to travel. Social isolation was quickly recognized as a critical element in managing the spread, but isolation is not an option for many essential workers who are critical to the healthcare system, food supply chain and transportation systems. There are clear divides in the region's communities regarding who can work from home and who is required to go out in public. COVID-19 clearly did not affect everyone equally. The Virginia Center for Inclusive Communities (https://inclusiveva.org/covid19/) noted the following disparities:

- older adults were more susceptible to the virus itself, leading to large numbers of socially isolated seniors;
- school closures led to food insecurity, disparities in technology and internet access, and a need for special services for students with disabilities and students learning English;
- persons with pre-existing conditions but less access to high quality, preventive healthcare were more susceptible to the virus;
- small businesses with existing banking relationships had better access to State and Federal financial assistance, especially during the early part of 2020;
- inequities related to transportation access impacted how the virus affected people;
- and violence against intimate partners, Asians, Islamics and others increased during the pandemic.

Fortunately, by February 2021, at least seven different vaccines had already been developed and were being administered to the most vulnerable populations throughout the world. Three primary vaccines were being used in Virginia, and by mid-March

2022, over 6.2 million Virginians, or 72.3% of the population, were fully vaccinated against the virus.[44]

As COVID-19 demonstrated, the nature and characteristics of a virus, such as how it is transmitted and who is most likely to suffer from severe symptoms, affects the populations most likely to be impacted. Social vulnerability can be influenced by financial health, physical health, mental health and other aspects of where and how a person lives. Similarly, access to virus testing, healthcare for those who contract the virus, and access to medications and vaccinations are all components in an assessment of social vulnerability to each virus and such assessment is difficult to manage while resources are committed to managing an ongoing virus. Communication and outreach to socially vulnerable groups is a key mitigation measure for lessening the impact of viruses that unequally impact demographic groups.

Future Vulnerability, Land Use and Climate Change

Future land use is expected to have less impact on future vulnerability than the protection of public health through dissemination of proper individual protection measures and emergency notification with regard to flu or disease outbreak.

Many causes of climate change also increase risk of pandemic, including deforestation, loss of habitat and loss of species. Warming temperatures and increasingly severe rainfall patterns make conditions better for Lyme disease, waterborne diseases and mosquito-borne diseases.

Mass evacuation is not expected to be a factor related to infectious disease, although COVID-19 did change transportation habits and work habits in the study area.

5.18 Conclusions on Hazard Risk

The risk and vulnerability assessment performed for the Richmond-Crater region provides significant findings that allow committee members to prioritize hazard risks and proposed hazard mitigation strategies and actions. Prior to assigning conclusive risk levels for each hazard, the committee reviewed the results of the assessments shown in the following tables.

Damages and frequency information from the risk and vulnerability assessments are summarized in **Table 5.44**. This table provides a quantitative assessment of existing data for the hazards, recognizing that some hazards are not readily assessed, nor are the assessments truly comparable.

[44] Virginia Department of Health, accessed online at: www.vdh.virginia.gov/coronavirus/see-the-numbers/covid-19-in-virginia/covid-19-vaccine-summary/

Table 5.44: Frequency and Damage Assessment from the Hazard Identification and Risk Assessment			
Hazard	**NCEI Annual Frequency**	**NCEI Annualized Damages**	**Other Damages and Notes**
Flooding	9.59	$95,000	$3,877,630,847 100-year flood damages (Hazus)
Severe Wind Events	0.852	$1,436,741	$9.7 million annual damage (Hazus)
Droughts	0.40	$1,765,040	
Tornadoes	1.97	$1,488,825	
Thunderstorms	3.22	$17,601	Annualized events include hail, lightning and thunderstorm events
Severe Winter Weather	0.06-0.75	$40,411	
Extreme Heat	0.01	$0	
Wildfires	n/a	n/a	$1,488,825 annual damage (VDOF) 1.97 events per year
Sinkholes	n/a	n/a	1.1 events per year
Infectious Diseases	n/a	n/a	.05 events per year (Pandemic Flu)
Earthquakes	n/a	n/a	$4,167,000 annual (Hazus)
Shoreline Erosion	n/a	n/a	
Radon Exposure	n/a	n/a	
Flooding Due to Impoundment Failure	n/a	n/a	

Table 5.45 summarizes the relative degree of mitigation priority assigned for all identified hazards in the region based on the application of the workshop qualitative assessment voting tool discussed in Methodologies Used (Section 5.2.1) at the beginning of Section 5.

Table 5.45: Summary of Qualitative Assessment	
Hazard	**Mitigation Priority Ranking**
Flooding and Flooding due to Impoundment Failure	$ 19,850,000
Severe Wind Events	$ 4,125,000
Shoreline Erosion	$ 3,125,000
Infectious Diseases	$ 2,575,000
Severe Winter Weather	$ 2,500,000
Droughts and Extreme Heat	$ 1,950,000
Tornadoes	$ 1,225,000
Thunderstorms	$ 325,000
Sinkholes	$ 325,000
Earthquakes	$ 300,000
Wildfires	$ 275,000
Radon Exposure	$ 50,000
Landslides	$ -

Risk level ranking was based on historical and anecdotal data, as well as input from committee members. This ranking was done collaboratively in Workshop #1 for each hazard, using the matrix shown in **Figure 5.52**. Each hazard was discussed and analyzed based on the participants' knowledge about consequences and likelihood. This risk scoring tool is a simplified approach to estimating risk that is easy to understand, based on a method developed for the Australian Institute for Disaster Resilience (AIDR)[45]. Scores from likelihood and consequence are then multiplied to provide a risk score, as shown in **Table 5.46**. Some hazards, such as landslides, sinkholes and shoreline erosion were grouped for simplicity's sake.

[45] AIDR. (2015). *Handbook 10: National Emergency Risk Assessment Guidelines*. 2nd Edition. Australian Institute for Disaster Resilience, Australian Government Attorney-General's Department.

Figure 5.52: Results of Committee Workshop Hazard Ranking Exercise

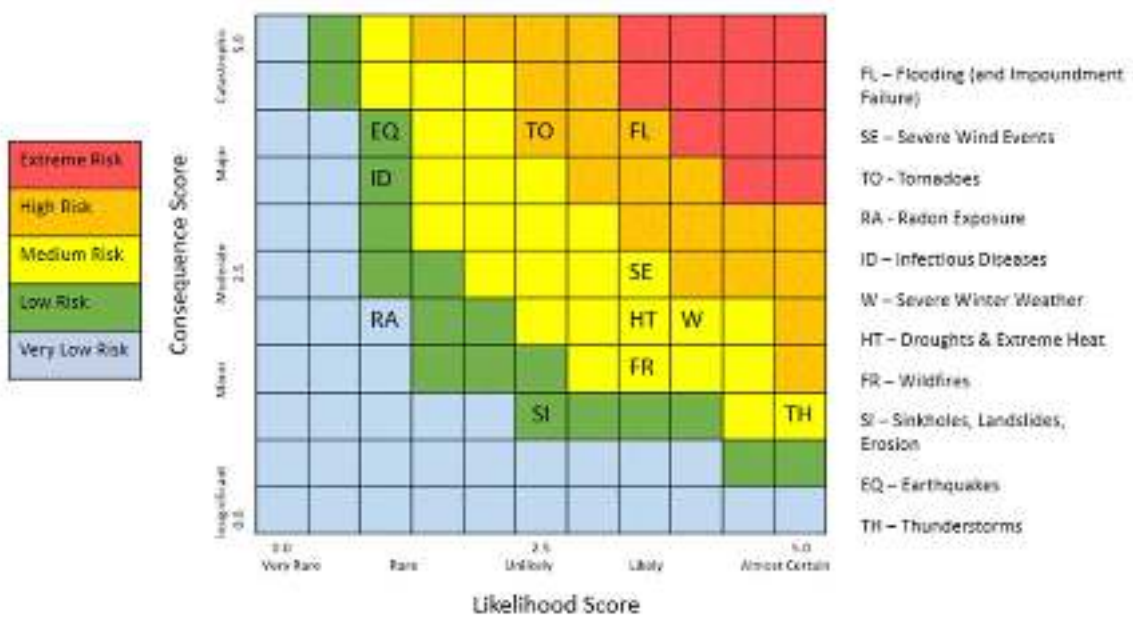


Table 5.46: Risk Scores for Each Hazard

Hazard	Risk Score	Risk Description
Flooding and Flooding due to Impoundment Failure	14	High
Tornadoes	10	High
Severe Wind Events	8.75	Medium
Severe Winter Weather	8	Medium
Droughts and Extreme Heat	7	Medium
Wildfires	5.25	Medium
Thunderstorms	5	Medium
Earthquakes	4	Low
Infectious Diseases	3.5	Low
Sinkholes, Landslides, Erosion	2.5	Low
Radon Exposure	2	Very Low

The conclusions drawn from the assessments, combined with an examination of the rankings in the 2017 plan, as well as final determinations and discussion from the committee, were considered for a final summary of hazard risk for the region based on High, Moderate, Low, or Negligible designations (**Table 5.47**). Although some hazards are classified as posing Low or Negligible risk, their occurrence is still possible.

Table 5.47: Conclusions on Hazard Risk for Richmond-Crater Region	
CRITICAL HAZARD - HIGH RISK	FLOODING SEVERE WIND EVENTS TORNADOES
CRITICAL HAZARD - MODERATE RISK	SEVERE WINTER WEATHER DROUGHTS AND EXTREME HEAT THUNDERSTORMS
NONCRITICAL HAZARD - LOW RISK	WILDFIRES INFECTIOUS DISEASES EARTHQUAKES SHORELINE EROSION FLOODING DUE TO IMPOUNDMENT FAILURE RADON EXPOSURE
NEGLIGIBLE CONSEQUENCES	SINKHOLES LANDSLIDES

6.0 Capability Assessment

6.1 Updates for 2022

The Capability Assessment was updated in 2021/2022 using a new questionnaire distributed to communities, interviews and discussions with committee members, and research on new capabilities added at the state and Federal levels. Local government highlights were expanded to capture many of the mitigation actions and programs completed since the previous plan was enacted.

6.2 Introduction

A "capability assessment" qualitatively summarizes the current and anticipated future capacity of the communities within the Richmond-Crater study area to mitigate the effects of the natural hazards identified in Section 5.0 of this plan. The capability assessment includes a comprehensive examination of the following local government capabilities:

- *Administrative Capability* – describes the forms of government in the region, including the departments that may be involved in hazard mitigation.
- *Technical Capability* – addresses the technical expertise of local government staff.
- *Fiscal Capability* – examines budgets and current funding mechanisms.
- *Policy and Program Capability* – describes past, present, and future mitigation projects in the region and examines existing plans (e.g., emergency operations plan, comprehensive plan).
- *Legal Authority* – describes how jurisdictions in the region use the four broad government powers (i.e., regulation, acquisition, taxation, and spending) to influence hazard mitigation activities.

The purpose of a capability assessment is to identify resources that will support implementation of potential hazard mitigation opportunities available to the region's local governments. For the most part, the towns in the region, with the exception of Ashland, are extremely small with several functions such as building inspections and public safety supported or performed by the corresponding county. To the extent information regarding towns was available, it is included in the capability assessment.

Analysis of capabilities helps planners detect existing gaps, shortfalls, or weaknesses within existing government activities that could exacerbate a community's vulnerability. The assessment will highlight positive measures already in place or being taken at the local level, which should continue to be supported and enhanced, if possible, through future mitigation efforts.

The capability assessment serves as a foundation for designing an effective hazard mitigation strategy. It not only helps establish the goals and mitigation actions for the Richmond-Crater region communities to pursue, but assures that those goals and actions are realistically achievable by communities.

6.3 Staff and Organizational Capability

The counties within the PlanRVA region operate under a Board of Supervisors – County Administrator/Manager system. In this form of government, the elected board of supervisors hires a county administrator/manager who oversees daily operations of the county. Charles City County has the smallest board with three members. Goochland, Henrico, New Kent, and Powhatan Counties each have five board members. Hanover County's board is the largest in the region with seven members.

The City of Richmond operates under the Mayor-Council system of government. The nine members of the council and the mayor are elected. The mayor appoints, with council approval, a chief administrative officer who oversees daily business operations of the city.

Charles City and Chesterfield Counties are dual members of both regional planning district commissions. Within the Crater region, the size of the Board of Supervisors also varies from jurisdiction to jurisdiction. Greensville has the smallest board with four members, Dinwiddie has a five-member board, and the remaining counties have six-member boards. The cities in the Crater region operate under the City Council -City Manager system. The city council is an elected body. Emporia has an eight-member council and the other cities have seven-member councils. The council, in turn, appoints a city manager who acts as the city's chief executive officer.

Incorporated towns in the Commonwealth of Virginia also have an elected governing body. Towns have zoning and planning authority though most choose to use the county planning commission as their town planning commission. Towns have the ability to issue general obligation and revenue bonds. In addition, towns of more than 5,000 residents may appoint an emergency services director and exercise emergency powers separate from the county.

Under the county administrator/manager, city mayor/manager, or town manager/mayor, each jurisdiction has numerous departments and boards that are responsible for the various functions of local government. Committee members for this mitigation planning process are members of various departments as shown in Table 3.2; their primary contributions or skills with regard to hazard mitigation are also provided in that table. While exact responsibilities differ from jurisdiction to jurisdiction, the general duties of the primary departments involved in this process are described below.

Building Inspections offices enforce the VUSBC, which contains the building regulations that govern new buildings, structures, and additions or repairs to existing buildings. The regulations must also be referenced when maintaining or repairing an existing building or renovating or changing the use of a building or structure. The VUSBC is comprised of three parts: Virginia Construction Code, Virginia Existing Building Code and Virginia Maintenance Code. Design requirements set out a minimum level of protection from wind, flood and snow loads, as well as requiring foundation protection from a variety of hazards. Building inspectors play a critical role in inspecting buildings damaged by hazards and determining if they are safe to inhabit or if repairs must be made prior to reoccupation.

Departments of Emergency Management/Fire/Emergency Medical Services (EMS)/Public Safety are responsible for the mitigation, preparedness, response, and recovery operations that deal with both natural and human-caused disaster events. These departments are typically categorized as "first responders" and encompass emergency response, emergency management, and fire safety. In addition, Fire/EMS departments provide medical aid and fire suppression at the scene of accidents and emergencies. These departments are often responsible for responding to hazardous materials incidents, water rescues, and entrapments. Many departments are also active in public engagement activities, informing community members through reverse 911, social media, and other outreach. Members of the Richmond Regional-Crater Hazard Mitigation Steering Committee were primarily emergency managers who also engaged local participation from other departments within their jurisdictions. They also work with other departments to ensure that their vulnerability analysis and mitigation actions are integrated into appropriate jurisdictional comprehensive plan updates, zoning and floodplain management regulatory or policy changes, emergency operations plan updates, disaster recovery plans and resiliency planning as these plans and policies are updated and renewed.

The Police or Sheriff's department is responsible for public safety and evacuation activities that might occur prior to events and assists in the response and recovery operations that deal with both natural and human-made disaster events. They also work to ensure the safety and security of residents and businesses as well as personal property during the immediate recovery period.

Parks and Recreation departments may be responsible for open-space programs. If acquisition projects are undertaken, coordination with this department becomes critical.

The Planning Department (or Department of Community Development) addresses land use planning and zoning. Planning and Community Development departments are typically responsible for managing grant programs funded by the U.S. Department of Housing and Urban Development (HUD), but some larger jurisdictions may have

separate housing departments or authorities who manage HUD programs. These grant programs provide assistance to low- and moderate-income persons for needed housing improvements. These departments also may develop residential and commercial revitalization plans for older areas, serve as a resource for housing and community development issues, and manage special redevelopment projects. Zoning ordinances, which may include the floodplain management and Chesapeake Bay Act overlay districts, are typically enforced by the Planning or Planning and Zoning Department, as well.

Economic Development departments concentrate on ensuring the growth and prosperity of existing businesses. These departments often administer small business loan programs, state economic development programs, and workforce training programs. In smaller jurisdictions, such as Charles City County, this function is managed through the County Administrator's office. Government entities such as Economic Development departments are also increasingly involved in recruiting new businesses to a jurisdiction.

Public utilities departments or cooperatives, in some jurisdictions, oversee community potable water treatment and natural gas services. Rural areas may be served by rural electric cooperatives which are not for profit, while a large extent of the region is served by Dominion Energy.

In many jurisdictions, Public Works or Engineering departments oversee maintenance of infrastructure including roadways, stormwater management, sewer, and wastewater treatment facilities. These departments may also review new development plans, ensure compliance with stormwater management and erosion and sediment control regulations, and work with VDOT on road issues.

GIS staff, vital in their support of mitigation with tools such as multiple data sets and mapping capability, provide data to various local government departments and residents. GIS staff may be located within one of several departments, or in multiple departments, depending on the local government organizational structure. Some communities in the region contract with a private firm for GIS services.

Depending on the jurisdiction, departments of Planning, Public Works, Engineering or Zoning may enforce the NFIP requirements. Two communities, the City of Richmond and the Town of Ashland, participate in the FEMA Community Rating System, which provides NFIP policyholders within the regulated floodplain a discount on their flood insurance policy premium at rate commensurate with the participating community's CRS classification.

6.4 Technical Capability

A mitigation program typically depends on a broad range of staff with diverse technical capabilities. Planners, engineers, building inspectors, emergency managers, floodplain

managers, GIS staff, and grant writers are all important in supporting mitigation actions implemented at the local level. **Table 6.1** provides information on each jurisdiction's technical capabilities.

All localities have GIS capabilities or receive technical support from their county (in the case of most towns) or their planning district commission. Most local governments have incorporated basic GIS systems into their existing planning and management operations. Several of the larger localities are expanding their GIS capabilities to provide more enhanced assistance to first responders and to improve data needed for hazard identification and risk analysis. For instance, Chesterfield County used information on power outages to examine communities dependent on well water. The fire department was then able to prioritize delivery of drinking water to these homes. The county also uses their GIS system to link data to damage assessment photos, a process that speeds up communication with VDEM after a disaster.

Staff members in all the jurisdictions have internet access. Most local governments use social media; fire, police, and emergency managers leverage Facebook pages and Twitter feeds for messaging. Some localities keep these sites active year-round while others activate them only during emergencies to relay vital information to the public.

Table 6.1: Technical Capabilities of Richmond-Crater Jurisdictions

Jurisdiction	Mitigation Assigned to Specific Department	GIS	Adequate Zoning Staff	Dedicated Floodplain Management Staff	Building Inspectors	Overall Technical Capabilities
Charles City County	Planning	Yes	Yes	No	Yes	Moderate
Chesterfield County	Environmental Engineering Planning Building Inspections	Yes	Yes	Yes	35	Moderate
City of Colonial Heights	Engineering Public Works Fire Department Building Official	Yes	Yes	1	3	Moderate
Dinwiddie County	Public Safety/	Yes	Yes	Yes	3	Moderate

Table 6.1: Technical Capabilities of Richmond-Crater Jurisdictions						
Jurisdiction	**Mitigation Assigned to Specific Department**	**GIS**	**Adequate Zoning Staff**	**Dedicated Floodplain Management Staff**	**Building Inspectors**	**Overall Technical Capabilities**
	Emergency Services					
Town of McKenney	County handles mitigation	Yes	Yes	No	N/A	Limited
City of Emporia	City Manager/Emergency Management	Yes	Yes	Yes	2	Moderate
Goochland County	Fire and Rescue	Yes	Yes	No	3	Moderate
Greensville County	No	Yes	Yes	Yes	2	Moderate
Town of Jarratt	County handles mitigation	Yes	Yes	No	N/A	Limited
Hanover County	Planning Fire/EMS	Yes	Yes	No	4	Moderate
Town of Ashland	Planning Police	Yes	Yes	No	Yes	High
Henrico County	Emergency Management	Yes	Yes	Yes	35	High
City of Hopewell	Emergency Management	Yes	Yes	Yes	2	Moderate
New Kent County	Fire , Sheriff and Social Services	Yes	Yes	No	Yes	Moderate
City of Petersburg	Fire/Rescue; Public Works	Moderate	No	No	2	Moderate
Powhatan County	Emergency Management	Yes	Yes	No	Yes	Moderate
Prince George County	All Departments	Yes	No	No	6	Limited
City of Richmond	Emergency Management/ Police/Fire	Yes	Yes	Yes	Yes	High
Town of Surry	County handles mitigation	Surry County	Surry County	Surry County	Surry County	Limited
Sussex County	Public Safety	Yes	Yes	No	2	Limited

Table 6.1: Technical Capabilities of Richmond-Crater Jurisdictions						
Jurisdiction	**Mitigation Assigned to Specific Department**	**GIS**	**Adequate Zoning Staff**	**Dedicated Floodplain Management Staff**	**Building Inspectors**	**Overall Technical Capabilities**
	Planning and Zoning					
Town of Stony Creek	County handles mitigation	Sussex County	Sussex County	No	Sussex County	Limited
Town of Wakefield	County handles mitigation	Sussex County	Sussex County	No	Sussex County	Limited
Town of Waverly	County handles mitigation	Sussex County	Sussex County	No	Sussex County	Limited

High: No increase in capability needed.
Moderate: Increased capability desired but not needed.
Limited: Increased capability needed.

6.5 Fiscal Capability

The counties and cities in the study area receive most of their revenue through local real estate tax, state and local sales tax, local services, and restricted intergovernmental contributions (federal and state pass-through dollars). With regard to mitigation, since 1998 Virginia has provided a 20% match on all eligible HMGP projects. These in-kind matches help to reduce the local contribution to less than 5% cash match, making mitigation projects much more feasible for local jurisdictions and for interested property owners. **Table 6.2** provides an indication of the operating budgets for the cities and counties in the study area.

Table 6.2: Fiscal Capability		
Jurisdiction	**Total FY22 Budget**	**Public Safety FY22 Budget**
Charles City County	$9,126,683	$1,400,107
Chesterfield County	$807,045,000	$207,070,800
Colonial Heights	$96,978,695	$ 12,694,931
Dinwiddie County	$51,552,250	$3,342,951
City of Emporia	$25,283,809	$4,913,139

Table 6.2: Fiscal Capability		
Jurisdiction	**Total FY22 Budget**	**Public Safety FY22 Budget**
Goochland County	$141,274,251	$16,076,318
Greensville County	$21,246,995 (FY 21)	$243,784 (FY 21)
Hanover County	$513,200,000	$88,000,000
Henrico County	$1,431,936,068	$932,525 (EM only)
City of Hopewell	$54,356,282	$5,261,335
New Kent County	$114,283,910	$12,500,685
City of Petersburg	$103,613,656	$17,322,301
Powhatan County	$135,866,359	$592,384
Prince George County	$112,000,000	$112,000,000
City of Richmond	$772,831,959	$200,528,261
Sussex County	$22,050,598	$1,612,820

Sources: Jurisdictional budget offices; websites.

Most communities in the Richmond-Crater region use capital improvement plans and general obligation bonds to plan and fund large-scale public expenditures. Most jurisdictions in the study area also use intergovernmental agreements to leverage resources.

6.6 Policy and Program Capability

6.6.1 Previous Mitigation Efforts

The region does not currently have strong participation amongst jurisdictions in FEMA HMA programs. However, some highlights of past grant-funded projects and other mitigation projects are presented below. Most localities in the region do not apply for HMA grants but instead incorporate mitigation strategies and actions into other regulatory and non-regulatory programs and support activities. Such programs include, but are not limited to, emergency preparedness outreach, floodplain management and building inspections.

6.6.2 Hazard Mitigation Activity Highlights

The region's Central Virginia Emergency Management Alliance is supported by an emergency management planner from PlanRVA. Since local adoption of the *2011 Richmond-Crater Hazard Mitigation Plan*, which merged the previous Crater PDC and Richmond Regional PDC plans, local mitigation has been intertwined with emergency management activities, especially for outreach and messaging. Regional mitigation program highlights are outlined below.

Education and Outreach: Prior to the COVID-19 pandemic, local emergency managers kept a busy calendar of outreach festivals and events which centered on hazard-based safety outreach. The pandemic has limited gatherings in recent years, which has impacted some community outreach efforts. Many previous projects were nationally-branded efforts, which each jurisdiction customized to their locality. Examples include tornado awareness month in March with preparedness drills, annual preparedness days for hazards such as floods, wind, and tornado, Turn Around Don't Drown, the June 1 beginning of hurricane season, and promotion of Virginia preparedness supplies sales tax free weekends. On August 27, 2016, a regional PreparAthon community festival was sponsored by local media and corporations and conducted at the Virginia Science Museum in Richmond Virginia. Preparedness was celebrated by teaching participants how to prepare for and react to disasters and emergencies. Participants who signed up for a Disaster Preparedness Workshop received a free kit worth $45.

Early Warning and Notification: Most communities have refined their early warning and notification systems to allow cell phone and sometimes text notifications and other technological advances, often with targeted abilities for populations with disabilities. Localities with river flood stage monitoring use river and stream gage data to inform warning messaging, but rarely to target detailed evacuation planning. Virginia Commonwealth University uses a loudspeaker system as well as digital notification.

Plan Integration: The 2011 plan was used by some locality planners to inform sections of local comprehensive plans. GIS technicians used some data-layers from the 2011 plan. The 2022 plan's map data will be provided to the PDCs, so the data can be easily integrated into other local government emergency management and planning documents. The Crater Planning District Commission Director of Planning and Information Technology provides GIS technical support to any Crater PDC jurisdictions so will ensure integration of hazard information. The Hazus flood analysis is expected to be used for resiliency planning, especially in coastal jurisdictions.

The region's experienced floodplain program administrators conduct activities on a regular basis to make certain local floodplain management ordinances are administered in accordance with the NFIP. Building officials are partners in working to ensure adherence to hazard-related regulations and criteria in the VUSBC.

Community Rating System (CRS): FEMA's CRS program provides flood insurance premium reductions in five-percent increments following a rigorous, comprehensive floodplain management program review by FEMA and FEMA's partners. The City of Richmond enjoys a CRS rating of Class 8, meaning NFIP policyholders in the SFHA receive a 10% reduction on their annual flood insurance premiums. The Town of Ashland has a CRS Rating of Class 9, giving its policyholders a 5% annual flood insurance policy reduction. Henrico County is actively preparing an application to the CRS.

Critical and Public Facilities Protection: Due to increased power outages from more frequent severe storms with high winds causing tree loss, the region's local governments have intensified efforts to provide redundant power to critical facilities such as public safety buildings, 911 communications centers, health care facilities, as well as schools and other buildings to be used as shelters. Additionally, redundant power or backflow wiring or "quick connects" so that public buildings are able to accept temporary generators have become a local priority. While sometimes eligible for FEMA HMA grant support, most of the generator quick connects and installations have been done through local funding. Most new critical facilities are pre-wired for generator acceptance if a permanent generator is not installed. Communities typically have programs in place to test and fuel the generators on a regular basis to ensure dependability. The trend toward smaller shelters or opening community resource centers in lieu of sheltering has introduced new considerations in determining which facilities are critical and expanding the options for modern disaster sheltering.

6.6.3 Local Government Highlights

Local jurisdictions within the Richmond-Crater region have had numerous successes with mitigation actions that reduce vulnerability from a variety of hazards. The following list of programs, projects and policy changes highlight both successfully completed mitigation actions and illustrate how the mitigation planning process and plan itself have been integrated into other community plans, policies and regulations.

Ashland

Ashland officials report considerable progress with Continuity of Operations (COOP) planning, a need identified in the 2017 plan. The new threat assessment, COOP and EOP have been prepared jointly with the county, although each department will have their own operational plans. The COOP is substantially complete, but must be finalized and implemented with the county in the next planning period.

Charles City County

Charles City County is now considered an ingestion pathway community for Surry nuclear power plant emergencies and participates in appropriate testing. All community critical facilities have adequate generator capabilities. The county has established an effective emergency operations center within its Judicial Center. Emergency communications are being enhanced by the addition of a communication tower in the vicinity of the Judicial Center.

Chesterfield County

Chesterfield County has acquired four repetitive loss properties along Beach and Old Beach Road in the central part of the county. FEMA mitigation grant funds were used for this project.

More recently, the county was successful in implementing a recommended action in the previous plan regarding incorporating the 2017 Mitigation Action Plan into the comprehensive plan update being conducted simultaneously. Mitigation actions are similar throughout the two documents. The county also has a new COOP that will aid in the process of identifying needs for protecting critical facility infrastructure, an action in the previous mitigation plan that is retained in this update.

The county strives to provide a variety of emergency management—related training opportunities to county staff on an annual basis. Emergency Management is currently revising their recovery training and developing new best practices. Simultaneously, they have expanded their public outreach efforts to focus on the whole community concept of including seniors, people with disabilities, civic associations and faith-based organizations.

County officials report that through coordination with Virginia Department of Energy and use of the agency's maps of abandoned mines, the county has modified their development review process to include consideration of physical abandoned mine and related sinkhole hazards.

City of Colonial Heights

City officials report that two mitigation actions identified in the previous plan have been completed in the past five years. The city has completed a project to purchase and distribute NOAA weather radios for public facilities. They have also worked with Crater PDC to obtain and begin using GIS data regarding building footprint data to enable more precise flood hazard analysis for a variety of purposes.

Dinwiddie County

COVID-19 created a number of lessons learned that will inform the refinement of the county's new COOP over the next several years. The COOP was finalized, as recommended in the 2017 plan, just before COVID impacted the globe. The county also implemented their new Debris Management Plan in the past five years as called for the in the 2017 plan. Also, the county's Computer Aided Dispatch system has been improved with regard to road and railroad crossings, better correlating the crossing numbers to geographic locations.

Goochland County

Goochland County has been working with VDOF to promote best management practices among landowners in the county. The department and the county have offered joint courses on forestry management and wetlands protection. In addition, the county has thinned more than 160 acres of flammable pine plantations vulnerable to wildfire and insect infestation while instituting best management practices on county-owned property.

Greensville County

In 2009, the USACE, Norfolk District, completed a stream and rain gauging network study within the Chowan River Basin. The study identified gauging station needs that would improve flood forecasts by the NWS. An additional study in 2009 evaluated water resource issues, such as environmental restoration, flood risk management, navigation, and water quality. These two studies helped to determine Risk Mapping, Assessment, and Planning (Risk MAP) program activities implemented in the Chowan River Basin. The three Risk MAP activities included:

- Assessment of basin flood hazard data.
- Establishment of local community officials' knowledge and understanding of flood risk management concepts and increasing public awareness of flood hazards and the NFIP.
- Support to state and local governments to engage in risk-based mitigation planning.

The Chowan River Basin report provides an in-depth assessment of the river basin and mitigation activities for understanding flood risk. Areas of concern are highlighted throughout the report, which should be used to identify future mitigation actions.

Hanover County

Fire Station #5, the location of the Hanover County EOC, has been updated since the first regional hazard mitigation plan to address its electrical power capacity issues. The county also used the proceeds of a bond issuance to improve the communication system and interoperability. The basement of the Hanover County Sheriff's Office is still subject to flooding through the windows. This flooding could affect the emergency communications ability of the Sheriff's Office. Hanover County has also used FEMA mitigation funds for minor, localized drainage improvement projects. County officials indicate that, per the mitigation actions in the previous plan, needs related to electrical hook-ups, wiring and switches for connections to emergency power generation at key critical facilities has been substantially completed.

Henrico County

Henrico County has implemented higher standards in floodplain management, including a prohibition on new residential structures in identified floodplains. As a FEMA Cooperating Technical Partner, the county has mapped floodplain drainage areas in 100 acre units, providing far more discrete floodplain modeling than industry standards of 1 square mile (640 acres). Development or redevelopment is prohibited if it will cause a rise in the base flood elevation (or 100-year flood level). In addition, the lowest floor of new development and substantially improved structures must be two foot above the BFE if within the SFHA, and one foot above the BFE if within the 500-

year floodplain or within 40 feet of the SFHA. Finally, through the Chesapeake Bay Preservation Act ordinance, a mandatory stream buffer further prohibits development adjacent to streams and wetlands.

In 2005, the county purchased several properties in the Bloomingdale neighborhood along with the property at the intersection of Brook and Lakeside Avenues that were high flood risk, repetitive damage sites.

More recently, the county implemented a mitigation action from the previous plan regarding enhanced water availability for wildfire fighting in the eastern portion of the county. As sheltering needs evolve in this century, the county is focusing more on multi-hazard vulnerability assessments and mitigation planning for all schools to determine their suitability as temporary shelters during tornadoes and earthquakes, for example. Henrico County is also currently developing a floodplain acquisition program.

Hopewell

A 2017 mitigation action involving stream channel and road embankment stabilization along the City's primary emergency route is substantially complete. Work along Winston Churchill Drive between High Avenue and Arlington Road to protect adjacent residences is substantially complete.

New Kent County

As recommended in the 2017 plan, the county has applied for and will retain StormReady certification from the NWS. A prior mitigation action related to continuing participation in the NFIP and CRS, to include training and CFM certifications and other related actions, is echoed in the county's comprehensive plan. County officials report that road construction in the Fannies Creek area is mitigated as suggested in the previous plan. The county has also completed measures that requires substantial coordination with regional stakeholders, including coordination with various state agencies regarding traffic management concerns related to a Hampton Roads evacuation. The county has also assessed earthquake vulnerability in the area as recommended by the previous plan.

Prince George County

A mitigation action in the 2017 plan called for construction of a new burn building for the Fire Department to conduct exercises. As of late fall 2021, the designs are complete and construction is expected to begin shortly. The county also constructed a new fire station at Route 10 and Moody Road.

City of Richmond

Following numerous floods from the 1970's through 1990's, the USACE performed a study and ultimately constructed a flood wall to protect the Shockoe Bottom area and a small area of the south bank from James River flooding. The City of Richmond has been very active since 2011 with new mitigation projects and programs to help reduce its vulnerability to future events. The city received about 14 inches of rain from Tropical Storm Gaston, which the stormwater system was not able to manage effectively. Drainage features such as the East Gravity Outlet, which are part of the floodwall project, were found to contribute to increased damages on the protected side of the floodwall. The occurrence of back-to-back flooding brought attention to the city's older infrastructure system and its need for a dedicated source of funding. Using Capital Improvement Plan (CIP) funds in 2008–2010, the city completed many improvements to the Shockoe Bottom area.

During the additional budget cycles, the City of Richmond added three gate structures on the Northeast Interceptor to prevent the transfer of flow from the Arch Sewer to the main Box Sewer, which is the primary sewer collector in the Shockoe Bottom area. The city also installed or modified approximately 100 curb inlets to improve the capture of stormwater from the steeper slopes leading to the Shockoe Bottom watershed, helping to prevent flooding in the lowest parts of the Shockoe Bottom area. In addition, the city redesigned the storm drainage system in Pine Alley to capture a significant portion of the stormwater that would normally enter the alley and flood area businesses. Separation of the East Gravity Outlet from the combined sewer overflow system was also done to eliminate the need for gate operations to minimize interior flooding, increase the reliability of both the flood-reduction system and environmental protection system, and allow the operation of the system with a fail-safe mode. City contractors also connected the Box Sewer to the East Gravity Outlet to provide a high-rate overflow, and restored the Upper Shockoe Creek Retention Basin to further improve the capacity of the Shockoe Bottom Drainage system.

The major improvements in the Shockoe Bottom area were facilitated by the creation of a stormwater utility controlled by the Department of Public Utilities in 2009. This new utility transferred maintenance and improvements of the city's stormwater system from Public Works to Public Utilities and created a long-term source of funding. The new utility now creates an annual CIP list of projects and has begun working to improve the various systems throughout the city to reduce the potential loss of life and damages from future events.

Tropical Storms Gaston and Ernesto led the City of Richmond to complete two large residential mitigation projects that helped reconstruct and remove homes from the floodplain. The first was Broad Rock Creek Floodway Mitigation Project. This project included the acquisition, demolition, and relocation of several homes. The project also

identified other structures in the city that were then reconstructed to move their systems out and above the BFE. All properties were located in the Broad Rock Creek floodway and were adjacent to a 100-year floodplain where structures sustained severe damage as a result of the remnants of Tropical Storm Gaston in 2004.

The second project occurred with the acquisition and relocation of structures in the Battery Park community. The historic city park and several homes immediately adjacent to it sustained heavy damage during Tropical Storm Ernesto in 2006. The project resulted in the removal of homes from the floodplain and the creation of new parkland.

Richmond successfully used HMGP grant funds to add several stream monitoring gaging stations to augment its flood warning system. These are tied to the Commonwealth's Integrated Flood Observing and Warning System (IFLOW) system. Recently, Richmond has distributed NOAA weather radios to residents to expand their communication capabilities when power is out after disaster events, and they have successfully integrated GIS capabilities with emergency management needs, although additional opportunities remain. Emergency managers indicate the City has conducted wind studies on many City-owned facilities as part of a more comprehensive inventory assessment identified in Richmond 300.

Sussex County

Following the early 2016 tornado which killed three in Waverly, a Waverly Tornado Recovery Urgent Needs Study was conducted, which focused on long-term recovery efforts for the area. Meetings were conducted in late 2016 with the objective of submission of HUD grant applications to support neighborhood recovery and manufactured housing rehabilitation/mitigation. Mitigation action 11 in the MAP (in Section 7) was developed for the previous Hazard Mitigation Plan. Although some progress has been made, the action is retained in this plan with additional action expected in partnership with HUD in the future.

6.6.4 Emergency Operations Plans (EOP)

A comprehensive emergency management operations plan (or emergency operations plan) sets out a series of actions to be taken by government agencies and private organizations in response to an emergency or disaster event. The plan describes the jurisdiction's capabilities to respond to emergencies and establishes the responsibilities and procedures for responding effectively to the actual occurrence of a disaster.

Emergency operations plans in the Richmond-Crater region typically reference the Richmond-Crater PDC mitigation plan rather than including a mitigation section to the EOP. EOPs describe the responsibilities of various departments and agencies, private businesses, and the public in a post-disaster scenario. Importantly, I EOP outlines a concept of operations that explains and supports activities to be undertaken before and

during a disaster. Specific tasks are assigned to the local governing body and various agencies, such as Emergency Services, Health, Building Officials/County Engineer/Planning and Zoning, Law Enforcement, Fire Department and Emergency Crew, Superintendent of Schools, and the Public Information Officer. Each of the operational subplans is part of a total response plan typically overseen by the Director of Emergency Management or a comparable division lead. Emergency Managers for each city and county were included preparation of the MAP because their knowledge of their jurisdiction's EOP and its strengths and weaknesses is a valuable component of this planning process. In this way, the EOP was integrated into the update to the hazard mitigation plan.

In addition to local EOPs, VDOT and VDEM have worked with the localities to develop incident plans that include evacuation routes. When an event occurs, the Emergency Alert System (EAS) provides the latest information on evacuation. The majority of the Richmond and Crater regions are within the Richmond Extended EAS area. Surry County is an exception and is part of the Eastern Virginia EAS area.

Many of the region's community emergency operations plans outline the concerns surrounding mass evacuation, in terms of jurisdictional evacuation, evacuation of other areas in which the locality acts as a "host," or as a transit route locale. In addition to EOPs, many jurisdictions without comprehensive COOPs for all internal agencies were interested in supplementing their existing EOP or existing COOP with additional planning, and this insight was included in the MAP planning process.

6.6.5 Floodplain Management

Communities that regulate development in floodplains are able to participate in the NFIP. In return, the NFIP makes federally-backed flood insurance policies available for properties in the community. In Virginia, local governments are provided the power to regulate land use through Code of Virginia, Title 15.2 Counties, Cities and Towns, Subtitle II Powers of Local Government. Floodplain management in the study area communities is administered as a zoning overlay in the Zoning Ordinance (§ 15.2-2280) or through a standalone Floodplain Management ordinance (§ 15.2-984). Table 5.5 summarizes the history of NFIP participation for the study area jurisdictions. The table also provides the current FIRM effective date for each community.

The Towns of Surry, McKenney and Waverly did not have initial identified SFHA boundaries on the FIRMs; however, McKenney has chosen to adopt an ordinance and participate to make flood insurance available. **Table 6.3** below provides additional information for the study area jurisdictions. Community floodplain management ordinances were reviewed by the consultant as part of the preparation for Workshop #3; analysis from the review was discussed and incorporated into the planning process through recommendations for mitigation actions.

Each community has designated staff who enforce their floodplain management ordinance. The staff of the DCR Floodplain Management Program, including the NFIP State Coordinator, serve as state level administrators of the program, providing assistance to communities upon request.

DCR's Virginia Dam Safety Program operates under the authority of the Virginia Soil and Water Conservation Board. The division regulates impounding structures in the Commonwealth to ensure that they are 'properly and safely constructed, maintained and operated.' The Virginia Dam Safety Act, Article 2, Chapter 6, Title 10.1 (10.1-604 et seq) of the Code of Virginia and Dam Safety Impounding Structure Regulations (Dam Safety Regulations), were established and published by the Virginia Soil and Water Conservation Board. Virginia's Dam Safety Regulations were last updated on March 23, 2016.

Ongoing dam inspections and Virginia's participation in the National Dam Safety Program administered by FEMA and the USACE serve as a preventative measure against dam failures. Disaster recovery programs include assistance to dam owners and local officials in assessing the condition of dams following a flood disaster and assuring the repairs and reconstruction of damaged structures in compliance with the NFIP regulations.

6.6.7 Comprehensive Plans

Virginia law requires that all communities have a comprehensive land use plan and that it be updated every five years. A community's comprehensive plan provides the future vision for the community regarding growth and development; not by coincidence, many of the study area plans include land use or environmental protection goals that could support future mitigation efforts. For example, limiting development in the floodplain (which is considered mitigation) may also help meet open space goals laid out in a comprehensive plan. Several comprehensive plans in the study area address mitigation, green space, resiliency and long-term community sustainability. These are relatively new inclusions, and as communities continue to update their comprehensive plans and to create separate resilience plans, mitigation and resiliency issues will likely be more comprehensively addressed.

For the most part, these strategies address development in the floodplain or otherwise flood-prone areas. In addition, the plans indicate that communities in the Richmond-Crater region are experienced with and willing to use growth management tools such as zoning, subdivision regulations, and preferential tax assessment. In many cases, demographic information, land use characteristics and growth projections found in the most current available local comprehensive plans were used to update Section 4.0 Community Profile. Comprehensive plans for the communities were also consulted during the development of mitigation actions to identify areas of potential overlap or synergy, where previously-identified recommendations in the comprehensive plan could

be integrated into new or modified mitigation actions that address specific hazard vulnerabilities. This practice also helps prevent conflict between community planning efforts.

Table 6.3 summarizes the local planning mechanisms used by the jurisdictions in the study area.

Table 6.3: Local Planning Mechanisms

Locality	Disaster Recovery Plan	Comprehensive Plan	Floodplain Management Ordinance	Stormwater Management Plan	Emergency Operations Plan	Other
Charles City County	✓	✓	✓		✓	Chesapeake Bay Preservation Program
Chesterfield County	✓	✓	✓		✓	Continuity of Operations (COOP); Evacuation Plan; Wetlands Preservation Program; Open Space Program; Riparian Buffers Program
City of Colonial Heights	✓	✓	✓	✓	✓	Historic preservation ordinance; Chesapeake Bay Preservation Program (wetlands)
Dinwiddie County		✓	✓		✓	
City of Emporia		✓	✓		✓	Transportation plan, 1984
Hanover County	✓	✓	✓	✓	✓	Chesapeake Bay Preservation Program
Town of Ashland		✓	✓		✓	CRS
Henrico County	✓	✓	✓	✓	✓	Chesapeake Bay Preservation Program
Goochland County	✓	✓	✓	✓	✓	

Table 6.3: Local Planning Mechanisms						
Locality	Disaster Recovery Plan	Comprehensive Plan	Floodplain Management Ordinance	Stormwater Management Plan	Emergency Operations Plan	Other
Greensville County	✓	✓	✓		✓	Erosion control and sediment ordinance
City of Hopewell	✓	✓	✓	✓	✓	COOP, 2001 Evacuation plan
New Kent County		✓	✓	✓	✓	Chesapeake Bay Preservation Program
City of Petersburg	✓	✓	✓	✓	✓	Transportation plan; Chesapeake Bay Preservation Program Riparian buffers Open space program and plan
Powhatan County	✓	✓	✓	✓	✓	Open Space; Natural Resources Inventory; Debris Management Plan
Prince George County	✓	✓	✓	✓	✓	Chesapeake Bay Preservation Program Riparian buffers
City of Richmond	✓	✓	✓	✓	✓	Chesapeake Bay Preservation Program; CRS
Town of Surry		✓ (through county)			✓ (through county)	Chesapeake Bay Preservation Program Evacuation plan
Sussex County		✓	✓		✓	Evacuation plan Transportation plan, 1997
Town of Wakefield		✓ (through county)	✓		✓ (through county)	Chesapeake Bay Preservation Program Evacuation plan
Town of Waverly		✓ (through county)			✓ (through county)	Chesapeake Bay Preservation Program Evacuation plan

Table 6.4 summarizes how individual communities expect to continue integrating hazard mitigation actions into other planning tools, regulations and activities beyond those activities listed above. Check marks indicate which planning mechanisms are targeted for existing or future coordination and integration with that community's mitigation action plan. None of the communities currently participating in the NFIP are considering a change in status at this time.

Table 6.4: Integration Of Hazard Mitigation Actions Into Other Planning Mechanisms

Locality	Regulations	Administrative & Technical Procedures	Fiscal Planning (CIP, grants, budgeting)	Land Use Planning (comprehensive, resilience, transportation)	Other (public information, activities, etc)
Charles City County	✓	✓	✓	✓	✓
Chesterfield County	✓	✓	✓	✓	✓
City of Colonial Heights	✓	✓	✓	✓	✓
Dinwiddie County	✓	✓	✓	✓	✓
City of Emporia	✓	✓	✓	✓	✓
Hanover County	✓	✓	✓	✓	✓
Town of Ashland	✓	✓	✓	✓	✓
Henrico County	✓	✓	✓	✓	✓
Goochland County	✓	✓	✓	✓	✓
Greensville County	✓	✓	✓	✓	✓
City of Hopewell	✓	✓	✓	✓	✓
New Kent County	✓	✓	✓	✓	✓
City of Petersburg	✓	✓	✓	✓	✓
Powhatan County	✓	✓	✓	✓	✓
Prince George County	✓	✓	✓	✓	✓
City of Richmond	✓	✓	✓	✓	✓
Town of Surry	✓	✓		✓	
Sussex County	✓	✓	✓	✓	✓
Town of Wakefield	✓		✓	✓	
Town of Waverly	✓		✓	✓	

6.7 Legal Authority

Local governments in Virginia, including those in the Richmond-Crater region, have a wide range of tools available to them for implementing mitigation programs, policies,

and actions. A hazard mitigation program can use any or all of the four broad types of government powers granted by the Commonwealth of Virginia, which are (a) regulation, (b) acquisition, (c) taxation, and (d) spending. The scope of this local authority is subject to constraints; however, as all of Virginia's political subdivisions only have the power to act with proper delegation from the state. All power is vested in the state and can only be exercised by local governments to the extent it is delegated (in accordance with Dillon's Rule). Thus, this portion of the capabilities assessment will summarize Virginia's enabling legislation that grants the four types of government powers within the context of available hazard mitigation tools and techniques.

6.7.1 Regulation

General Police Power

Virginia's local governments have been granted broad regulatory powers in their jurisdictions. Virginia State Statutes bestow the general police power on local governments, allowing them to enact and enforce ordinances that define, prohibit, regulate or abate acts, omissions, or conditions detrimental to the health, safety, and welfare of the people, and to define and abate nuisances (including public health nuisances). Since hazard mitigation can be included under the police power (as protection of public health, safety, and welfare), towns, cities, and counties may include requirements for hazard mitigation in local ordinances. Local governments may use their ordinance-making power to abate "nuisances," which could include, by local definition, any activity or condition making people or property more vulnerable to any hazard.

All of the jurisdictions located in the Richmond-Crater region have enacted and enforce regulatory ordinances designed to promote the public health, safety, and general welfare of its citizenry.

Land Use

Regulatory powers granted by the state to local governments are the most basic manner in which a local government can control the use of land within its jurisdiction. Through various land use regulatory powers, a local government can control the amount, timing, density, quality, and location of new development. All these characteristics of growth can determine the level of a community's vulnerability in the event of a natural hazard. Land use regulatory powers include the power to plan, enact and enforce zoning ordinances, floodplain ordinances, and subdivision controls. Each local community in the Richmond-Crater region possesses legal authority to prevent unsuitable development in hazard-prone areas.

Planning

According to state statutes, local governments in Virginia may create or designate a planning agency. The planning agency may perform a number of duties, including:

- making studies of the area;
- determining objectives;
- preparing and adopting plans for achieving those objectives;
- developing and recommending policies, ordinances, and administrative means to implement plans; and
- performance of other related duties.

The importance of the planning powers of local governments is illustrated by the requirement that zoning regulations be made in accordance with a comprehensive plan. While the ordinance itself may provide evidence that zoning is being conducted "in accordance with a plan," the existence of a separate planning document ensures that the government is developing regulations and ordinances that are consistent with the overall goals of the community.

The cities and counties within the Richmond-Crater region all have planning departments and comprehensive plans. Most of the towns in the region, with the exception of Ashland, have no formal planning and limited zoning authority; these small towns rely on the county in which they are located to enforce most planning and zoning regulations. For purposes of the NFIP, towns are required to have their own floodplain management ordinances, but may rely on the county for help with administration, preferably through a mutual aid agreement.

Zoning

Zoning is the traditional and most common tool available to local governments to control the use of land. Broad authority is granted for municipalities and counties in Virginia to engage in zoning. Land "uses" controlled by zoning include the type of use (e.g., residential, commercial, and industrial), as well as minimum specifications that control height and bulk such as lot size, building height and setbacks, and density of population. Local governments are authorized to divide their territorial jurisdiction into districts, and to regulate and restrict the erection, construction, reconstruction, alteration, repair or use of buildings, structures, or land within those districts. Districts may include general-use districts, overlay districts (such as for floodplains), and special-use or conditional-use districts. Zoning ordinances consist of maps and written text.

Subdivision Regulations

Subdivision regulations control the division of land into parcels for the purpose of building development or sale. Flood-related subdivision controls may prohibit the subdivision of land subject to flooding unless flood hazards are identified and addressed. Subdivision regulations may also require that developers install adequate drainage facilities or stormwater controls, address erosion and sediment control, and design water and sewer systems to minimize flood damage and contamination.

All PlanRVA jurisdictions continue enforcement of their adopted subdivision ordinances and in many instances, have updated those ordinances during the past ten years. Some of the ordinances contain floodplain-specific provisions. For instance, Powhatan County requires a 100-foot natural vegetative buffer along all perennial streams as well as setbacks for residential structures from the floodplain. In New Kent County, new subdivisions with 50 or more homes are required to have at least two ingresses and egresses. This requirement will allow an alternate route if one is blocked in case of emergency. Since subdivisions of four lots or more trigger major subdivision review standards in Charles City County, most subdivisions are smaller to avoid these more rigorous standards.

Likewise, the jurisdictions in the Crater PDC have adopted subdivision ordinances. Many of the ordinances require that land be suited for development, and specifically, that land platted for residential use not be subject to flooding. The City of Emporia and Surry County require that utilities be buried underground.

Floodplain Management

All communities with a FEMA-designated SFHA in the Richmond-Crater region have adopted floodplain management regulations. Powhatan County's regulations have been in place since 1973, prior to joining the NFIP. The other jurisdictions adopted floodplain regulations as part of joining the NFIP.

In several cases, the regulations adopted by the study communities go beyond the minimum standards of the NFIP. Goochland and Powhatan Counties restrict uses in the floodplain. Henrico County prohibits new residential development in the floodplain and the county has developed, mapped and regulates their own floodplains that extend beyond the boundaries of the FEMA SFHA. The majority of communities set design criteria for utilities and other public infrastructure.

Goochland County and the City of Richmond prohibit manufactured homes in all or portions of the floodplain. Chesterfield County prohibits new manufactured home parks, while Greensville County prohibits new manufactured homes unless located in an existing park.

Twelve of the ordinances in the Richmond-Crater region describe procedures for structures built before the regulations were in place. While the ordinances must, at a

minimum, require that lowest floors of new and improved structures in the SFHA be constructed with the lowest floor at or above the base, or 100-year, flood elevation, freeboard refers to an extra level or protection that some communities incorporate into their regulations above the minimums. All localities that allow development in the floodplain require at least a 1-foot freeboard for development with some localities having higher freeboard requirements. The City of Hopewell and Henrico County require a 2-foot freeboard for all new and substantially reconstructed homes in the floodplain, Greensville County requires 18 inches of freeboard in its ordinance, and Surry County includes a 1-foot freeboard. Goochland County has the highest freeboard with a level of 3 feet above the base flood elevation for construction within the regulated floodplain.

Effective January 1, 2022, a new flood disclosure requirement of Virginia Code Section 55.1-708.2, requires that an owner of residential real property who knows that the dwelling unit is a repetitive risk loss structure must disclose such fact to the purchaser. A "repetitive risk loss structure" is defined as a property for which two or more claims of more than $1,000 were paid by the National Flood Insurance Program within any rolling 10-year period since 1978. The law further requires that the owner of a property subject to the disclosure requirement must provide notification to the purchaser of any disclosure before the ratification of a contract.

Resiliency

In 2021, the Commonwealth began working with 2,000 stakeholders to build the *Coastal Resilience Master Plan*. This plan documents which land is exposed to coastal flooding hazards now and into the future, as well as the impacts of future flooding scenarios on coastal Virginia's community resources and manmade and natural infrastructure.

The Master Plan concluded that between 2020 and 2080:

- the number of residents living in homes exposed to extreme coastal flooding is projected to grow from approximately 360,000 to 943,000, an increase of 160%;
- the number of residential, public, and commercial buildings exposed to an extreme coastal flood is projected to increase by almost 150%, from 140,000 to 340,000, while annualized flood damages increase by 1,300% from $0.4 to $5.1 billion;
- the number of miles of roadways exposed to chronic coastal flooding is projected to increase from 1,000 to nearly 3,800 miles, an increase of nearly 280%; and
- an estimated 170,000 acres, or 89%, of existing tidal wetlands and 3,800 acres, or 38%, of existing dunes and beaches may be permanently inundated, effectively lost to open water.

The Commonwealth intends to develop successive updates of the Master Plan on at least a five-year cycle, managed by DCR in consultation with the Chief Resilience Officer, the Special Assistant to the Governor for Coastal Adaptation and Protection, and the Technical Advisory Committee.

The next phase of the Master Plan anticipated by 2024, will aim to address recommendations of the Technical Advisory Committee to broaden the analysis of natural hazards by including rainfall-driven, riverine, and compound flooding, expand and improve the inventory of resilience projects by continuing to add efforts and working with project owners to better understand the benefits of projects, and extend this critical work beyond the coastal region to encompass statewide resilience needs.

Projects identified in the Master Plan must go through a specified resiliency planning process to be funded through the Community Flood Preparedness Fund (CFPF), also launched in 2021. Several communities in the Richmond-Crater region are beginning initial stages of the planning process. CFPF is a statewide program maintained by DCR that fills pressing needs by prioritizing low-income communities and provides a permanent funding stream to finance flooding resilience projects, studies, and capacity-building initiatives. The Regional Greenhouse Gas Initiative (RGGI) is an initiative made up of eleven states that aims to reduce greenhouse gas emissions. RGGI holds carbon dioxide auctions, which will fund the Virginia CFPF.

North Atlantic Coast Comprehensive Study

The USACE recently completed a report detailing the results of a two-year study to address coastal storm and flood risk to vulnerable populations, property, ecosystems, and infrastructure affected by Hurricane Sandy in the North Atlantic region of the United States.

The *North Atlantic Coast Comprehensive Study* is designed to help local communities better understand changing flood risks associated with climate change and to provide tools to help those communities better prepare for future flood risks. It builds on lessons learned from Hurricane Sandy and attempts to bring to bear the latest scientific information available for state, local, and tribal planners.

The conclusions of the study, as detailed in the final report, include several findings, outcomes, and opportunities, such as the use of a nine-step Coastal Storm Risk Management Framework that can be customized for any coastal watershed. The study ranked localities risk impacts as to High, Medium or Low Impact. Within the Richmond-Crater region, Henrico, Charles City, Chesterfield, Prince George and Sussex Counties were ranked “Low” and Surry County was ranked “Medium.” This comprehensive study can provide planners with additional information on long-term impacts of coastal storms.

Stormwater Management

A stormwater management plan is designed to address flooding associated with stormwater runoff. The stormwater management plan is typically focused on design and construction measures that are intended to reduce the impact of frequent urban nuisance flooding.

Virginia Department of Environmental Quality (VDEQ) is the lead agency for developing and implementing statewide stormwater management and nonpoint source pollution control programs to protect the Commonwealth's water quality and quantity. Currently, three laws apply to land disturbance activity in Virginia: the Stormwater Management Act (§ 62.1-44.15:24 et seq.), Erosion and Sediment Control Law (§ 62.1-44.15:51 et seq.), and Chesapeake Bay Preservation Act (§ 62.1-44.15:67 et seq.). These laws evolved at different times, have been administered by different agencies throughout the years, and created three distinct regulatory programs with varying requirements. At the request of the Chairs of the Virginia House and Senate Natural Resources committees, VDEQ pulled together a group of stakeholders to consider ways to streamline and possibly combine these programs. The goal is to make the requirements clearer, more consistent and more "user-friendly", while continuing to ensure the protection of the Commonwealth's water quality. The Department asked representatives of all affected constituencies to take part in this important effort – including local governments, the development community, environmental organizations, agriculture, and others.

Local governments in Virginia are required to administer the stormwater management and erosion and sediment control laws and regulations promulgated by the State through local ordinances. Surry County's program is administered directly by VDEQ.

Chesapeake Bay Preservation Act (CBPA)

The Virginia General Assembly enacted the Chesapeake Bay Preservation Act in 1988, requiring local governments statewide to include water quality protection measures in their zoning and subdivision ordinances and in their comprehensive plans. Although the Act was developed with the intent of improving water quality throughout Virginia, the regulations have the additional benefit of controlling or restricting development in floodplain areas. The CBPA Overlay District consists of three components: Resource Protection Area (RPA) that includes a 100 foot RPA buffer, a Resource Management Area (RMA), and the Intensely Developed Areas (IDA). The lands that make up Chesapeake Bay Preservation Areas are those that have the potential to impact floodplains and water quality most directly. Generally, there are two main types of land features: those that protect and benefit water quality (RPAs); and those that, without proper management, have the potential to damage water quality (RMAs). Areas with intensive waterfront industrial land uses and activities are categorized as IDAs.

Localities within the plan update region that are within the Chesapeake Bay watershed and thus enforce the CBPA regulations include: Charles City, Chesterfield, Hanover, Henrico, New Kent, Prince George, and Surry Counties, the cities of Colonial Heights, Hopewell, Petersburg and Richmond and the towns of Ashland, and Surry.

Building Codes and Building Inspection

Building codes regulate design and construction standards. Permits are issued and work is inspected on new construction and building alterations. Permitting and inspection processes both before and after a disaster can affect the level of hazard risk faced by a community.

Under Virginia law, the Department of Housing and Community Development (DHCD) has authority to promulgate building regulations and a regulatory process for development and adoption of a statewide mandatory mini/maxi construction code that all 167 units of local government (counties and incorporated cities) must adopt and implement. As stated above, the VUSBC is administered by the Virginia Board of Housing and Community Development and regulates construction and maintenance of buildings and structures. Effective July 1, 2021, Virginia adopted the 2018 I-codes as referenced in the Virginia Construction Code Part 1, the 2018 Statewide Fire Prevention Code; and the 2017 National Electrical Code. Implementation for state colleges and universities is the responsibility of the Virginia General Services Department. The State Fire Marshal within DHCD is responsible for statewide implementation of the Fire Code unless localities elect to adopt this code at the local level. Localities can and do adopt the Property Maintenance Code, which is within the scope of the statewide code. Enforcement of the VUSBC is the responsibility of the local government's building inspections department. Many of the towns in the study area rely upon the county building department for code-related functions.

DHCD has a resiliency subcommittee on codes that met and made recommendations for the 2018 code, and each code change had to have a resiliency impact considered. The 2018 version of the codes incorporates several resiliency measures, including: a requirement for 3 Elevation Certificates at various stages of construction for structures built in the SFHA; various freeboard requirements based on building characteristics (1 foot minimum for residential); and coastal high hazard area requirements for Coastal A Zones, or areas seaward of the LiMWA. The resiliency subcommittee is doing the same for the 2021 update currently underway.

Radon Exposure Remediation

The Code of Virginia requires that Radon testers and mitigators be currently certified by either the National Radon Proficiency Program or the National Radon Safety Board. The program is administered by VDH, Office of Radiological Health, Indoor Radon Program. In 1993, the Virginia General Assembly passed legislation that requires all

schools in the Commonwealth to be tested for radon after July 1, 1994, and also any new school buildings or additions built after that date. Each school is required to maintain files of their radon test results. Upon request, the Department's Radon Coordinator can present a course on radon for real estate transactions in Virginia. The department has a limited supply of radon test devices that are distributed annually, free upon request.

6.7.2 Acquisition

The power of acquisition can be a useful tool for pursuing local mitigation goals. Local governments may find that the most effective method for completely "hazard-proofing" a particular piece of property or area is to acquire the property (either in fee simple or a lesser interest, such as an easement), thus removing the property from the private market and eliminating or reducing the possibility of inappropriate development. Virginia legislation empowers jurisdictions to acquire property for public purpose by gift, grant, devise, bequest, exchange, purchase, lease, or eminent domain.

The City of Richmond completed acquisition projects after 2006 Tropical Depression Ernesto, in both the Broad Rock Creek and Battery Park neighborhoods. All projects were completed without using FEMA mitigation funds. Virginia CDBG Urgent Needs funds were used following Ernesto to acquire and demolish flood-damaged properties. Once the structures were demolished, the lots were dedicated to permanent open space. In some instances, Richmond has used city funds available to the Building Official to acquire and demolish disaster-impacted properties, such as with some trailer park communities and a residence impacted by the landslide on Church Hill following Tropical Depression Gaston. Chesterfield County acquired several repetitive loss properties along Beach and Old Beach Roads using FEMA HMGP funds following Hurricane Isabel. Development of an acquisition program is proposed in the City of Petersburg Comprehensive Plan. The City of Colonial Heights continues to consider a voluntary acquisition program along high-risk creeks to eliminate repetitive flood claims in the city. Henrico County is currently developing a floodplain acquisition program, as well.

6.7.3 Taxation

Real estate taxes are a significant source of local revenue. Code of Virginia §58.1-3201 requires that a structure be assessed at 100% of fair market value. A building that increases in value of more than $500 due to repairs or additions must be assessed as new (Code of Virginia §58.1-3291), also at 100% of fair market value. At the same time, the code allows the abatement of local real estate taxes for buildings unusable for at least 30 days during the year (Code of Virginia §58.1-3222); however, the abatement is prorated based on what portion of the year the property was impacted.

Specified local governments in the Commonwealth have the ability to levy special assessments on property owners for all or part of the costs of acquiring, constructing,

reconstructing, extending, or otherwise building or improving flood protection works within a designated area (Code of Virginia §15.2-2404(D)); however, none of the specified communities are within the Richmond-Crater study area. Special assessments for flood control structures can serve to increase the cost of building in such areas, thereby effectively discouraging development. Because the usual methods of apportionment seem mechanical and arbitrary, and because the tax burden on a particular piece of property is often quite large, the major constraint in using special assessments is policy-oriented. Special assessments seem to offer little in terms of control over land use in developing areas. They can, however, be used to finance the provision of necessary services within municipal or county boundaries. In addition, they are useful in distributing the costs of the infrastructure required by new development to new property owners.

The State Corporation Commission collects communication taxes in Virginia, including a 75 cent E911 tax on landlines and Voice Over Internet Protocol phones, a 94 cent postpaid wireless E-911 tax for mobile phones, and a 63 cent prepaid wireless E-911 tax for mobile phones. These taxes pay for the cost of an emergency response communications system that identifies both the caller and the location of the call.

6.7.4 Spending

The fourth major power that has been delegated from the Virginia General Assembly to local governments is the power to make expenditures in the public interest. Hazard mitigation principles should be made a routine part of relevant spending decisions made by the local government, including the adoption of annual budgets and the CIP.

A CIP is a schedule for the provision of municipal or county services during a specified period of time. Capital programming, by itself, can be used as a growth management technique, with a view to hazard mitigation. By tentatively committing itself to a timetable for the provision of capital to extend services, a community can control growth to some extent, especially in areas where the provision of on-site sewage disposal and water supply are unusually expensive.

In addition to formulating a timetable for the provision of services, a local community can regulate the extension of and access to services. A CIP that is coordinated with extension and access policies can provide a significant degree of control over the location and timing of growth. These tools can also influence the cost of growth. If the CIP is effective in directing growth away from environmentally-sensitive or high-hazard areas, for example, it can reduce environmental costs.

The majority of the jurisdictions in the Richmond-Crater region have some form of a CIP. The construction or renovation of capital facilities, such as schools, municipal offices, and police/fire stations is often a highlight of their capital improvements. Investments in stormwater and sewer systems are included in the capital

improvements program for most municipalities. Some jurisdictions also have included open space and other park acquisition costs as part of their CIP.

6.8 Summary

Most of the information in the capability assessment was provided by the jurisdictions in the study area through a capability assessment survey. **Table 6.5** summarizes the self-reported capability and priority assessment; note that several jurisdictions have not returned the 2016 or 2021 update capability assessment surveys.

Table 6.5: Mitigation Capability & Priority Self-Assessment by Jurisdiction

Jurisdiction	Planning and Regulatory Capability	Administrative Capability	Technical Capability	Fiscal Capability	Overall Capability
PlanRVA	Planning High	Moderate	Moderate	Moderate	Moderate
Crater PDC	Planning High	Moderate	Moderate	Moderate	Moderate
Charles City County	Moderate	Moderate	Moderate	Moderate	Moderate
Chesterfield County	High	High	High	High	High
City of Colonial Heights	Moderate	Moderate	Moderate	Moderate	Moderate
Dinwiddie County	Moderate	Moderate	Moderate	Moderate	Moderate
Town of McKenney	Limited	Limited	N/A	Limited	Limited
City of Emporia	Moderate	Moderate	Moderate	Moderate	Moderate
Goochland County	Moderate	Moderate	Moderate	Moderate	Moderate
Greensville County	Moderate	Moderate	Moderate	Moderate	Moderate
Town of Jarratt	Limited	Limited	N/A	Limited	Limited
Hanover County	Moderate	Moderate	Moderate	Moderate	Moderate
Town of Ashland	Moderate	High	Moderate	Limited	Moderate
Henrico County	High	High	High	High	High
City of Hopewell	Moderate	Moderate	Moderate	Limited	Moderate
New Kent County	Moderate	High	Moderate	Moderate	Moderate
City of Petersburg	Limited	Limited	Moderate	Limited	Limited
Powhatan County	Moderate	High	Moderate	Moderate	Moderate
Prince George County	Moderate	Moderate	Moderate	Moderate	Moderate
City of Richmond	Moderate	Moderate	Moderate	Limited	Moderate
Town of Surry	Limited	Limited	Limited	Limited	Limited
Sussex County	Moderate	Limited	Limited	Limited	Limited
Town of Stony Creek	Limited	Limited	Limited	Limited	Limited
Town of Wakefield	Moderate	Moderate	Limited	Moderate	Moderate
Town of Waverly	Limited	Limited	Limited	Limited	Limited

High: No increase in capability needed (e.g., extensive regulations on development in place).

Moderate: Increased capability desired but not needed (e.g., funding exists for mitigation but availability fluctuates).

Limited: Increased capability needed (e.g., additional staff are needed to successfully implement mitigation projects).

7.0 Mitigation Strategy

7.1 Updates for 2022

During the 2022 update, Section 7 was updated to reflect the Committee's work to update the Goals and Objectives. The following major changes were incorporated:

1. All tables were added or updated to reflect new information, including the new goals and objectives;
2. Mitigation actions were reviewed, completed actions were deleted; and, new mitigation actions were revised and added as directed by Committee members; and
3. Mitigation actions were modified to include a ranking for social vulnerability.

7.2 Introduction

This section of the Plan provides the "blueprint" for the Richmond-Crater region to become less vulnerable to natural hazards. It is based on the general consensus of the Committee along with the findings and conclusions of the Capability Assessment and Risk Assessment. The Mitigation Strategy section consists of the following four subsections:

7.1 Mitigation Goals

7.2 Identification and Analysis of Mitigation Techniques

7.3 Selection of Mitigation Techniques

7.4 Mitigation Action Plan

The intent of the Mitigation Strategy is to provide participating communities with the goals that will serve as the guiding principles for future mitigation policy and project administration, along with a list of proposed actions available to meet those goals and reduce the impact of natural hazards. It is designed to be comprehensive and strategic in nature.

The development of the strategy included a thorough review of all natural hazards and identified policies and projects intended to not only reduce the future impacts of hazards, but also to assist the region in achieving compatible economic, environmental, and social goals. The development of this section is also intended to be strategic, in that all policies and projects are linked to established priorities assigned to specific departments responsible for their implementation and assigned target completion deadlines. Funding sources are identified when possible, that can be used to assist in project implementation.

The first step in designing the Mitigation Strategy includes the identification of mitigation goals. Mitigation goals represent broad statements that are achieved through the implementation of more specific, action-oriented tasks listed in the Mitigation Action Plan (MAP). These actions include both hazard mitigation policies (such as the regulation of land in known hazard areas), and hazard mitigation projects that seek to address specifically targeted at-risk properties (such as the acquisition and relocation of flood-prone structures). Additional mitigation measures are then considered over time as new mitigation opportunities are identified, new data become available, technology improves, and mitigation funding becomes available.

The last step in designing the Mitigation Strategy is the creation of a set of jurisdictionally specific MAPs. The MAPs represent the key outcome of the mitigation planning process. MAPs include a prioritized list of proposed hazard mitigation actions (policies and projects), including accompanying information such as those agencies or individuals responsible for their implementation, potential funding sources, and an estimated target date for completion. The MAPs provide those individuals or agencies responsible for implementing mitigation actions with a clear roadmap that also serves as an important tool for monitoring progress over time. The collection of actions listed in the MAP also serves as a synopsis of activities for local decision makers.

In preparing the MAPs, committee members considered their overall hazard risk and capability to mitigate natural hazards, in addition to the mitigation goals. The prioritization of mitigation actions was based on the following five factors: (1) effect on overall risk to life and property; (2) ease of implementation; (3) political and community support; (4) a general economic cost/benefit review; and (5) funding availability.

A separate ranking for each MAP's impact on socially vulnerable populations is also included. This High, Moderate or Low impact rating is based on the NRI vulnerability information provided in Section 5. Where projects were identified in a specific location and/or tied to reducing vulnerability from a single hazard, the hazard-specific ranking for that Census tract and hazard was used. Projects geared toward reducing risk community-wide, such as general outreach, were evaluated based on the relative NRI social vulnerability of that community versus the percent of counties/cities with lower social vulnerability in Virginia (–ow - less than 40% of other counties/cities have lower social vulnerability; Moderate – 41-75%; High –75-100%). In cases where an action was specifically geared toward highly socially vulnerable populations within a community, the NRI risk was overridden, and the action was rated High.

7.3 Mitigation Goals

The goals of the Richmond-Crater Hazard Mitigation Plan were crafted as part of Workshop #3, a facilitated discussion and brainstorming session with committee members (see Section 3: Planning Process). As part of the 2022 update, the planning consultant reviewed the goals and objectives of the previous plan as well as pertinent

goals and objectives from Virginia Beach's Sea Level Rise: Adaptation Strategy, Virginia's Coastal Resilience Master Planning Framework, the most recent Hampton Roads Hazard Mitigation Plan (2021 draft), the 2016 Middle Peninsula Hazard Mitigation Plan, and the 2018 Commonwealth of Virginia Hazard Mitigation Plan. In this way, the committee was able to incorporate some important regional resilience goals and work to find common ground in statewide, regional and local mitigation programming.

The group reassessed each goal word for word, reprioritized the list, and edited overall for brevity. The original document ("2017 Plan Goals and Objectives") and updated ("2022 Plan Goals and Objectives") goals are provided in **Table 7.1** below, with notes about the discussion leading to the changes. Each of the following updated goal statements represents a broad target to achieve through associated objectives which are fulfilled through implementation of specific Mitigation Action Plans, both for the region as a whole and for each community.

Table 7.1: Updated Goals and Objectives

2017 Plan Goals and Objectives	2022 Plan Goals and Objectives
~~**Goal 1:** Reduce risk exposure and vulnerabilities to hazards ranked "medium" and "high" by focusing on regional and local mitigation actions on priority hazards.~~	Deleted **Why the Change:** The goal was worded so broadly as to encompass the purpose of the whole plan.
Goal 2: Prepare and protect the whole community within the Central Virginia Emergency Management Alliance (EMACV) region through all-hazards planning staff, outreach publications and activities, and through training, and exercising volunteers and the general public.	**Goal 1: Equitably prepare and protect the whole community against natural hazards** 1.1 Increase staff capabilities regarding multi-hazard management and mitigation 1.2 Conduct outreach and educational opportunities for diverse groups of citizens 1.3 Share mitigation successes with citizens and stakeholders 1.4 Reduce disparities in how communities prepare for, respond to, and recover from hazards. **Why the Change:** Previous goal was divided into several objectives to show how the goal can be achieved. The EMACV does not cover the entire study area. The word "equitably" was added to reflect group's desire to identify mitigation actions for socially vulnerable areas of their communities.
Goal 3: Strengthen and sustain response coordination and collaboration through planning, equipment, training, and exercises to increase interoperability between all stakeholders in the EMACV region and other regions/entities that impact interoperability within the region, to include, but not limited to voice, video, and data.	**Goal 2: Strengthen and develop partnerships for mitigating and reducing hazard impacts** 2.1 Include stakeholders and other regions in planning and training actions. 2.2 Expand outreach and educational opportunities to influence and inform a broad spectrum of stakeholders. 2.3 Collaborate on public safety and support effective system redundancies

Table 7.1: Updated Goals and Objectives	
2017 Plan Goals and Objectives	**2022 Plan Goals and Objectives**
	Why the Change: The focus on stakeholders was retained, but goal was divided into several manageable objectives to fulfill of overall goal. The EMACV does not cover entire study area.
~~**Goal 4:** Provide support for public health and human service needs of the whole community through robust and coordinated sheltering capability, to include planning, resources, equipment, training, and exercises to include support of client needs tracking, family reunification services, information sharing, and public health response support.~~	Deleted **Why the Change:** The concepts captured in the action were similar to old Goal 5, and thus were merged into new Goal 3.
Goal 5: In the aftermath of a catastrophic incident, provide restoration of basic services, long term housing, and revitalization of a sustainable economy that includes the health, social, cultural, historic, and environmental fabric of the community, through planning, staffing, equipment, training, and exercises.	**Goal 3: Encourage sustainable government practices that support the short- and long-term health, safety and welfare of citizens** 3.1 Identify and protect important elements of the economic, social, cultural, historic, and environmental fabric of the community and neighborhoods 3.2 Address restoration of long-term housing and continuity of basic government services for affected populations, especially socially vulnerable communities, during recovery from hazard events **Why the Change:** The focus on sustainability was retained as was the concept of community "fabric", but the goal was broken down into several manageable objectives to show how to attain the overall goal.
~~**Goal 6:** Enhance and maintain public safety and incident management response capabilities to all hazard emergencies including acts of terrorism, through planning, staffing, equipment, training, and exercises.~~	Deleted **Why the Change:** The concepts captured in the previous action were similar to old Goal 5, and thus were merged into new Goal 3.
Goal 7: Protect the critical infrastructure of the CVEMA region, and enhance the capability to disrupt criminal or terrorist threats through effective information and intelligence gathering and sharing, outreach, planning, equipment, training, and exercises.	**Goal 4: Protect critical infrastructure** 4.1 Identify opportunities for information- and intelligence-sharing regarding threats and hazards 4.2 Collaborate on utility management and support effective system redundancies 4.3 Identify and assist owners to maintain and upgrade high hazard potential dams, and protect the people and property downstream **Why the Change:** The focus on critical infrastructure was retained, but overall goal was divided into several objectives to show how to attain goal. The EMACV does not cover entire study area. Added high hazard potential dam protection.

7.4 Identification and Analysis of Mitigation Techniques

44 CFR Requirement

Part 201.6(c)(3)(ii): The mitigation strategy shall include a section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effect of each hazard, with particular emphasis on new and existing buildings and infrastructure.

In formulating the Richmond-Crater Mitigation Strategy, a wide range of activities was considered in order to help achieve the goals and address specific hazard concerns. At the third workshop, committee members considered six broad categories of mitigation techniques. Committee discussions regarding each category are summarized beneath each category, including notes on the appropriateness and applicability of each as it applies to the region.

1. Prevention

Preventative activities are intended to reduce the impact of future hazard events, and are typically administered through government programs or regulatory actions that influence the way land is developed and buildings are constructed. They are particularly effective in reducing a community's future vulnerability, especially in areas where development has not occurred or capital improvements have not been substantial. Examples of preventative activities include:

- Planning and zoning
- Building codes
- Open space preservation
- Floodplain regulations
- Stormwater management regulations
- Drainage system maintenance
- Capital improvements programming
- Shoreline/riverine setbacks

Committee Discussion: Prevention activities have been implemented in the past in the region, are ongoing, and will continue to be included in this and future mitigation action plans. Many communities will mitigate flood damage through planning and zoning actions, such as amendments to their floodplain management ordinances which are viewed as very effective mitigation tools locally. Most communities in the region are continually updating zoning ordinances, especially for flood zones. The statewide building code is viewed as a rather static mitigation tool; it

has components that mitigate especially for wind and flood, but is not a product that local governments exert a great deal of influence upon regularly. Appendix F of the building code could be adopted by communities concerned about protecting future construction from the impacts of radon exposure.

Open space preservation strategies are contained in most of the regional comprehensive plans, and some communities such as Richmond, have targeted planning in place for protecting green spaces and adding to their inventory. In the more urbanized areas of the region, open space preservation is also addressed in subdivision regulations. Several communities have integrated information from their existing hazard mitigation plans into Comprehensive Plan revisions, and vice versa.

Stormwater management regulations and drainage system maintenance rules promulgated at the state level are viewed as quite robust and not in need of additional local action at this time, although several communities are considering adopting more stringent regulations to require use of better future precipitation levels (similar to Virginia Beach); in addition, VDOT performs much of the drainage system maintenance in the region. Similarly, the state's Chesapeake Bay Act regulations governing shoreline setbacks are enforced locally in the Chesapeake Bay watershed communities. Capital improvements programming is seen as a useful tool in the implementation of high priority mitigation activities across the participating communities.

2. Property Protection

Property protection measures involve the modification of existing buildings and structures or the removal of the structures from hazardous locations. Examples include:

- Acquisition
- Relocation
- Building elevation
- Critical facilities protection
- Retrofitting (i.e., windproofing, floodproofing, seismic design)
- Safe rooms, shutters, shatter-resistant glass
- Insurance

Committee Discussion: Property protection measures have been implemented in the past in the region and across the state, and are ongoing primarily through HMGP projects. These measures will continue to be included in this and future mitigation action plans. Communities expressed various priorities for acquisition versus elevation versus relocation of flood-prone structures. Critical facilities

protection and floodproofing/retrofitting are popular alternatives with the region's emergency managers, and many communities continually seek ways to increase insurance coverage for vulnerable property owners. The Community Rating System and related activities encompass and highlight several property protection measures ongoing in the participating communities of Richmond and Ashland.

The Committee decided to continue acquisition, relocation, and elevation measures for repetitively flooded properties, including critical facilities retrofits, in the Mitigation Action Plan, but did not act on any measures specifically for safe rooms or shatter-resistant glass as tornadoes are not a high risk critical hazard. Some communities had discussions about providing safe rooms in designated areas, particularly in manufactured home parks, but only Sussex County expressed interest in pursuing that action at this time.

Existing building code requirements are seen as sufficient with regard to wind and tornado protection; however, hurricane shutters and shatter-resistant glass may be an option for critical facility or emergency shelter retrofits as necessary. Many of the study area communities have installed or are considering installation of back-up generators for specific critical facilities, although some communities prefer mobile and some communities prefer permanent generators.

With regard to insurance, many of the communities have produced community flyers regarding the importance of having insurance coverage on structures.

3. Natural Resource Protection

Natural resource protection activities reduce the impact of natural hazards by preserving or restoring natural areas and their protective functions. Natural areas could include floodplains, wetlands, steep slopes, barrier islands and sand dunes. Parks, recreation or conservation agencies and organizations often implement these measures. Examples include:

- Land acquisition
- Floodplain protection
- Watershed management
- Beach and dune preservation
- Riparian buffers
- Forest and vegetation management (i.e., fire resistant landscaping, fuel breaks)
- Erosion and sediment control
- Wetland preservation and restoration
- Habitat preservation

- Slope stabilization
- Historic properties and archaeological site preservation

Committee Discussion: Natural resource protection measures remain commonly-used throughout the state. Many state programs discussed in Section 6, such as the Chesapeake Bay Act, are long-established natural resource protection measures considered effective and pro-active. The most important of these measures in relation to the region's critical hazards are floodplain protection, erosion and sediment control, and watershed management. Several communities indicated the cost of flood-prone land mitigation is often prohibitive for their local governments due to the level of administrative oversight required for grant programs.

Several rivers in the study area are designated scenic rivers and that designation has positively impacted watershed management efforts. Forest management in conjunction with VDOF is important in parts of the region, and affects vulnerability for wildfire. Beach and dune preservation is another state-promulgated program that requires permitting for impacts in the eastern or coastal portions of the study area. Friends of the Lower Appomattox River (FOLAR) participated in Committee discussions And expressed interest in partnering with riverside communities in protecting open space floodplains through land acquisition, and other eco-tourism related measures.

Several communities decided to continue floodplain protection measures and land acquisition in the MAP, but did not act specifically on other natural resource protection measures as those are considered to be sufficiently addressed through state regulations. Slope stabilization is important along the James River, although individual projects are not identified in the MAP. Abandoned mines are mapped by the state and development in relation to them is strictly regulated at the local level to ensure natural land cover disturbances are minimized.

4. Structural Projects

Structural mitigation projects are intended to lessen the impact of a hazard by modifying the hazard itself through construction. These projects are usually designed by engineers and managed or maintained by public works staff. Examples include:

- Reservoirs
- Dams/levees/dikes/floodwalls/seawalls
- Diversions/detention/retention
- Channel modification
- Beach nourishment
- Storm sewers

Committee Discussion: New large-scale reservoirs are not under consideration at this time in the region. Dam regulations at the state level are considered sufficient and communities are not considering additional regulation. Several structural protection measures are in place and must be maintained by the communities or private owners. Channel modifications, diversions, detention/retention, and stream restoration have been effective in reducing flood hazards in some areas and will remain viable mitigation actions in the future, especially for reducing the compounding effects of increased precipitation, floods and sea level rise. Stream restoration was recently included as a best management practice (BMP) in the State's BMP clearinghouse and some committee members believe that this may result in this method being considered and possibly used more in the future. Dry hydrants, and smoke testing of sanitary sewers, and the stormwater management preventive maintenance schedule are potential structural projects, with dry hydrants particularly important in wildfire control in the rural counties, including Charles City County. Beach nourishment is not being considered for limited beaches in the study area's eastern counties; erosion is typically on private proper

5. Emergency Services

Although not typically considered a "mitigation" technique, emergency services can minimize the impacts of a hazard event on people and property. These actions are often taken prior to, during, or in response to an emergency or disaster. Examples include:

- Warning systems
- Evacuation planning and management
- Emergency response training and exercises
- Sandbagging for flood protection
- Installing temporary shutters for wind protection

Committee Discussion: Riverine warning systems are being considered to help address some of the region's flood hazards. Several communities have recently implemented unified critical communications software to deliver messages to targeted audiences, and most communities have some form of reverse 911. Leveraging the various communities' flood warning systems to create a more regional approach would aid the people who live and commute through multiple jurisdictions. Regional cooperation on this front could benefit residents and visitors to the region and may result in savings to communities. Some communities with industrial waterfronts are concerned with hazardous materials in the floodplain and storm surge zones, and this generated discussion on actions related to business resilience and readiness in communities such as the City of Hopewell.

Evacuation planning is aided at the regional and state levels, but local planners use many tools to continually manage and improve the program; several are now considering more use of targeted evacuations in accordance with an evacuation plan that includes timed evaluation of road elevations and predicted flood elevations. Evacuation and sheltering plans for vulnerable populations are a high priority for the region's emergency planners at this time, and planners continue to express concerns about mass evacuation from coastal Virginia, North Carolina and the Washington D.C. area, which can have devastating impacts on the region's infrastructure.

Sandbagging for flood protection is generally considered helpful, but local governments are not typically involved in helping property owners sandbag. Individual property owners may decide to sandbag for protection, but this is not an action committee members want to include in the MAP, as longer-term retrofit protection methods are deemed preferable. Adding generator electrical circuits to support critical operations during power outages was discussed by almost every community. This activity is both an Emergency Services action and a Property Protection measure.

6. Public Education and Awareness

Public education and awareness activities are used to advise residents, elected officials, business owners, potential property buyers, and visitors about hazards, hazardous areas, and mitigation techniques they can use to protect themselves and their property. Examples of measures used to educate and inform the public include:

- Outreach projects
- Speaker series/demonstration events
- Hazard mapping
- Real estate disclosure
- Library materials
- School children educational programs
- Hazard expositions
- Inter-governmental coordination

Committee Discussion: Public education and outreach activities are a particular focus of emergency planners in the region and are ongoing, particularly through existing web sites, social media outlets and several CRS-related activities. Speaker series and demonstration events are supported by several of the local governments throughout the year, but may not rise to the importance of being included in the MAP for each of these communities. Many of these activities are supported or promoted by the PDCs, such as annual preparedness days. Some of these activities have been on hold because of COVID-19.

FEMA, working with the USACE, has revised many of the Flood Insurance Rate Maps for the region as studies are completed. Additional hazard mapping has been done by Henrico County in particular. Real estate disclosure, particularly for flood risk and radon risk, is guided by current State regulations and not influenced by local government. Library materials, school programs, and open houses are included in the MAP for interested communities.

Committee members discussed use of Community Emergency Response Teams (CERT) and potential existing actions; however, in several cases CERTs have altered functions or been reduced or eliminated during the COVID-19 disaster. The PDCs support several efforts at inter-governmental coordination, including the Emergency Management Alliance of Central Virginia, a voluntary association of government and key stakeholder organizations that manage emergency preparation, response, relief, recovery and mitigation in Central Virginia. There is also a CRS User's Group, facilitated by Wetlands Watch, that is very active among CRS and CRS-interested communities in some parts of the study area.

7.5 Selection of Mitigation Techniques

In order to determine the most appropriate mitigation techniques, committee members reviewed and considered the findings of the Capability Assessment and Risk Assessment. Other considerations included each mitigation action's effect on overall risk reduction, its ease of implementation, its degree of political and community support, its general cost-effectiveness and funding availability.

FEMA guidance for meeting the planning requirements of the Disaster Mitigation Act of 2000 also specifies that local governments should prioritize their mitigation actions based on the level of risk a hazard poses to the lives and property of a given jurisdiction. A Mitigation Technique Matrix (**Table 7.2**) shows that those hazards posing the greatest threat are addressed by the updated MAP.

The matrix provides the committee with the opportunity to cross-reference each of the priority hazards (as determined through the Risk Assessment) with the comprehensive range of available mitigation techniques, including prevention, property protection, natural resource protection, structural projects, emergency services, and public education and awareness. The Mitigation Action Plan includes an array of actions targeting multiple hazards, not just those classified as either high or moderate risk.

As part of the 2022 update, the committee reviewed several documents to assist with the development of new mitigation actions and the assessment of existing actions. Review documents included: 1) a spreadsheet of each community's capabilities and any mitigation program gaps subsequently identified; 2) each community's Comprehensive Plan, specifically components that may be compatible with mitigation goals, or that may be appropriate as mitigation actions; 3) contractor review of local floodplain

regulations; 4) the mitigation action items from the existing plans with 2022 status information; and 5) several recommended publications, including FEMA Publication *Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards*, January 2013, FEMA's *Mitigation Best Practices* and *Mitigation Action Portfolio* web site, and resilience design guidelines for Miami Beach, Boston and New York City.

Table 7.2: Mitigation Technique Matrix

Mitigation Technique	HIGH RISK HAZARDS			MODERATE RISK HAZARDS		
	Flooding	Severe Wind Events	Tornadoes	Severe Winter weather	Droughts and Extreme Heat	Thunderstorms
Prevention	✓	✓	✓	✓	✓	✓
Property Protection	✓	✓	✓	✓		✓
Natural Resource Protection	✓				✓	
Structural Projects	✓	✓	✓	✓		
Emergency Services	✓	✓	✓	✓	✓	✓
Public Education and Awareness	✓	✓	✓	✓	✓	✓

The mitigation actions proposed for local adoption are listed in the MAP on the pages that follow. They will be implemented according to the plan maintenance procedures established for the Richmond-Crater Hazard Mitigation Plan (see Section 8: Plan Maintenance Procedures). The action items have been designed to achieve the mitigation goals and priorities established by the committee.

Each proposed mitigation action has been identified as an effective measure to reduce hazard risk in the Richmond-Crater region. Each action is described with available background information such as the location of the project and general cost benefit information.

Other information provided includes data on cost estimates and potential funding sources to implement the action should funding be required (not all proposed actions are contingent upon funding). Most importantly, implementation mechanisms are provided for each action, including the designation of a lead agency or department responsible for carrying the action out, as well as a timeframe for its completion. These implementation mechanisms ensure that the Richmond-Crater Hazard Mitigation Plan remains a functional document that can be monitored for progress over time. Proposed actions are not listed in exact priority order though each has been assigned a priority level of "high," "moderate" or "low" as described in the previous section.

Table 7.3 describes the key elements of the Mitigation Action Plan, and **Table 7.4** lists the additional considerations that were evaluated for each proposed action once selected for inclusion in the Mitigation Action Plan. This includes social, technical, administrative, political, legal, economic, and environmental considerations collectively known as "STAPLEE" evaluation criteria.

As part of the plan update process, the committee reviewed the list of recommended actions included in their respective existing plans to determine if the actions should be deleted because they are completed, cancelled, or retained, and made recommendations regarding modified and new actions. Summary results of this review are included in Appendix G.

Table 7.3: Key Elements of the Mitigation Action Plan	
Proposed Action	Identifies a specific action that, if accomplished, will reduce vulnerability and risk in the impact area. Actions may be in the form of local policies (i.e., regulatory or incentive-based measures), programs or structural mitigation projects and should be consistent with any pre-identified mitigation goals and objectives.
Site and Location	Provides details with regard to the physical location or geographic extent of the proposed action, such as the location of a specific structure to be mitigated, whether a program will be Citywide, countywide or regional, etc.
Cost Benefit	Provides a brief synopsis of how the proposed action will reduce damages for one or more hazards.
Hazard(s) Addressed	Lists the hazard(s) the proposed action is designed to mitigate for.
Goal(s) Addressed	Indicates the Plan's established mitigation goal(s) the proposed action is designed to help achieve.
Priority	Indicates whether the action is a "high" priority, "moderate" priority, or "low" priority based on the established prioritization criteria.
Impact on Socially Vulnerable Populations	Indicates whether the action has a "high" impact, "moderate" impact , or "low" impact based on the established ranking criteria.
Estimated Cost	Indicates what the total cost will be to accomplish this action. This amount will be an estimate until actual final dollar amounts can be determined.

Table 7.3: Key Elements of the Mitigation Action Plan	
Potential Funding Sources	If applicable, indicates how the cost to complete the action will be funded. For example, funds may be provided from existing operating budgets or general funds, a previously established contingency fund, or a cost-sharing federal or state grant program.
Lead Agency/Department Responsible	Identifies the local agency, department or organization that is best suited to implement the proposed action.
Implementation Schedule	Indicates when the action will begin and when it is estimated to be completed. Some actions will require only a minimal amount of time, while others may require a long-term or continuous effort.

Table 7.4: STAPLE/E Prioritization Criteria for Actions to be Taken
Socially Acceptable
• Is the proposed action socially acceptable to the community(s)? • Are there equity issues involved that would mean that one segment of a community is treated unfairly? • Will the action cause social disruption?
Technically Feasible
• Will the proposed action work? • Will it create more problems than it solves? • Does it solve a problem or only a symptom? • Is it the most useful action in light of other community(s) goals?
Administratively Possible
• Can the community(s) implement the action? • Is there someone to coordinate and lead the effort? • Is there sufficient funding, staff, and technical support available? • Are there ongoing administrative requirements that need to be met?
Politically Acceptable
• Is the action politically acceptable? • Is there public support both to implement and to maintain the project?
Legal
• Is the community(s) authorized to implement the proposed action? Is there a clear legal basis or precedent for this activity? • Are there legal side effects? Could the activity be construed as a taking? • Is the proposed action allowed by a comprehensive plan, or must a comprehensive plan be amended to allow the proposed action? • Will the community(s) be liable for action or lack of action? • Will the activity be challenged?

Table 7.4: STAPLE/E Prioritization Criteria for Actions to be Taken
Economically Sound
• What are the costs and benefits of this action? • Do the benefits exceed the costs? • Are initial, maintenance, and administrative costs taken into account? • Has funding been secured for the proposed action? If not, what are the potential funding sources (public, non-profit, and private)? • How will this action affect the fiscal capability of the community(s)? • What burden will this action place on the tax base or local economy? • What are the budget and revenue effects of this activity? • Does the action contribute to other community goals, such as capital improvements or economic development? • What benefits will the action provide?
Environmentally Sound
• How will the action affect the environment? • Will the action need environmental regulatory approvals? • Will it meet local and state regulatory requirements? • Are endangered or threatened species likely to be affected?

The following is a list of current funding sources and their acronyms as may be indicated in the mitigation actions. Additional acronyms used throughout this plan are interpreted in Appendix H. The pool of potential funding mechanisms is changing very rapidly as a result of COVID-19 and other Federal and state legislative priorities at the time of this update.

Key to Potential Funding Source Acronyms:

DHS U.S. Department of Homeland Security

- BRIC – Building Resilient Infrastructure and Communities
- HMGP – Hazard Mitigation Grant Program
- FMA – Flood Mitigation Assistance Program
- HHPD – Rehabilitation of High Hazard Potential Dams (HHPD) grant program

ARPA American Rescue Plan Act

USACE U.S. Army Corps of Engineers

- SFCP – Small Flood Control Projects
- FPMS – Flood Plain Management Services Program
- CAP – Continuing Authorities Program

DOI U.S. Department of the Interior
- LWCF – Land and Water Conservation Fund Grants

EDA U.S. Economic Development Administration
- DMTA – Disaster Mitigation and Technical Assistance Grants

EPA U.S. Environmental Protection Agency
- CWA – Clean Water Act Section 319 Grants

HUD U.S. Department of Housing and Urban Development
- CDBG – Community Development Block Grant Program

USDA U.S. Department of Agriculture
- EWP – Emergency Watershed Protection
- WPFP – Watershed Protection and Flood Prevention
- WSP – Watershed Surveys and Planning

Virginia

CFPF – Virginia Community Flood Preparedness Fund

Table 7.5 provides a matrix indicating that each critical and noncritical hazard affecting communities is addressed in the Mitigation Action Plan. Section 7.4 contains the Mitigation Action Plan for the Richmond-Crater region.

Table 7.5: Mitigation Actions for Critical and Non-Critical Hazards												
	Flooding	Severe Wind Events	Tornadoes	Severe Winter Weather	Droughts and Extreme Heat	Thunderstorms	Wildfires	Infectious Diseases	Earthquakes	Shoreline Erosion	Flooding Due to Impoundment Failure	Radon Exposure
Regional Actions	M*	M	M	M	M	M	M	M	M	M	M	M
Charles City Co	M	M	M	M	2	M	M	2	M	2	M	1,2
Chesterfield Co	M	M	M	M	M	M	M	M	M	M	M	M
Colonial Heights	M	M	3, 5	M	3	M	M	3	M	7	M	2,3
Dinwiddie Co	M	M	M	M	M	M	M	M	M	M	M	M
Town of McKenney	M	M	M	M	3,4	M	M	3	M	3	M	3,5
City of Emporia	M	M	M	M	4,8	M	M	4,8	M	4,8	M	M
Goochland Co	M	M	M	M	M	M	M	M	M	M	M	M
Greensville Co	M	M	M	M	M	M	M	M	M	1,9	M	M
Town of Jarratt	1, 2	1, 2	1	1, 2		1, 2	1		1, 2		1,2	1
Hanover Co	M	M	M	M	M	M	M	M	M	M	M	M
Town of Ashland	M	M	M	M	M	M	M	M	M	M	M	M
Henrico Co	M	M	M	M	M	M	M	M	M	M	M	M
City of Hopewell	M	M	M	M	M	M	M	M	M	M	M	M
New Kent Co	M	M	M	M	M	M	M	M	M	M	M	M
City of Petersburg	M	M	M	M	M	M	M	M	M	M	M	M
Powhatan Co	M	M	M	M	M	M	M	M	M	M	M	M
Prince George Co	M	M	M	M	M	M	M	M	M	M	M	M
City of Richmond	M	M	M	M	M	M	M	M	M	M	M	M
Town of Surry	1, 2	1, 2	1	1, 2		1, 2	1		1, 2		1,2	1
Sussex Co	M	M	M	M	M	M	M	M	M	M	M	M
Town of Stony Creek	1, 2	1, 2	2	1, 2		1, 2	1		1, 2		1,2	1
Town of Wakefield	1, 2	1, 2	2	1, 2		1, 2	1		1, 2		1,2	1
Town of Waverly	1, 2	1, 2	2	1, 2		1, 2	1		1, 2		1,2	1

** "M" indicates that 3 or more actions address this hazard.*

7.6 Mitigation Actions

REGIONAL MITIGATION ACTIONS

REGIONAL MITIGATION ACTION 1	
Strengthen regional strategy for incoming evacuees, to include plan development, traffic management, sheltering, and information sharing.	
BACKGROUND INFORMATION	
Site and Location:	Throughout the Richmond-Crater study area
Benefit Cost:	No single community can effectively assess and address the impacts of mass evacuations alone. Regional participation in the analysis and planning can reduce redundant resource expenditures and streamline the approach. Communities with fewest resources are most likely to benefit.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Severe Wind Events, Tornadoes, Wildfires, Earthquakes, Infectious Diseases
Goal(s) Addressed:	Goal 3; Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Staff time
Potential Funding Sources:	DHS: BRIC, HMGP
Lead Agency/Department Responsible:	PDCs with local Emergency Managers
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

REGIONAL MITIGATION ACTION 2	
Continue to improve the quality, detail and availability of data used to prepare effective hazard assessments and vulnerability analyses. Data may include, but are not limited to, gauging systems, inundation mapping using existing gauges, GIS data, flood insurance coverage and loss data, assessor data and other structure-specific information, landslide- and radon-related geological data, and pandemic-related economic impact data. Local reports that are fed into NCEI are also important for calculating event frequency and total losses. Hazard data are multi-purpose and may be used to support evacuation mapping and planning. The PDCs should consider serving as administrator(s) of a regional hazard data hub.	
BACKGROUND INFORMATION	
Site and Location:	Throughout the Richmond-Crater study area
Benefit Cost:	Economies of scale can be realized with the regional PDCs acting as data hubs. Better data on hazard frequency and impacts improve BCR calculations for other hazard mitigation projects, and in cases such as evacuation planning, make the planning more effective.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All Hazards
Goal(s) Addressed:	Goal 1: Objective 1.4; Goal 2; Goal 4: Objective 4.1
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	Staff time
Potential Funding Sources:	DHS; USACE
Lead Agency/Department Responsible:	PlanRVA and Crater PDC
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
An example of a related project might be improving critical infrastructure data in coastal communities, and more critically examining the relationship of critical facilities to projected flood risk and sea level rise.	

REGIONAL MITIGATION ACTION 3	
Integrate mitigation goals and actions into other regional planning mechanisms, for example regional economic development, resiliency, transportation, parks and trail, and watershed plans.	
BACKGROUND INFORMATION	
Site and Location:	Throughout the Richmond-Crater study area
Benefit Cost:	The PDCs play a large role in local and regional level planning in the study area. Their knowledge and expertise regarding the various planning efforts underway will create low-cost synergies among each community's plans, and among regional efforts as a whole.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 2: Objective 2.1; Goal 3
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Staff time
Potential Funding Sources:	Existing budgets
Lead Agency/Department Responsible:	PlanRVA and Crater PDC
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

REGIONAL MITIGATION ACTION 4	
Work with state partners and neighboring localities to monitor and implement Next Generation 911 GIS data standards.	
BACKGROUND INFORMATION	
Site and Location:	Crater PDC region
Benefit Cost:	Improvements to 911 GIS data reduce response times and reduce hazard impacts.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 1: Objective 1.1; Goal 2: Objective 2.1; Goal 3; Goal 4: Objective 4.1
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	TBD
Potential Funding Sources:	DHS
Lead Agency/Department Responsible:	Crater PDC
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

REGIONAL MITIGATION ACTION 5	
Identify communities that need more current NFIP repetitive flood loss data for CRS and other planning purposes. **1. Request data from FEMA for all NFIP-participating communities on a regular basis, to include repetitive flood loss data and minus-rated policies;** **2. Update repetitive flood loss area polygons every 2 years;** **3. Rank repetitive flood loss areas by social vulnerability and provide areas and rankings to communities; and** **4. Identify areas subject to future flooding due to climate change and sea level rise.**	
BACKGROUND INFORMATION	
Site and Location:	Throughout the PlanRVA and Crater regions
Benefit Cost:	Handling these data requests at the regional level and on a regular basis will help communities be more prepared to examine the data for useful analysis. Mitigation projects to address repetitive flood loss properties are more likely to have positive BCRs.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding
Goal(s) Addressed:	Goal 1: Objective 1.4; Goal 2; Goal 4: Objective 4.1
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Variable across the region
Estimated Cost:	Staff time
Potential Funding Sources:	HMGP, State funds
Lead Agency/Department Responsible:	PDCs with VaDCR and VDEM
Implementation Schedule:	Within 3 years of plan adoption
ADDITIONAL COMMENTS	
The PDCs and VDEM may also be able to support development of Substantial Damage Management Plans and Repetitive Flood Loss Area Analyses (RLAAs), which are creditable for CRS communities. Data may also be integrated with data from the State's Crisis Track software post-disaster.	

REGIONAL MITIGATION ACTION 6	
Provide Community Rating System (CRS) support for interested communities, to include: application assistance, Plans for Public Information (PPI), Substantial Damage Management Plans, Repetitive Flood Loss Area Analyses (RLAAs), web site development, and library resources.	
BACKGROUND INFORMATION	
Site and Location:	Throughout the PlanRVA and Crater regions
Benefit Cost:	The time investment to apply for and participate in the CRS is substantial. Regional assistance through provision of application assistance, templates for certain activities, and labor assistance with some of the record keeping could increase the number of participating communities, which reduces costs of flood insurance and keeps premium money *in the community*.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding; Flooding due to Impoundment Failure
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.4; Goal 2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Moderate to High; variable across the region
Estimated Cost:	Staff time
Potential Funding Sources:	USACE; existing resources
Lead Agency/Department Responsible:	PDCs with VaDCR and Wetlands Watch
Implementation Schedule:	Within 2 years of plan adoption
ADDITIONAL COMMENTS	

REGIONAL MITIGATION ACTION 7	
Address high and significant hazard dam safety in the region. Assist Virginia DCR with investigating significant hazard dams region-wide for possible reclassification as high hazard. Inspect high hazard potential dams for necessary retrofits/repairs. Implement retrofits in partnership with dam owners. This action includes outreach to: 1) private dam owners to either provide or offer to collect data, and to provide additional guidance and resources; and 2) the public, to build awareness through signage installation and other media regarding the dangers associated with low-head dams.	
BACKGROUND INFORMATION	
Site and Location:	High and significant hazard dams throughout the PlanRVA and Crater regions
Benefit Cost:	Local engineering expertise and regional knowledge may prove effective in supplementing existing, limited state resources for inspecting and rating dams. Dam inundation planning is similarly impacted.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding due to Impoundment Failure, Flooding
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.2, 1.4; Goal 2; Goal 4: Objectives 4.1, 4.2, 4.3
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High, if dams in areas with high NRI risk for flooding are prioritized
Estimated Cost:	TBD
Potential Funding Sources:	DHS: HHPD, BRIC, HMGP; USACE
Lead Agency/Department Responsible:	Virginia DCR, Crater PDC, PlanRVA
Implementation Schedule:	Continuously over next 5 years
ADDITIONAL COMMENTS	

REGIONAL MITIGATION ACTION 8	
Use commercially available radon test kits to determine radon levels in structures. Evaluate radon data against known geological formations in the region to determine geographic variability in vulnerability. End product will be a refined map of radon zones.	
BACKGROUND INFORMATION	
Site and Location:	Throughout the PlanRVA and Crater regions, particularly areas of suspected high radon concentration over the western extent of the Yorktown Formation.
Benefit Cost:	Radon exposure has a high cost; it is a known cause of lung cancer, especially in smokers. Radon tests are inexpensive (<$50) and structural mitigation is inexpensive. The results of additional testing and map refinement will provide local and state officials with additional tools to advise homeowners when testing is advised, resulting in mitigation of lung cancer. Leaders at the local, regional and State level will gain valuable information to determine if a change in capabilities is warranted (e.g., building code requirements, real estate transaction disclosures, or testing).
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Radon Exposure
Goal(s) Addressed:	Goal 1; Goal 2; Goal 3
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Variable across region; more data required to make determination
Estimated Cost:	Estimated $30/structure, plus mapping costs
Potential Funding Sources:	EPA, DHS: HMGP, BRIC
Lead Agency/Department Responsible:	PDCs, College of William & Mary
Implementation Schedule:	Begin project within 2 years of plan adoption; project may extend beyond 2027 planning horizon

REGIONAL MITIGATION ACTION 9	
Provide assistance to communities and residents regarding Risk Rating 2.0, the NFIP's new flood insurance rating policy standards. This action includes assistance with: **1) Evaluation of rating methodology and accuracy;** **2) Messaging and outreach to homeowners and renters;** **3) Elevation Certificate correction; and** **4) Mitigation assistance for property protection, including retrofit guidance and physical alterations to structures or structure components.**	
BACKGROUND INFORMATION	
Site and Location:	Flood-prone areas throughout the region
Benefit Cost:	The rollout of Risk Rating 2.0 is likely to introduce uncertainty in the flood insurance market. The state and region have an interest in helping ensure that property owners retain flood insurance, so good information available locally will help alleviate uncertainty.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding; Flooding due to Impoundment Failure
Goal(s) Addressed:	Goal 1: Objectives 1.2, 1.4; Goal 3: Objective 3.2
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Variable across the region; High, if effort is focused on areas with high NRI flood risk such as portions of Dinwiddie and Sussex counties
Estimated Cost:	<$5,000
Potential Funding Sources:	HMGP, BRIC
Lead Agency/Department Responsible:	VaDCR, PDCs
Implementation Schedule:	Within 1 year of plan adoption

REGIONAL MITIGATION ACTION 10	
Work with private companies to advance continuity of operations, including but not limited to power, gas, and water service restoration. Mitigation actions may include implementation of system redundancies, mutual aid agreements or other partnerships to address critical capability gaps. Physical retrofits may increase resilience of critical infrastructure, such as burying power lines and provision of dependable backup power to water and wastewater treatment facilities.	
BACKGROUND INFORMATION	
Site and Location:	Throughout Richmond-Crater region
Benefit Cost:	Damages are reduced when critical lifelines are returned to service promptly after a disaster. By creating partnerships between private utility providers, the region can expect a faster return to full operations, thereby reducing losses to business and property owners.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 3: Objective 3.2; Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	TBD
Potential Funding Sources:	ARPA; DHS
Lead Agency/Department Responsible:	Dominion Energy, public and private utility providers, PDCs
Implementation Schedule:	Within 4 years of plan adoption
ADDITIONAL COMMENTS	

REGIONAL MITIGATION ACTION 11	
Partner with VDOF on sharing Wildland Urban Interface data in support of efforts to develop local tools (ordinances, outreach templates, etc.) to determine impacts of fire and climate change as well as potential local projects. **Partner with Virginia Department of Wildlife Resources (VDWR) regarding Wildlife Action Plan climate change assessment and development of Wildlife Climate Change Adaptation Committee.**	
BACKGROUND INFORMATION	
Site and Location:	Throughout Richmond-Crater region
Benefit Cost:	Builders and property owners benefit when regional and state plans set out clear, concise direction for planning and policy.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire, Severe Wind Events; Droughts and Extreme Heat
Goal(s) Addressed:	Goal 1: Objective 1.1; Goal 2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Staff time
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	PDCs, VDOF, VDWR
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
Existing Capabilities at VDOF include: Forest Action Plan, FireWise, Ready Set Go – includes mitigation planning guidance at community level and grant fund guidance. The PDCs can support these capabilities by taking part in planning committees as regional stakeholders, and by disseminating information to their respective community partners.	

REGIONAL MITIGATION ACTION 12	
Convene interested parties to discuss NFIP status of the Town of Waverly, and encourage participation. Notify FEMA that town boundaries are incorrect on the FIRM.	
BACKGROUND INFORMATION	
Site and Location:	Town of Waverly
Benefit Cost:	NFIP participation would benefit Waverly property owners by making flood insurance available, and opening up some types of disaster assistance.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding
Goal(s) Addressed:	Goal 1: Objectives 1.2, 1.4; Goal 3: Objective 3.2
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	
Estimated Cost:	Staff time only
Potential Funding Sources:	n/a
Lead Agency/Department Responsible:	PlanRVA, with assistance from VDCR, Sussex County and Waverly
Implementation Schedule:	Immediately
ADDITIONAL COMMENTS	
FEMA FIRM for Waverly/Sussex County does not show the town's current boundaries correctly. The town does not participate in the NFIP. The town's sewage treatment plant is also located near the SFHA.	

REGIONAL MITIGATION ACTION 13	
Strengthen community resilience planning and project implementation through: **1) Public Education/Awareness – Create resilience dashboard to share information and data with the general public about resilience issues, including flood risk. Enhance other outreach efforts to educate the public about hazard risk and regional resilience.** **2) Engage communities in Resilience Adaptation Feasibility Tool (RAFT) process and support training and implementation.** **3) Combine elements of regional resilience efforts into regional plan to satisfy DCR and CFPF requirements.** **4) Resilience Program and Project Cobenefit Connector - expand current PDC staff capacity, web presence and guidance documents to better understand and educate localities on fully harnessing existing and future grant programs given the cobenefits of resilience-related projects.** **5) Business resiliency training.**	
BACKGROUND INFORMATION	
Site and Location:	Throughout Richmond-Crater region
Benefit Cost:	Community resilience measures that permeate all facets of local and regional government save resources in post-disaster scenarios.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 1; Goal 2; Goal 3: Objective 3.1
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	~$100,000
Potential Funding Sources:	CFPF
Lead Agency/Department Responsible:	PlanRVA & Crater PDC, DCR, UVA, W&M, ODU, Chambers of Commerce, Economic Development departments
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

CHARLES CITY COUNTY MITIGATION ACTION 1	
Protect public and private structures from natural hazard damage, including acquiring, relocating, retrofitting or elevating floodprone property. This action may include minor structural flood control projects, retrofits to address critical infrastructure and facilities and stormwater management system improvements.	
BACKGROUND INFORMATION	
Site and Location:	Countywide, with particular emphasis on floodprone areas.
Benefit Cost:	Structures and infrastructure can often be retrofitted to provide additional protection from hazards such as flood, thereby reducing average annual losses.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Severe Wind Events, Wildfires, Severe Winter Weather, Thunderstorms, Earthquakes, Landslides, Radon Exposure
Goal(s) Addressed:	Goal 1: Objective 1.4; Goal 3; Goal 4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate in eastern half of the county
Estimated Cost:	TBD
Potential Funding Sources:	DHS: BRIC, HMGP, FMA, RFC; ARPA; USACE: SFCP, FPMS; HUD: CDBG; Virginia CFPF
Lead Agency/Department Responsible:	Planning and Emergency Management
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
Generators, in particular, are identified as a high priority need at: Roxbury Pumping Stations (generator failed); Kimages Well #1 (generator failed); Animal Shelter (no generator); Mt Zion Vacuum Station (no generator); and Ruthville Fire & EMS (no generator).	

CHARLES CITY COUNTY MITIGATION ACTION 2	
Distribute brochures and use other means to educate the public regarding preparedness and mitigation. Conduct annual preparedness days for hazards to include floods, wind, and earthquakes.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	FEMA, VDEM and other agencies maintain a large library of free paper and online materials to support this action. Social media is free for communities and has potential to reach large number of citizens in a short period of time, and at little cost.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Severe Wind Events, Tornadoes, Wildfires, Severe Winter Weather, Thunderstorms, Droughts and Extreme Heat, Earthquakes, Radon Exposure, Infectious Diseases, Shoreline Erosion
Goal(s) Addressed:	Goal 1: Objectives 1.2, 1.4; Goal 2: Objective 2.2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	Minimal
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

CHARLES CITY COUNTY MITIGATION ACTION 3	
Work with private utilities to keep right-of-way clear.	
BACKGROUND INFORMATION	
Site and Location:	Countywide, with particular emphasis on evacuation routes
Benefit Cost:	Right of ways must remain clear of debris that clogs drains and trees that block roads so that drainageways and roads continue to operate as designed.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Severe Wind Events, Tornadoes, Wildfires, Severe Winter Weather, Thunderstorms, Earthquakes, Landslides
Goal(s) Addressed:	Goal 1: Objective 1.1; Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	Staff time
Potential Funding Sources:	Existing budgets
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

CHARLES CITY COUNTY MITIGATION ACTION 4	
Reduce rural wildfire risk by increasing resources used to fight wildfires. Equipment needs may include, but are not limited to: dry hydrants, drafting equipment, personnel and tankers.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	Rural wildfire risk and raze risk to rurally-located structures can be reduced by strategically locating and maintaining dry hydrants, and having sufficient personnel, drafting equipment and tanker trucks available to deploy quickly.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.4: Goal 4: Objectives 4.1, 4.2
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	TBD
Potential Funding Sources:	Existing budgets; DHS: HMGP;ARPA
Lead Agency/Department Responsible:	Administration
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
Dry hydrants are currently located in just 3 areas of the county: the Industrial Park area, near Kimages Road and Wayside Road (State Route 607) in the southwest part of the county, and in the southeast along Wilcox Neck Road. The Charles City County Fire Department has identified the following needs: 2 engines with 1000 gallons of water on each side; 1 tanker (2200 gallons); 12 firefighters working 24/7, 3 shifts; and, 3 ambulances (1 ALS, 2 BLS). The Charles City County Volunteer Fire Department has identified the following needs: 1 engine with 1000 gallons of water; 2 ambulances BLS; and, 1 rescue truck.	

CHARLES CITY COUNTY MITIGATION ACTION 5	
Use available statewide, regional, or county advanced warning systems, weather gauging systems, evacuation planning tools, and public information resources to prepare community officials and residents in case of a hazard event. Acquire additional resources to supplement these systems, as required.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	When people have adequate time to prepare for a hazard event and know what actions to take ahead of time, damages are reduced.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Tornadoes, Severe Wind Events, Thunderstorms, Earthquakes, Severe Winter Weather
Goal(s) Addressed:	Goal 1; Goal 2; Goal 4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	TBD
Potential Funding Sources:	DHS: HMGP, BRIC; Virginia CFPF; USACE
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
Examples include the *Virginia Hurricane Evacuation Guide* and data collected through VDEM's Crisis Track after a disaster.	

CHESTERFIELD COUNTY MITIGATION ACTION 1	
Conduct regular review of repetitive loss and severe repetitive loss NFIP data. Continue to work with VDEM and FEMA to mitigate repetitive and SRL properties as owners demonstrate interest in participation. Projects may include acquisition, relocation, elevation or retrofits.	
BACKGROUND INFORMATION	
Site and Location:	Repetitively flooded areas in the county
Benefit Cost:	Structures designated as repetitive flood losses are treated differently under NFIP rating procedures. Ensuring the list is correct is important for property owners in the county who have to pay for flood insurance. Helping these owners, in particular, will have a positive impact on the flood vulnerability of the county.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure
Goal(s) Addressed:	Goal 1; Goal 2; Goal 4: Objective 4.1
Priority (High, Moderate, Low):	Low
Impact on Socially Vulnerable Populations:	Moderate – 2 rep loss areas along Falling Creek, near Newby's Bridge Rd, 1 rep loss area near Screamersville, and1 rep loss area near Mt Blanco Low – all other rep loss areas
Estimated Cost:	TBD
Potential Funding Sources:	DHS: BRIC, HMGP, FMA, RFC; ARPA; USACE: SFCP, FPMS; HUD: CDBG; Virginia CFPF
Lead Agency/Department Responsible:	Environmental Engineering – Floodplain Manager
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

CHESTERFIELD COUNTY MITIGATION ACTION 2	
Enhance and centralize use of GIS to gather damage assessment information by all county agencies including establishing naming conventions and data categories.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	Emergency Management and hazard response functionality are improved with high level data integration and geographic/spatial data.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.4; Goal 3; Goal 4: Objectives 4.1 and 4.3
Priority (High, Moderate, Low):	Low
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Staff time and associated software
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	GIS, Risk Management, Building Inspections
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

CHESTERFIELD COUNTY MITIGATION ACTION 3	
Protect critical facility infrastructure through quick connects for generator power, wind and snow retrofits, and other protective measures, which may include permanent generators, elevation, or relocation. This action may include minor flood control structures and stormwater system modifications.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	Structures and infrastructure can often be retrofitted to provide additional protection from hazards such as flood, thereby reducing average annual losses.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Severe Wind Events, Tornadoes, Wildfires, Severe Winter Weather, Thunderstorms, Earthquakes, Radon Exposure
Goal(s) Addressed:	Goal 3, Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	TBD
Potential Funding Sources:	DHS: HMGP, BRIC, FMA; ARPA; Virginia CFPF
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
The county's new COOP will aid in the process of identifying needs.	

CHESTERFIELD COUNTY MITIGATION ACTION 4	
Provide training opportunities to educate all county staff with a role in disaster recovery regarding mitigation principles and long term recovery best practices, particularly related to housing options.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	Preparing all county staff to assist citizens and themselves in the event of a disaster reduces damages and allows faster recovery. If staff are also able to incorporate mitigation principles during recovery/rebuilding, future damages are reduced.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.4; Goal 3: Objective 3.2; Goal 4: Objective 4.1
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Staff time
Potential Funding Sources:	Existing budgets
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Annually/Ongoing
ADDITIONAL COMMENTS	
Introduction to EM provided to all interested county staff, annually. EM is revising recovery training and developing new best practices, restructuring the EOC and developing new training techniques/priorities.	

CHESTERFIELD COUNTY MITIGATION ACTION 5	
Encourage whole community preparedness through education regarding hazards affecting the community and steps to reduce vulnerability.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	Sharing mitigation priorities with a broad group of stakeholders encourages multiple small steps that reduce vulnerability to individual businesses, homes and families.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 1; Goal 2; Goal 3
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	$12,000/yr for materials plus staff costs
Potential Funding Sources:	DHS: HMGP; ARPA; Virginia CFPF
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Annually/Ongoing
ADDITIONAL COMMENTS	
County has expanded public outreach to focus on the whole community, including seniors, populations with medical, functional, and access needs, lesser served populations, civic associations, youth, and faith-based organizations.	

CHESTERFIELD COUNTY MITIGATION ACTION 6	
Use abandoned mines mapping to guide zoning, development, and building inspection decisions. Work with Virginia Department of Energy to continue to refine the Locations of Abandoned Mines in the Greater Richmond Area maps.	
BACKGROUND INFORMATION	
Site and Location:	See maps in Section 5
Benefit Cost:	Measures that discourage or prohibit new development in areas over or near abandoned minds reduce vulnerability to dangerous sinkholes or other land movements that may affect structural stability, especially to underground components.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Sinkholes, Landslides, Earthquakes
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.4; Goal 2; Goal 3: Objective 3.2; Goal 4: Objectives 4.1, 4.2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Staff time
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Inspections; Environmental Engineering; Planning
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
Mapping is part of development review process. Both the physical hazard and historical significance are considered.	

CHESTERFIELD COUNTY MITIGATION ACTION 7	
Enhance processes and procedures in building permit application system within Enterprise Land Management System (ELM) to comprehensively capture damage assessment data.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	Emergency Management and hazard response functionality are improved with high level data integration and geographic/spatial data.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 1: Objective 1.1; Goal 3: Objective 3.2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Staff time
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	GIS; Inspections
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

CHESTERFIELD COUNTY MITIGATION ACTION 8	
Continue participating in the National Flood Insurance Program, including enforcement of zoning and building codes. Consider development of a standalone floodplain ordinance.	
BACKGROUND INFORMATION	
Site and Location:	Flood prone areas countywide
Benefit Cost:	NFIP regulations reduce flood damage by requiring elevation to the base flood elevation.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure
Goal(s) Addressed:	Goal 1: Objective 1.1, 1.4; Goal 4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low to Moderate
Estimated Cost:	Staff time
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Inspections, Planning, Environmental Engineering
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

CHESTERFIELD COUNTY MITIGATION ACTION 9	
Maintain StormReady certification (last certification 2020).	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	StormReady helps arm communities with the communication and safety skills needed to save lives and property--before, during and after the event. StormReady helps community leaders and emergency managers strengthen local safety programs.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Severe Wind Events, Tornadoes, Severe Winter Weather, Thunderstorms, Extreme Heat
Goal(s) Addressed:	Goal 1; Goal 2
Priority (High, Moderate, Low):	Low
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Staff time
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

CHESTERFIELD COUNTY MITIGATION ACTION 10	
Incorporate hazard mitigation potential in decision making for acquiring new park land and open space easements.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	Strategic acquisition of land by Parks and Recreation can reduce vulnerability to a variety of hazards.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Wildfires, Droughts and Extreme Heat, Landslides, Shoreline Erosion, Sinkholes
Goal(s) Addressed:	Goal 1: Objective 1.4; Goal 3: Objective 3.1
Priority (High, Moderate, Low):	Low
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	TBD
Potential Funding Sources:	DHS: HMGP, BRIC, FMA; ARPA; Virginia CFPF
Lead Agency/Department Responsible:	Parks and Recreation; FOLAR
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

CHESTERFIELD COUNTY MITIGATION ACTION 11	
Protect public and private structures from natural hazard damage, including acquiring, relocating, retrofitting or elevating floodprone property. This action may include minor structural flood control projects, retrofits to address critical infrastructure and facilities and stormwater management system improvements.	
BACKGROUND INFORMATION	
Site and Location:	Countywide, with particular emphasis on floodprone areas.
Benefit Cost:	Structures and infrastructure can often be retrofitted to provide additional protection from hazards such as flood, thereby reducing average annual losses.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Severe Wind Events, Wildfires, Severe Winter Weather, Thunderstorms, Earthquakes, Landslides, Radon Exposure
Goal(s) Addressed:	Goal 1: Objective 1.4; Goal 3; Goal 4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	TBD
Potential Funding Sources:	DHS: BRIC, HMGP, FMA, RFC; ARPA; USACE: SFCP, FPMS; HUD: CDBG; Virginia CFPF
Lead Agency/Department Responsible:	Community Development; Planning; Environmental Engineering
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

CHESTERFIELD COUNTY MITIGATION ACTION 12	
Apply hazard mitigation concepts across development project review, capital improvement planning and all other community planning efforts.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	Hazard mitigation is forward-thinking, and thus requires application across disciplines in order to reduce damages.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 1; Goal 2; Goal 3
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Staff time
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Community Development; Planning
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

CHESTERFIELD COUNTY MITIGATION ACTION 13	
Install new monitoring systems for county-owned dams.	
BACKGROUND INFORMATION	
Site and Location:	County-owned dams, high and significant hazard potential, countywide
Benefit Cost:	Real-time monitoring is necessary for early notification of dam/impoundment problems, information that can be used to notify the public to take protective action. Public information helps arm citizens with the communication and safety skills needed to save lives and property--before, during and after a flood event.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding due to Impoundment Failure
Goal(s) Addressed:	Goal 1; Goal 4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low to Moderate
Estimated Cost:	>$330,000
Potential Funding Sources:	DHS: HHPD; CIP
Lead Agency/Department Responsible:	Department of Utilities
Implementation Schedule:	Within 3 years of funding
ADDITIONAL COMMENTS	

CHESTERFIELD COUNTY MITIGATION ACTION 14	
Use available statewide, regional, or county advanced warning systems, weather gauging systems, evacuation planning tools, and public information resources to prepare community officials and residents in the event of a hazard event. Acquire additional resources to build components of a flood warning system and local evacuation plan.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	When people have adequate time to prepare for a hazard event and know what actions to take ahead of time, damages are reduced.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Tornadoes, Severe Wind Events, Thunderstorms, Earthquakes, Severe Winter Weather
Goal(s) Addressed:	Goal 1; Goal 2; Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	TBD
Potential Funding Sources:	DHS: HMGP, BRIC; Virginia CFPF; USACE; USGS
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
Incorporate any manufactured home park evacuation plans promulgated in response to the floodplain management ordinance at Sec. 19.1-503(10).	

CHESTERFIELD COUNTY MITIGATION ACTION 15	
Improve stormwater management system to reduce flooding, particularly in neighborhoods. Projects may include raising roads and regrading to eliminate 100-year flood hazard, redesign and installation of infrastructure to more properly handle current and future flows.	
BACKGROUND INFORMATION	
Site and Location:	Countywide, but with particular emphasis on Otterdale Road improvements at Otterdale Branch, Horsepen Creek and Blackman Creek. 
Benefit Cost:	Structures and infrastructure can often be retrofitted to provide additional protection from hazards such as flood, thereby reducing average annual losses. In some cases, the risk of flooding is so great that relocation, demolition or elevation is the only cost effective and safe solution.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding
Goal(s) Addressed:	Goal 1; Goal 4
Priority (High, Moderate, Low):	Moderate

Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	$25,000,000
Potential Funding Sources:	100% county funded
Lead Agency/Department Responsible:	Environmental Engineering
Implementation Schedule:	Ongoing; Construction of all Otterdale Road crossings expected complete by 2024.
ADDITIONAL COMMENTS	
County funding has been identified to address existing drainage issues on Otterdale Road between Woolridge Road and Genito Road. Preliminary engineering to address the Blackman Creek, Horsepen Creek, and Otterdale Branch crossings is underway. Project brochure available online at: https://www.chesterfield.gov/DocumentCenter/View/21384/Otterdale-Rd-Drainage-CIM---Project-Brochure-PDF	

CHESTERFIELD COUNTY MITIGATION ACTION 16	
Develop and expand use of mass notification tool. Final system should have four audiences for messaging: 1) residents; 2) employees; 3) IPAWS all hazard notifications; and 4) a community engagement tool. Include notification system for dam inundation area dwellers, as identified on recorded plats.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	When people have adequate time to prepare for a hazard event and know what actions to take ahead of time, damages are reduced.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Severe Wind Events, Tornadoes, Severe Winter Weather, Thunderstorms, Droughts and Extreme heat, Earthquakes, Infectious Diseases
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.2, 1.4; Goal 4: Objectives 4.1, 4.3
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	$71,000/year plus staff time
Potential Funding Sources:	USGS; USACE; DHS: HMGP; Virginia CFPF; ARPA; existing budget
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Within 3 years of plan adoption
ADDITIONAL COMMENTS	
Investigate the possibility of using NWS weather radio for non-weather related messaging, as well.	

CHESTERFIELD COUNTY MITIGATION ACTION 17	
Finalize and implement county COOP. Coordinate implementation across all county departments.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	An effective COOP helps identify and reduce vulnerabilities in the county's operational procedures. The plan requires continuous refinement and updating.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 1; Goal 2; Goal 3: Objective 3.2; Goal 4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate (it keeps critical human services going)
Estimated Cost:	Minimal
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	within 2 years of plan adoption
ADDITIONAL COMMENTS	
COOP is substantially complete.	

CITY OF COLONIAL HEIGHTS MITIGATION ACTION 1	
Continue participating in the National Flood Insurance Program, including enforcement of zoning and building codes.	
BACKGROUND INFORMATION	
Site and Location:	Floodprone areas throughout the city
Benefit Cost:	NFIP regulations reduce flood damage by requiring elevation to the base flood elevation.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment
Goal(s) Addressed:	Goal 1: Objective 1.1, 1.4; Goal 4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate to High
Estimated Cost:	Minimal
Potential Funding Sources:	Existing budgets and staff
Lead Agency/Department Responsible:	Building Inspection Department
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

CITY OF COLONIAL HEIGHTS MITIGATION ACTION 2	
Protect public and private structures from natural hazard damage, including acquiring, relocating, retrofitting or elevating floodprone property. This action may include minor structural flood control projects, retrofits to address critical infrastructure and facilities and stormwater management system improvements.	
BACKGROUND INFORMATION	
Site and Location:	Citywide, but with particular emphasis on Newcastle Apartments in the Old Town Creek floodway and floodplain. Safe evacuation of these buildings during flood events is problematic.  *Source: Virginia Flood Risk Information System*
Benefit Cost:	Structures and infrastructure can often be retrofitted to provide additional protection from hazards such as flood, thereby reducing average annual losses. In some cases, the risk of flooding is so great that relocation, demolition or elevation is the only cost effective and safe solution.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Severe Wind Events, Wildfires, Severe Winter Weather, Thunderstorms, Earthquakes, Landslides, Radon Exposure
Goal(s) Addressed:	Goal 1: Objective 1.4; Goal 3; Goal 4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High – Newcastle Apartments rep loss area Moderate – 2 rep loss areas along Swift Creek west of Jefferson Davis Highway Low – rep loss area east of I-95 and north of Temple Ave, along Old Town Creek
Estimated Cost:	Depends on method selected to address the problem.
Potential Funding Sources:	DHS: BRIC, HMGP, FMA, RFC; ARPA; USACE: SFCP, FPMS; HUD: CDBG; Virginia CFPF
Lead Agency/Department Responsible:	Fire and EMS; Planning and Community Development; Economic Development; PDC
Implementation Schedule:	Within 3 years of plan adoption
ADDITIONAL COMMENTS	
Additional projects include projects to repair/replace/retrofit aging infrastructure, such as: shelter retrofits; protection for Lakeview Elementary which is in the SFHA; repairs to flood-damaged stormwater components; protection for sewer pump stations; and aging sewer and water lines and components (Conjurer's Neck and Boulevard north of Temple).	

CITY OF COLONIAL HEIGHTS MITIGATION ACTION 3	
Distribute brochures and use other means to educate the public regarding preparedness and mitigation. Conduct annual preparedness days for hazards to include floods, wind, earthquakes, and tornado. Customize messaging to address: repetitive flood loss areas, importance of flood insurance coverage, and the high vulnerability of certain populations.	
BACKGROUND INFORMATION	
Site and Location:	Citywide, with particular emphasis on repetitive flood loss areas.
Benefit Cost:	FEMA, VDEM and other agencies maintain a large library of free paper and online materials to support this action. Social media is free for communities and has potential to reach large number of citizens in a short period of time, and at little cost.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Severe Wind Events, Tornadoes, Wildfires, Severe Winter Weather, Thunderstorms, Droughts and Extreme Heat, Earthquakes, Radon Exposure, Infectious Diseases
Goal(s) Addressed:	Goal 1: Objectives 1.2, 1.4; Goal 2: Objective 2.2
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	~$5,000
Potential Funding Sources:	Existing budgets
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Within 1 year of plan adoption

ADDITIONAL COMMENTS
The current messaging/outreach the City is deploying is not reaching the targeted populations. Officials are optimistic about reworking the current system to address more people and measuring the number of people reached.

CITY OF COLONIAL HEIGHTS MITIGATION ACTION 4	
Conduct regular review of repetitive loss and severe repetitive flood loss properties from FEMA. Review will include verification of the geographic location of each property and determination if mitigated and by what means. Corrections can be made to FEMA by filing form FEMA AW-501.	
BACKGROUND INFORMATION	
Site and Location:	Repetitively flooded areas in the city
Benefit Cost:	Structures designated as repetitive flood losses are treated differently under NFIP rating procedures. Ensuring the list is correct is important for property owners who have to pay for flood insurance, and for targeting flood risk messaging.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.4; Goal 3; Goal 4: Objective 4.1
Priority (High, Moderate, Low):	Low
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	Minimal
Potential Funding Sources:	Existing budgets
Lead Agency/Department Responsible:	Fire and EMS, PDC and VDEM
Implementation Schedule:	Within 2 years of plan adoption and regularly thereafter as new data are provided
ADDITIONAL COMMENTS	

CITY OF COLONIAL HEIGHTS MITIGATION ACTION 5	
Use available statewide, regional, or county advanced warning systems, weather gauging systems, evacuation planning tools, and public information resources to prepare community officials and residents in case of a hazard event. Acquire additional resources to build components of a flood warning system and local evacuation plan, including: new flood warning gauges (especially, Swift Creek, Swift Creek dam and Old Town Creek), road crossing elevations for county, city and state-owned roads, a flood alert system, and an additional tornado siren for the north end of the City near Tussing Elementary and Conjurer's Neck.	
BACKGROUND INFORMATION	
Site and Location:	Citywide, with particular emphasis on the Swift Creek floodplain, Sherwood Hills, and Conjurer's Neck, as described above. Access/egress to Sherwood Hills and evacuation plans are a critical need.
Benefit Cost:	When people have adequate time to prepare for a hazard event and know what actions to take ahead of time, damages are reduced.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Tornadoes, Severe Wind Events, Thunderstorms, Earthquakes, Severe Winter Weather
Goal(s) Addressed:	Goal 1; Goal 2; Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	Tornado Siren $25,000
Potential Funding Sources:	DHS: HMGP, BRIC; Virginia CFPF; USACE
Lead Agency/Department Responsible:	Fire and EMS
Implementation Schedule:	Within 4 years of plan adoption

CITY OF COLONIAL HEIGHTS MITIGATION ACTION 6	
Repair flood gates on Lakeview Dam, as identified in after action report from the last flood event that impacted the dam.	
BACKGROUND INFORMATION	
Site and Location:	Lakeview Dam is located in a meander bend of Swift Creek in the northwest portion of the City.
Benefit Cost:	Critical infrastructure requires regular upkeep, maintenance and repairs to operate at design capacity. Repairs to the dam are far less expensive than the potential flooding that could result should the flood gates fail.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding due to Impoundment Failure
Goal(s) Addressed:	Goal 4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	TBD
Potential Funding Sources:	DHS: HHPD, HMGP; USACE
Lead Agency/Department Responsible:	Emergency Management, VaDCR
Implementation Schedule:	Immediately; identify funding source within 1 year of plan adoption
ADDITIONAL COMMENTS	
Lakeview Dam was built in 1920; it is considered a high hazard potential dam. The dam is owned by the City. Although no structures are listed as potential impact structures on the Dam Safety Data Sheet, the dam impounds water above the Sherwood Hills neighborhood and access/egress to that neighborhood during flood events on Swift Creek is very limited.	

CITY OF COLONIAL HEIGHTS MITIGATION ACTION 7

Include additional reviewers on Design Review Committee for new development, specifically to review projects for hazard-related vulnerabilities. Include staff training for decision making tools, such as those developed by VIMS Center for Coastal Resources Management for shoreline development and the Certified Floodplain Manager program from the Association of State Floodplain Managers.

BACKGROUND INFORMATION	
Site and Location:	Citywide
Benefit Cost:	Early review of projects to reduce existing and future hazard vulnerabilities reduce future damages.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Wildfires, Landslides, Shoreline Erosion, Sinkholes
Goal(s) Addressed:	Goal 1; Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	Minimal
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Planning and Community Development, Emergency Management
Implementation Schedule:	Within 2 years of plan adoption

ADDITIONAL COMMENTS
This action includes elements from the Comprehensive Plan Environment Policies section.

DINWIDDIE COUNTY MITIGATION ACTION 1	
Conduct regular review of repetitive loss and severe repetitive flood loss properties from FEMA. Review will include verification of the geographic location of each property and determination if mitigated and by what means. Corrections can be made to FEMA by filing form FEMA AW-501.	
BACKGROUND INFORMATION	
Site and Location:	Floodprone areas of the county
Benefit Cost:	Structures designated as repetitive flood losses are treated differently under NFIP rating procedures. Ensuring the list is correct is important for property owners in the county who have to pay for flood insurance, and for targeting flood risk messaging.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.4; Goal 3; Goal 4: Objective 4.1
Priority (High, Moderate, Low):	Low
Impact on Socially Vulnerable Populations:	Moderate – Single rep loss area east of Namozine Creek, north of New Cox Road
Estimated Cost:	Minimal
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Planning/Zoning
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
Dinwiddie County currently has 1 repetitive loss area identified in Section 5.	

DINWIDDIE COUNTY MITIGATION ACTION 2	
Address road flooding in the county. Appropriate measures may include elevation of bridges, maintenance of roadside ditches, and improvements to BMPs.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	Road flooding impacts safety and welfare of citizens and travelers. Impassable roads present a dangerous hazard for drivers, and for first responders.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding
Goal(s) Addressed:	Goal 1; Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Moderate to High
Estimated Cost:	TBD
Potential Funding Sources:	VDOT; county CIP
Lead Agency/Department Responsible:	Emergency Management, VDOT
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

DINWIDDIE COUNTY MITIGATION ACTION 3	
Distribute brochures and use other means to educate the public regarding preparedness and mitigation. Conduct annual preparedness days for hazards to include floods, wind, tornados and earthquakes.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	FEMA, VDEM and other agencies maintain a large library of free paper and online materials to support this action. Social media is free for communities and has potential to reach large number of citizens in a short period of time, and at little cost.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Severe Wind Events, Tornadoes, Wildfires, Severe Winter Weather, Thunderstorms, Droughts and Extreme Heat, Earthquakes, Radon Exposure, Infectious Diseases
Goal(s) Addressed:	Goal 1: Objectives 1.2, 1.4; Goal 2: Objective 2.2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	Minimal
Potential Funding Sources:	Existing budgets
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

DINWIDDIE COUNTY MITIGATION ACTION 4	
Continue to refine and update Continuity of Operations Plan (COOP) with lessons learned from COVID-19 pandemic.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	An effective COOP helps identify and reduce vulnerabilities in the county's operational procedures. The plan requires continuous refinement and updating, especially post-disaster when memories are fresh regarding how the plan can be improved.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 1; Goal 2; Goal 3: Objective 3.2; Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	Staff time
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Emergency Services
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

DINWIDDIE COUNTY MITIGATION ACTION 5	
Continue participating in the National Flood Insurance Program, including enforcement of zoning and building codes. Ensure easy access to FEMA floodplain maps by citizens and property owners.	
BACKGROUND INFORMATION	
Site and Location:	Floodprone areas throughout the county
Benefit Cost:	NFIP regulations reduce flood damage by requiring elevation to the base flood elevation.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment
Goal(s) Addressed:	Goal 1: Objective 1.1, 1.4; Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Moderate to High
Estimated Cost:	Minimal
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Planning/Zoning
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

DINWIDDIE COUNTY MITIGATION ACTION 6	
Protect public and private structures from natural hazard damage, including acquiring, relocating, retrofitting or elevating floodprone property. This action may include minor structural flood control projects, retrofits to address critical infrastructure and facilities, and stormwater management system improvements. Conduct countywide facilities assessment, including schools, to determine vulnerability to multiple hazards, continuous power availability and utility redundancies.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	Structures and infrastructure can often be retrofitted to provide additional protection from hazards such as flood, thereby reducing average annual losses.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Severe Wind Events, Wildfires, Severe Winter Weather, Thunderstorms, Earthquakes, Landslides, Radon Exposure
Goal(s) Addressed:	Goal 1: Objective 1.4; Goal 3; Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	TBD
Potential Funding Sources:	DHS: BRIC, HMGP, FMA, RFC; ARPA; USACE: SFCP, FPMS; HUD: CDBG; Virginia CFPF
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
Critical facilities operated by the wastewater authority and the Dinwiddie County Water Authority are of particular concern.	

DINWIDDIE COUNTY MITIGATION ACTION 7	
Increase water/wastewater treatment systems resiliency with County, McKenney and two private subdivisions with their own water systems. Measures may include generators and additional wells.	
BACKGROUND INFORMATION	
Site and Location:	Stony Springs and Lew Jones Village are the private subdivisions.
Benefit Cost:	Safe drinking water in post-disaster scenarios is a basic necessity both for recovery and for safety of citizens.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Tornadoes, Wildfires, Severe Winter Weather, Droughts and Extreme Heat, Earthquakes
Goal(s) Addressed:	Goal 4: Objectives 4.1 and 4.2
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	TBD
Potential Funding Sources:	DHS: HMGP
Lead Agency/Department Responsible:	Dinwiddie County Water Authority, wastewater authority
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

DINWIDDIE COUNTY MITIGATION ACTION 8	
Integrate mitigation plan goals and actions into other appropriate planning mechanisms such as comprehensive plans and capital improvement plans.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	Mitigation actions that are represented in various plans, budgets and programming are more likely to be funded sufficiently and implemented because the number of people engaged in making the actions happen increases.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 1; Goal 2; Goal 3
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	Staff time
Potential Funding Sources:	Existing budgets
Lead Agency/Department Responsible:	Planning; Emergency Management
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

DINWIDDIE COUNTY MITIGATION ACTION 9	
Integrate Health Department and Emergency Management operations in the event of a health-related event, such as pandemic. Address Incident Command Services at both departments; coordinate with the PDC and other regional entities, and prepare post-incident review of COVID response.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	Aligning agency goals within county government helps ensure a better-coordinated response process.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Infectious Diseases, Radon Exposure
Goal(s) Addressed:	Goal 2; Goal 3
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate to High
Estimated Cost:	Staff time
Potential Funding Sources:	Existing budgets
Lead Agency/Department Responsible:	Emergency Management, Health Department, PDC
Implementation Schedule:	Within 1 year of plan adoption
ADDITIONAL COMMENTS	

DINWIDDIE COUNTY MITIGATION ACTION 10	
Fill and train GIS/addressing staff and planner level position. Expand the Planning Department staff to more effectively and efficiently address short-term and long-term planning needs.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	Emergency Management and hazard response functionality are improved with high level data integration and geographic/spatial data.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 1: Objective 1.1; Goal 4: Objective 4.1
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	TBD
Potential Funding Sources:	DHS: HMGP; ARPA
Lead Agency/Department Responsible:	Emergency Management, Planning/Zoning
Implementation Schedule:	Within 2 years of plan adoption
ADDITIONAL COMMENTS	

DINWIDDIE COUNTY MITIGATION ACTION 11	
Design any new county schools to current shelter standards.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	New schools that can also serve as shelters benefit the county in numerous ways because stringent design requirements ensure protection from a variety of hazards.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Severe Wind Events, Tornadoes, Wildfires, Severe Winter Weather, Thunderstorms, Droughts & Extreme Heat, Earthquakes
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.4; Goal 3: Objective 3.2; Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	Design costs
Potential Funding Sources:	CIP
Lead Agency/Department Responsible:	Emergency Management, County Administration
Implementation Schedule:	Long-term
ADDITIONAL COMMENTS	

DINWIDDIE COUNTY MITIGATION ACTION 12	
Develop methods for encouraging private property owners to properly maintain BMPs.	
BACKGROUND INFORMATION	
Site and Location:	Countywide, several locations
Benefit Cost:	Ill-maintained BMPs can contribute to flooding problems and disturb valuable ecosystem.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Severe Winter Weather, Shoreline Erosion, Landslides, Sinkholes
Goal(s) Addressed:	Goal 1, Goal 2, Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	Methodology development requires staff time, but maintenance will cost landowners.
Potential Funding Sources:	TBD
Lead Agency/Department Responsible:	Environmental
Implementation Schedule:	Within 4 years of plan adoption
ADDITIONAL COMMENTS	

DINWIDDIE COUNTY MITIGATION ACTION 13	
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.	
BACKGROUND INFORMATION	
Site and Location:	Countywide study
Benefit Cost:	Stormwater conveyances are necessary in urbanized areas to alleviate flooding. Improvements over time are necessary to retrofit incorrectly sized systems, and to accommodate changes in precipitation rates and frequency.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure
Goal(s) Addressed:	Goal 1: Objective 1.1; Goal 4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate to High
Estimated Cost:	TBD
Potential Funding Sources:	Virginia CFPF
Lead Agency/Department Responsible:	Environmental, VDOT
Implementation Schedule:	Within 1 year of plan adoption
ADDITIONAL COMMENTS	
The county plans to build these measures into the county resilience plan in order to become eligible for CFPF money for planning and implementation.	

TOWN OF MCKENNEY MITIGATION ACTION 1	
Conduct regular review of repetitive loss and severe repetitive flood loss properties from FEMA, if any.	
BACKGROUND INFORMATION	
Site and Location:	Throughout the town
Benefit Cost:	Although the town does not have a mapped SFHA through FEMA, they do participate in the NFIP and flood insurance is available. Town officials should monitor the flood insurance loss list for any claims to determine if reconsideration of flood hazard areas is or may become advisable.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.4; Goal 3; Goal 4: Objective 4.1
Priority (High, Moderate, Low):	Low
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	Minimal
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Mayor and Administration
Implementation Schedule:	
ADDITIONAL COMMENTS	

TOWN OF MCKENNEY MITIGATION ACTION 2	
Continue to work with VDOT to evaluate and mitigate at-risk roads.	
BACKGROUND INFORMATION	
Site and Location:	Throughout the town
Benefit Cost:	Roads are critical infrastructure in this town.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Severe Wind Events, Tornadoes, Wildfires, Severe Winter Weather, Earthquakes, Landslides
Goal(s) Addressed:	Goal 4: Objectives 4.1, 4.2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	TBD
Potential Funding Sources:	Dinwiddie County, VDOT
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

TOWN OF MCKENNEY MITIGATION ACTION 3	
Distribute brochures and use other means to educate the public regarding preparedness and mitigation. Conduct annual preparedness days for hazards to include floods, wind, tornado, and earthquakes.	
BACKGROUND INFORMATION	
Site and Location:	Throughout the town
Benefit Cost:	FEMA, VDEM and other agencies maintain a large library of free paper and online materials to support this action. Social media is free for communities and has potential to reach large number of citizens in a short period of time, and at little cost.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Severe Wind Events, Tornadoes, Wildfires, Severe Winter Weather, Thunderstorms, Droughts and Extreme Heat, Earthquakes, Radon Exposure, Infectious Diseases, Shoreline Erosion
Goal(s) Addressed:	Goal 1: Objectives 1.2, 1.4; Goal 2: Objective 2.2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	Minimal
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

TOWN OF MCKENNEY MITIGATION ACTION 4	
Increase water/wastewater treatment systems resiliency between Dinwiddie County, the Town of McKenney and two private water systems.	
BACKGROUND INFORMATION	
Site and Location:	Town and surrounding county
Benefit Cost:	Critical infrastructure resiliency can be a low-cost way to supplement existing systems and help ensure the utilities stay online during a disaster.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Tornadoes, Wildfires, Severe Winter Weather, Droughts and Extreme Heat, Earthquakes
Goal(s) Addressed:	Goal 4: Objectives 4.1 and 4.2
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	TBD
Potential Funding Sources:	DHS: HMGP; ARPA
Lead Agency/Department Responsible:	Town officials, Dinwiddie County Water Authority, private system owners
Implementation Schedule:	Within 2 years of plan adoption
ADDITIONAL COMMENTS	

TOWN OF MCKENNEY MITIGATION ACTION 5	
Protect public and private structures from natural hazard damage, including acquiring, relocating, retrofitting or elevating floodprone property. This action may include minor structural flood control projects, retrofits to address critical infrastructure and facilities, mapping to determine detailed flood hazards, and stormwater management system improvements.	
BACKGROUND INFORMATION	
Site and Location:	Throughout the town
Benefit Cost:	Structures and infrastructure can often be retrofitted to provide additional protection from hazards such as flood, thereby reducing average annual losses.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Severe Wind Events, Wildfires, Severe Winter Weather, Thunderstorms, Earthquakes, Landslides, Radon Exposure
Goal(s) Addressed:	Goal 1: Objective 1.4; Goal 3; Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	TBD
Potential Funding Sources:	DHS: BRIC, HMGP, FMA, RFC; ARPA; USACE: SFCP, FPMS; HUD: CDBG; Virginia CFPF
Lead Agency/Department Responsible:	Town Administration
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

TOWN OF MCKENNEY MITIGATION ACTION 6	
Use available statewide, regional, or county advanced warning systems, weather gauging systems, evacuation planning tools, and public information resources to prepare community officials and residents in case of a hazard event. Acquire additional resources to supplement these systems, as required.	
BACKGROUND INFORMATION	
Site and Location:	Throughout the town
Benefit Cost:	When people have adequate time to prepare for a hazard event and know what actions to take ahead of time, damages are reduced.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Tornadoes, Severe Wind Events, Thunderstorms, Earthquakes, Severe Winter Weather
Goal(s) Addressed:	Goal 1; Goal 2; Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	TBD
Potential Funding Sources:	DHS: HMGP, BRIC; Virginia CFPF; USACE
Lead Agency/Department Responsible:	Town Administration
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

CITY OF EMPORIA MITIGATION ACTION 1	
Investigate all public utility lines to evaluate their resistance to flood, wind, and winter storm hazards.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Benefit Cost:	Provision of public utilities during and after disasters is critical to public safety.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Severe Wind Events, Tornadoes, Wildfires, Severe Winter Weather, Thunderstorms, Earthquakes
Goal(s) Addressed:	Goal 4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	$75,000 for inspection & report; retrofit costs TBD
Potential Funding Sources:	DHS: HMGP, BRIC; ARPA
Lead Agency/Department Responsible:	Public Utilities
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

CITY OF EMPORIA MITIGATION ACTION 2	
Complete replacement of Halifax Street Bridge.	
BACKGROUND INFORMATION	
Site and Location:	Halifax Street crosses Metcalf Branch southeast of the intersection of Routes 58 and 301. Area is identified as Zone A on the FIRM.
Benefit Cost:	The bridge is aging and in disrepair and may be a culprit in the repetitive flooding reported in the area.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding
Goal(s) Addressed:	Goal 4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	$150,000 (2016/17)
Potential Funding Sources:	CIP
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Within 10 years of plan adoption
ADDITIONAL COMMENTS	
Building adjacent to the bridge (north side) is in SFHA and contains numerous hazardous materials.	

CITY OF EMPORIA MITIGATION ACTION 3	
Continue to review and make recommendations for improvements to the stormwater system.	
BACKGROUND INFORMATION	
Site and Location:	Citywide; improvements at industrial park and Emporia Shopping Center were budgeted to 2020/2021.
Benefit Cost:	Stormwater conveyances are necessary in urbanized areas to alleviate flooding. Improvements over time are necessary to retrofit incorrectly sized systems, and to accommodate changes in precipitation rates and frequency.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure
Goal(s) Addressed:	Goal 1: Objective 1.1; Goal 4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	$400,000 budgeted 2020/21
Potential Funding Sources:	ARPA; DHS: HMGP, BRIC
Lead Agency/Department Responsible:	Emergency Services, Public Works
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

CITY OF EMPORIA MITIGATION ACTION 4	
Finalize Continuity of Operations Plan.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Benefit Cost:	Plans that reduce the impacts of ongoing disasters save taxpayer dollars by bringing businesses back online sooner and providing normal services to citizens in need.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 1; Goal 2; Goal 3: Objective 3.2; Goal 4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	Minimal
Potential Funding Sources:	Existing resources, CIP; VDEM
Lead Agency/Department Responsible:	Administration; Emergency Services
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

CITY OF EMPORIA MITIGATION ACTION 5	
Improve gauging and warning system. Install additional flood gauges on the Meherrin River. Integrate data from all new flood gauges into citizen notification system, including a siren system. Use gauging and warning system data and existing flood depth data to begin developing targeted evacuation plan for flood-prone areas.	
BACKGROUND INFORMATION	
Site and Location:	Flood-prone areas Citywide, particularly Falling Run and the Meherrin River
Benefit Cost:	The state hurricane evacuation plan does not take all local factors into account and may not be sufficient for some residents of Emporia, especially if flooding isn't caused by hurricane. Local planning will facilitate evacuation when needed and better focus evacuation messaging to reduce confusion, speed evacuation and reduce the number of people in danger.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure
Goal(s) Addressed:	Goal 1; Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	$50,000 - $125,000
Potential Funding Sources:	DHS: HMGP, FMA; USACE: FPMS; ARPA
Lead Agency/Department Responsible:	Emergency Services
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

CITY OF EMPORIA MITIGATION ACTION 6	
Protect public and private structures from natural hazard damage, including acquiring, relocating, retrofitting or elevating floodprone property. This action may include minor structural flood control projects, retrofits to address critical infrastructure and facilities and stormwater management system improvements.	
BACKGROUND INFORMATION	
Site and Location:	Hazard prone areas Citywide, especially repetitive flood loss areas as discussed in Section 5
Benefit Cost:	Structures and infrastructure can often be retrofitted to provide additional protection from hazards such as flood, thereby reducing average annual losses.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Severe Wind Events, Wildfires, Severe Winter Weather, Thunderstorms, Earthquakes, Landslides, Radon Exposure
Goal(s) Addressed:	Goal 1: Objective 1.4; Goal 3; Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	TBD
Potential Funding Sources:	DHS: BRIC, HMGP, FMA, RFC; ARPA; USACE: SFCP, FPMS; HUD: CDBG; Virginia CFPF
Lead Agency/Department Responsible:	Emergency Services
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

CITY OF EMPORIA MITIGATION ACTION 7	
Continue participating in the National Flood Insurance Program, including enforcement of zoning and building codes.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Benefit Cost:	NFIP regulations reduce flood damage by requiring elevation to the base flood elevation.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment
Goal(s) Addressed:	Goal 1: Objective 1.1, 1.4; Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	Staff time
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Zoning Administrator
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

CITY OF EMPORIA MITIGATION ACTION 8	
Distribute brochures and use other means to educate the public regarding preparedness and mitigation. Conduct annual preparedness days for hazards to include floods, wind, and earthquakes.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Benefit Cost:	FEMA, VDEM and other agencies maintain a large library of free paper and online materials to support this action. Social media is free for communities and has potential to reach large number of citizens in a short period of time, and at little cost.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Severe Wind Events, Tornadoes, Wildfires, Severe Winter Weather, Thunderstorms, Droughts and Extreme Heat, Earthquakes, Radon Exposure, Infectious Diseases, Shoreline Erosion
Goal(s) Addressed:	Goal 1: Objectives 1.2, 1.4; Goal 2: Objective 2.2
Priority (High, Moderate, Low):	Low
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	Minimal
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Emergency Services
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

CITY OF EMPORIA MITIGATION ACTION 9	
Conduct regular review of repetitive loss and severe repetitive flood loss properties from FEMA. Review will include verification of the geographic location of each property and determination if mitigated and by what means. Corrections can be made to FEMA by filing form FEMA AW-501.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Benefit Cost:	Structures designated as repetitive flood losses are treated differently under NFIP rating procedures. Ensuring the list is correct is important for property owners in the city who have to pay for flood insurance.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.4; Goal 3; Goal 4: Objective 4.1
Priority (High, Moderate, Low):	Low
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	Staff time
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Zoning Administrator
Implementation Schedule:	Every 2 years
ADDITIONAL COMMENTS	

GOOCHLAND COUNTY MITIGATION ACTION 1	
Continue coordination with VDEM on incoming evacuee issues.	
BACKGROUND INFORMATION	
Site and Location:	Countywide, particularly along the I-64 corridor along the northern edge of the county.
Benefit Cost:	Evacuees from the Washington DC and Hampton Roads metropolitan areas place a burden on local infrastructure. Coordination with VDEM keeps local officials informed and aware of potential impacts.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Severe Wind Events, Earthquakes
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.4; Goal 2; Goal 3
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Minimal
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

GOOCHLAND COUNTY MITIGATION ACTION 2	
Continue to coordinate with City of Richmond and Department of Corrections to address wastewater capacity issues.	
BACKGROUND INFORMATION	
Site and Location:	Countywide, but particularly near Goochland Courthouse
Benefit Cost:	There are critical capacity issues with wastewater that impact the ability of the utility to continue operating throughout a disaster event.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Severe Wind Events, Tornadoes, Wildfires, Severe Winter Weather, Thunderstorms, Earthquakes, Landslides, Sinkholes
Goal(s) Addressed:	Goal 3: Objective 3.2; Goal 4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Coordination costs are minimal; future costs for infrastructure retrofits TBD
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Public Utilities
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

GOOCHLAND COUNTY MITIGATION ACTION 3	
Continue to provide training opportunities to county staff. Hazard-related topics may include: floodplain management training, conferences and certification through VaDCR and the Association of Floodplain Managers; conferences and training for emergency managers regarding wildfire mitigation and other hazards; conferences and training for county officials regarding mitigation grant availability and processes.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	Funds to provide county official with training can reduce damages from hazard events in the future by helping to reduce exposure of new development and identify grant opportunities for retrofitting existing structures and infrastructure.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.3; Goal 2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	$2500/year
Potential Funding Sources:	Existing budgets
Lead Agency/Department Responsible:	Emergency Management & Community Development
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

GOOCHLAND COUNTY MITIGATION ACTION 4	
Distribute brochures and use other means to educate the public regarding preparedness and mitigation. Customize approach to provide outreach to large group of citizens with regard to broad spectrum of hazards, including flood, radon and wildfire. Continue the floodplain map-related outreach to support county's new FEMA FIRMs.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	FEMA, VDEM and other agencies maintain a large library of free paper and online materials to support this action. Social media is free for communities and has potential to reach large number of citizens in a short period of time, and at little cost.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Severe Wind Events, Tornadoes, Wildfires, Severe Winter Weather, Thunderstorms, Droughts and Extreme Heat, Earthquakes, Radon Exposure, Infectious Diseases, Shoreline Erosion
Goal(s) Addressed:	Goal 1: Objectives 1.2, 1.4; Goal 2: Objective 2.2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Minimal
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

GOOCHLAND COUNTY MITIGATION ACTION 5	
Strengthen system of coordinating, collecting, storing and transmitting damage assessment data for each natural hazard event which causes death, injury, and/or property damage.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	Emergency Management and hazard response functionality are improved with high level data integration and geographic/spatial data.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Severe Wind Events, Tornadoes, Wildfires, Severe Winter Weather, Thunderstorms, Earthquakes, Landslides, Sinkholes
Goal(s) Addressed:	Goal 1: Objective 1.1; Goal 2; Goal 3: Objective 3.2; Goal 4: Objective 4.1
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Staff time and data storage costs
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Emergency Management/ IT
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
VDEM has Crisis Track system for this purpose, as well, which meet community needs for post-disaster data collection.	

GOOCHLAND COUNTY MITIGATION ACTION 6	
Continue participating in the National Flood Insurance Program, including enforcement of zoning and building codes.	
BACKGROUND INFORMATION	
Site and Location:	Flood-prone areas Countywide
Benefit Cost:	NFIP regulations reduce flood damage by requiring elevation to the base flood elevation.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment
Goal(s) Addressed:	Goal 1: Objective 1.1, 1.4; Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Minimal
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Community Development
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

GOOCHLAND COUNTY MITIGATION ACTION 7	
Protect public and private structures from natural hazard damage, including acquiring, relocating, retrofitting or elevating floodprone property. This action may include minor structural flood control projects, retrofits to address critical infrastructure and facilities, mapping to determine detailed flood hazards, and stormwater management system improvements.	
BACKGROUND INFORMATION	
Site and Location:	Countywide, particularly in the repetitive flood loss area identified in Section 5 of this plan and the existing Fire Training Center.
Benefit Cost:	Structures and infrastructure can often be retrofitted to provide additional protection from hazards such as flood, thereby reducing average annual losses.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Severe Wind Events, Wildfires, Severe Winter Weather, Thunderstorms, Earthquakes, Landslides, Radon Exposure
Goal(s) Addressed:	Goal 1: Objective 1.4; Goal 3; Goal 4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	TBD
Potential Funding Sources:	DHS: BRIC, HMGP, FMA, RFC; ARPA; USACE: SFCP, FPMS; HUD: CDBG; Virginia CFPF
Lead Agency/Department Responsible:	Emergency Services, Community Development
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
County has outgrown existing Fire Training Center and is examining locations and designs for a new building.	

GOOCHLAND COUNTY MITIGATION ACTION 8	
Use available statewide, regional, or county advanced warning systems, weather gauging systems, evacuation planning tools, and public information resources to prepare community officials and residents in case of a hazard event. Acquire additional resources to build components of a flood warning system and local evacuation plan, including: new IFLOWS gauges, high hazard water crossing elevations for county and state-owned roads, and a flood alert system.	
BACKGROUND INFORMATION	
Site and Location:	Countywide, particularly flood-prone areas and the repetitive flood loss area just south of Westview on the James River.
Benefit Cost:	When people have adequate time to prepare for a hazard event and know what actions to take ahead of time, damages are reduced.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Tornadoes, Severe Wind Events, Thunderstorms, Earthquakes, Severe Winter Weather
Goal(s) Addressed:	Goal 1; Goal 2; Goal 4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	TBD
Potential Funding Sources:	DHS: HMGP; ARPA; USACE: FPMS
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Within 2 years of plan adoption
ADDITIONAL COMMENTS	

GOOCHLAND COUNTY MITIGATION ACTION 9	
Hire full time Environmental Planner to support stormwater management, PlanRVA coordination, environmental planning, conservation easements, community outreach and awareness of various hazards. Add a second Environmental Inspector.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	These positions support the policies and regulations already in place in the County. Administration of existing policies and providing assistance to citizens are important components in the mitigation process.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 1; Goal 2: Objective 2.2; Goal 3
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	$175,000 per year
Potential Funding Sources:	ARPA; Virginia CFPF
Lead Agency/Department Responsible:	Environmental and Land Development
Implementation Schedule:	Within 2 years of plan adoption
ADDITIONAL COMMENTS	

GOOCHLAND COUNTY MITIGATION ACTION 10	
Support Virginia DCR in its efforts to bring all regulated dams into compliance with the Dam Safety Regulations Implement projects and assign responsibility to ensure maintenance/retrofit needs are addressed.	
BACKGROUND INFORMATION	
Site and Location:	Dams throughout the county
Benefit Cost:	Local engineering expertise and regional knowledge may prove effective in supplementing existing, limited state resources for inspecting and rating dams.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding due to Impoundment Failure
Goal(s) Addressed:	Goal 1; Goal 3: Objective 3.2; Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Contracted cost for inspections TBD.
Potential Funding Sources:	DHS: HHPD, HMGP; ARPA; USACE
Lead Agency/Department Responsible:	Community Development and Public Safety
Implementation Schedule:	Within 5 years of plan adoption
ADDITIONAL COMMENTS	

GREENSVILLE COUNTY MITIGATION ACTION 1	
Complete development of Continuity of Operations plan.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	Plans that reduce the impacts of ongoing disasters save taxpayer dollars by bringing businesses back online sooner and providing normal services to citizens in need.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 1; Goal 2; Goal 3: Objective 3.2; Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Staff time
Potential Funding Sources:	CIP; DHS; VDEM
Lead Agency/Department Responsible:	Public Safety
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

GREENSVILLE COUNTY MITIGATION ACTION 2	
Complete implementation of citizen notification system.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	Other methods of notifying citizens require massive amounts of staff time which exceeds budgetary restraints. Reverse 911 quickly and efficiently uses existing infrastructure to notify property owners of appropriate pre- and post-disaster mitigation actions.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Severe Wind Events, Tornadoes, Wildfires, Severe Winter Weather, Thunderstorms, Droughts and Extreme Heat, Earthquakes, Infectious Disease
Goal(s) Addressed:	Goal 1; Goal 2: Objective 2.2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Staff time
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Public Safety
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

GREENSVILLE COUNTY MITIGATION ACTION 3	
Consider participating in "Turn Around, Don't Drown" public education campaign.	
BACKGROUND INFORMATION	
Site and Location:	Flood-prone road crossings throughout the county
Benefit Cost:	Public information helps arm citizens with the communication and safety skills needed to save lives and property--before, during and after a flood event. Reminders via social media are free of charge and require only staff time.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure
Goal(s) Addressed:	Goal 1: Objectives 1.2, 1.3; Goal 2: Objective 2.2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Minimal
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Public Safety
Implementation Schedule:	Immediately upon plan adoption
ADDITIONAL COMMENTS	

GREENSVILLE COUNTY MITIGATION ACTION 4	
Improve GIS layers and track storm damages.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	Emergency Management and hazard response functionality are improved with high level data integration and geographic/spatial data.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Severe Wind Events, Tornadoes, Wildfires, Severe Winter Weather, Thunderstorms, Droughts and Extreme Heat, Earthquakes, Landslides, Shoreline Erosion, Sinkholes
Goal(s) Addressed:	Goal 3: Objective 3.1; Goal 4: Objective 4.1
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Staff time
Potential Funding Sources:	DHS: HMGP; ARPA
Lead Agency/Department Responsible:	Public Safety
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
VDEM Crisis Track can be used by localities to obtain, record and share storm damages from the field immediately following disaster events.	

GREENSVILLE COUNTY MITIGATION ACTION 5	
Install high water mark signage along bridges and other structures to indicate dangerous water levels along creeks and rivers in flood-prone areas.	
BACKGROUND INFORMATION	
Site and Location:	Floodprone stream crossings throughout the county
Benefit Cost:	Signage that notifies drivers about how high the water is helps reduce water rescues and save lives. Combined with a "Turn Around, Don't Drown" campaign, this action could be very effective at minimizing dangerous water rescues.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure
Goal(s) Addressed:	Goal 1: Objective 1.2; Goal 2: Objective 2.2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	$15,000
Potential Funding Sources:	DHS: HMGP, FMA; USACE: FPMS; ARPA
Lead Agency/Department Responsible:	Public Safety, with VDOT
Implementation Schedule:	Within 2 years of plan adoption
ADDITIONAL COMMENTS	

GREENSVILLE COUNTY MITIGATION ACTION 6	
Continue participating in the National Flood Insurance Program, including enforcement of zoning and building codes.	
BACKGROUND INFORMATION	
Site and Location:	Throughout floodprone areas of the county
Benefit Cost:	NFIP regulations reduce flood damage by requiring elevation to the base flood elevation.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment
Goal(s) Addressed:	Goal 1: Objective 1.1, 1.4; Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	Staff time
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Planning and Zoning
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

GREENSVILLE COUNTY MITIGATION ACTION 7	
Distribute brochures and use other means to educate the public regarding preparedness and mitigation. Conduct annual preparedness days for hazards to include floods, wind, and earthquakes.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	FEMA, VDEM and other agencies maintain a large library of free paper and online materials to support this action. Social media is free for communities and has potential to reach large number of citizens in a short period of time, and at little cost.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Severe Wind Events, Tornadoes, Wildfires, Severe Winter Weather, Thunderstorms, Droughts and Extreme Heat, Earthquakes, Radon Exposure, Infectious Diseases, Shoreline Erosion
Goal(s) Addressed:	Goal 1: Objectives 1.2, 1.4; Goal 2: Objective 2.2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Minimal
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Public Safety
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

GREENSVILLE COUNTY MITIGATION ACTION 8	
Conduct regular review of repetitive loss and severe repetitive flood loss properties from FEMA. Review will include verification of the geographic location of each property and determination if mitigated and by what means. Corrections can be made to FEMA by filing form FEMA AW-501.	
BACKGROUND INFORMATION	
Site and Location:	Repetitively flooded areas in the county
Benefit Cost:	Structures designated as repetitive flood losses are treated differently under NFIP rating procedures. Ensuring the list is correct is important for property owners in the county who have to pay for flood insurance.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.4; Goal 3; Goal 4: Objective 4.1
Priority (High, Moderate, Low):	Low
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	Staff time
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Planning and Zoning
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

GREENSVILLE COUNTY MITIGATION ACTION 9	
Work with state partners and neighboring localities to monitor and implement Next Generation 911 GIS data standards. Explore 911 consolidation with Emporia.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	Emergency Management and hazard response functionality are improved with high level data integration and geographic/spatial data.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.4; Goal 2; Goal 4: Objective 4.1
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	TBD
Potential Funding Sources:	DHS: HMGP; existing resources
Lead Agency/Department Responsible:	GIS Manager, PDC
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

GREENSVILLE COUNTY MITIGATION ACTION 10	
Protect public and private structures from natural hazard damage, including acquiring, relocating, retrofitting or elevating floodprone property. This action may include minor structural flood control projects, retrofits to address critical infrastructure and facilities and stormwater management system improvements.	
BACKGROUND INFORMATION	
Site and Location:	Countywide, with particular emphasis on floodprone areas.
Benefit Cost:	Structures and infrastructure can often be retrofitted to provide additional protection from hazards such as flood, thereby reducing average annual losses.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Severe Wind Events, Wildfires, Severe Winter Weather, Thunderstorms, Earthquakes, Landslides, Radon Exposure
Goal(s) Addressed:	Goal 1: Objective 1.4; Goal 3; Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	TBD
Potential Funding Sources:	DHS: BRIC, HMGP, FMA, RFC; ARPA; USACE: SFCP, FPMS; HUD: CDBG; Virginia CFPF
Lead Agency/Department Responsible:	Emergency Services, Planning
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

GREENSVILLE COUNTY MITIGATION ACTION 11	
Use available statewide, regional, or county advanced warning systems, weather gauging systems, evacuation planning tools, and public information resources to prepare community officials and residents in case of a hazard event. Acquire additional resources to supplement these systems, as required.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	When people have adequate time to prepare for a hazard event and know what actions to take ahead of time, damages are reduced.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Tornadoes, Severe Wind Events, Thunderstorms, Earthquakes, Severe Winter Weather
Goal(s) Addressed:	Goal 1; Goal 2; Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	TBD
Potential Funding Sources:	DHS: HMGP, BRIC; Virginia CFPF; USACE
Lead Agency/Department Responsible:	Emergency Services, Planning
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

TOWN OF JARRATT MITIGATION ACTION 1	
Protect public and private structures from natural hazard damage, including acquiring, relocating, retrofitting or elevating floodprone property. This action may include minor structural flood control projects, retrofits to address critical infrastructure and facilities and stormwater management system improvements.	
BACKGROUND INFORMATION	
Site and Location:	Throughout the town
Benefit Cost:	Structures and infrastructure can often be retrofitted to provide additional protection from hazards such as flood, thereby reducing average annual losses.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Severe Wind Events, Wildfires, Severe Winter Weather, Thunderstorms, Earthquakes, Landslides, Radon Exposure
Goal(s) Addressed:	Goal 1: Objective 1.4; Goal 3; Goal 4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	TBD
Potential Funding Sources:	DHS: BRIC, HMGP, FMA, RFC; ARPA; USACE: SFCP, FPMS; HUD: CDBG; Virginia CFPF
Lead Agency/Department Responsible:	Zoning and Planning; Fire Department
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

TOWN OF JARRATT MITIGATION ACTION 2	
Use available statewide, regional, or county advanced warning systems, weather gauging systems, evacuation planning tools, and public information resources to prepare community officials and residents in case of a hazard event. Acquire additional resources to supplement these systems, as required.	
BACKGROUND INFORMATION	
Site and Location:	Throughout the town
Benefit Cost:	When people have adequate time to prepare for a hazard event and know what actions to take ahead of time, damages are reduced.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Tornadoes, Severe Wind Events, Thunderstorms, Earthquakes, Severe Winter Weather
Goal(s) Addressed:	Goal 1; Goal 2; Goal 4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	TBD
Potential Funding Sources:	DHS: HMGP, BRIC; Virginia CFPF; USACE
Lead Agency/Department Responsible:	Zoning and Planning; Fire Department
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
Examples include the Virginia Hurricane Evacuation Guide and data collected via VDEM's Crisis Track post-disaster.	

HANOVER COUNTY MITIGATION ACTION 1	
Use available statewide, regional, or county advanced warning systems, weather gauging systems, evacuation planning tools, and public information resources to prepare community officials and residents in case of a hazard event: • **Develop a more advanced flood warning system to increase the ability to locally and specifically forecast flood events and flood depths. Partner with other organizations including the NWS, U.S. Geological Survey (USGS), and local watershed organizations.** • **Acquire additional resources to build components of a local evacuation plan, including: new IFLOWS gauges, high hazard water crossing elevations for county and state-owned roads, and a flood alert system (using GIS, CodeRed and reverse 911).** • **Create more targeted flood messages and planning that can be conveyed to citizens. Include dam owners and downstream property owners.**	
BACKGROUND INFORMATION	
Site and Location:	Countywide, especially in floodprone areas and communities downstream of the dam
Benefit Cost:	When people have adequate time to prepare for a hazard event and know what actions to take ahead of time, damages are reduced and lives are saved.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Tornadoes, Severe Wind Events, Thunderstorms, Earthquakes, Severe Winter Weather
Goal(s) Addressed:	Goal 1; Goal 2; Goal 4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	TBD

Potential Funding Sources:	DHS: HMGP, BRIC; Virginia CFPF; USACE
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Within 2 years of plan adoption
ADDITIONAL COMMENTS	

HANOVER COUNTY MITIGATION ACTION 2	
Promote the "Turn Around, Don't Drown" public education campaign.	
BACKGROUND INFORMATION	
Site and Location:	Floodprone road crossings countywide
Benefit Cost:	Public information helps arm citizens with the communication and safety skills needed to save lives and property--before, during and after a flood event. Reminders via social media are free of charge and require only staff time.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure
Goal(s) Addressed:	Goal 1: Objective 1.2; Goal 2: Objective 2.2
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Minimal
Potential Funding Sources:	Existing budgets
Lead Agency/Department Responsible:	Public Safety and National Weather Service
Implementation Schedule:	Ongoing and frequently
ADDITIONAL COMMENTS	

HANOVER COUNTY MITIGATION ACTION 3	
Continue participating in the National Flood Insurance Program, including enforcement of zoning and building codes. Develop plan to improve flood insurance coverage in the county, similar to the CRS Plan for Public Involvement. Consider updating flood ordinance from 2008.	
BACKGROUND INFORMATION	
Site and Location:	Throughout floodprone areas of the county
Benefit Cost:	NFIP regulations reduce flood damage by requiring elevation to the base flood elevation.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.2, 1.4; Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Staff time
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Planning and Community Development
Implementation Schedule:	Within 4 years of plan adoption
ADDITIONAL COMMENTS	

HANOVER COUNTY MITIGATION ACTION 4	
Distribute brochures and use other means to educate the public regarding preparedness and mitigation. Conduct annual preparedness days for hazards to include floods, wind, tornado, and earthquakes.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	FEMA, VDEM and other agencies maintain a large library of free paper and online materials to support this action. Social media is free for communities and has potential to reach large number of citizens in a short period of time, and at little cost.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Severe Wind Events, Tornadoes, Wildfires, Severe Winter Weather, Thunderstorms, Droughts and Extreme Heat, Earthquakes, Radon Exposure, Infectious Diseases, Shoreline Erosion
Goal(s) Addressed:	Goal 1: Objectives 1.2, 1.4; Goal 2: Objective 2.2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Minimal
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
This is an ongoing action. The county's CERT and Medical Reserve Corps (MRC) distribute literature at multiple public events and work with Emergency Management on general preparedness training program that includes hazard information, at least twice per year.	

HANOVER COUNTY MITIGATION ACTION 5	
Conduct regular review of repetitive loss and severe repetitive flood loss properties from FEMA. Review will include verification of the geographic location of each property and determination if mitigated and by what means. Corrections can be made to FEMA by filing form FEMA AW-501.	
BACKGROUND INFORMATION	
Site and Location:	Repetitive flooded areas in the county, particularly the area identified in Section 5 near Pegway Lane and Route 642 (Bell Creek Road)
Benefit Cost:	Structures designated as repetitive flood losses are treated differently under NFIP rating procedures. Ensuring the list is correct is important for property owners in the county who have to pay for flood insurance.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.4; Goal 3; Goal 4: Objective 4.1
Priority (High, Moderate, Low):	Low
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Minimal
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Planning and Community Development
Implementation Schedule:	Ongoing as data are provided
ADDITIONAL COMMENTS	
IMPORTANT: Officials noted that they need to determine if the repetitive flood loss area identified in Section 5 is included on the new preliminary FEMA SFHA maps.	

HANOVER COUNTY MITIGATION ACTION 6	
Protect public and private structures from natural hazard damage, including acquiring, relocating, retrofitting or elevating floodprone property. This action may include minor structural flood control projects, retrofits to address critical infrastructure and facilities and stormwater management system improvements.	
BACKGROUND INFORMATION	
Site and Location:	Countywide, with particular emphasis on floodprone areas and repetitive flood loss area.
Benefit Cost:	Structures and infrastructure can often be retrofitted to provide additional protection from hazards such as flood, thereby reducing average annual losses.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Severe Wind Events, Wildfires, Severe Winter Weather, Thunderstorms, Earthquakes, Landslides, Radon Exposure
Goal(s) Addressed:	Goal 1: Objective 1.4; Goal 3; Goal 4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	TBD
Potential Funding Sources:	DHS: BRIC, HMGP, FMA, RFC; ARPA; USACE: SFCP, FPMS; HUD: CDBG; Virginia CFPF
Lead Agency/Department Responsible:	Emergency Management, Public Works, Planning and Community Development
Implementation Schedule:	Ongoing

ADDITIONAL COMMENTS
Action may include stormwater management conveyance improvements, stream cleanouts with VDOT, storage management and communications with dam owners, and coordination with Va Department of Forestry regarding the hydrologic impacts of mass timber clearing. County has made and continues to make significant progress addressing generators for critical facilities, including switching from diesel to natural gas generators at fire stations, replacing the Wickham Building generator, adding a generator at Town Hall and the new terminal in the airport, and replacing units at the Police Department, and Fire Training Center.

HANOVER COUNTY MITIGATION ACTION 7	
Improve community interoperability when cell services are interrupted. Work with cell service providers and electric utility to ensure power redundancies at cell towers.	
BACKGROUND INFORMATION	
Site and Location:	All regional cell towers that affect county communications
Benefit Cost:	Cell service is critical to management of emergencies and for communicating messages to the public.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 1: Objective 1.1; Goal 4: Objective 4.1
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	TBD
Potential Funding Sources:	DHS, Dominion Energy
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Within 3 years of plan adoption
ADDITIONAL COMMENTS	

HANOVER COUNTY MITIGATION ACTION 8	
Assemble pre-approved messaging plans for various hazard events. Include focus audience, message, and plan for dissemination. Assemble resources required to execute plans for each hazard.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	Time is precious in post disaster scenarios, and having the tools available and pre-approved messaging agreed upon can help save lives and reduce damage.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.2, 1.3
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	<$25,000; electronic messaging boards range from $13,000 - $35,000 each
Potential Funding Sources:	DHS: HMGP; ARPA
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Within 3 years of plan adoption
ADDITIONAL COMMENTS	
Messaging will address a variety of hazard events and identify conflicts in messaging, such as from online apps (e.g., Waze) that send information to residents and visitors. Methods of dissemination may vary, but may include electronic messaging boards and door stickers or door hangers.	

TOWN OF ASHLAND MITIGATION ACTION 1	
Continue to identify areas of existing development where drainage is of significant concern, and implement a drainage improvement program, where feasible. Evaluate and make improvements, as needed, to stormwater system to ensure adequacy to handle major rain events.	
BACKGROUND INFORMATION	
Site and Location:	Throughout the town
Benefit Cost:	Ashland is generally flat and has poorly drained soils. Much of the town was developed prior to current standards for stormwater quantity control. Drainage studies can identify sites where undersized structures contribute to flooding and propose projects to reduce flooding now and in the future.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure
Goal(s) Addressed:	Goal 1: Objective 1.1; Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Moderate (in southern portion of town) to Low
Estimated Cost:	TBD
Potential Funding Sources:	CIP; DHS: HMGP; ARPA
Lead Agency/Department Responsible:	Planning & Utilities
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
This action is also in the town's comprehensive plan, as policy recommendation E.14.	

TOWN OF ASHLAND MITIGATION ACTION 2	
Continue NFIP Community Rating System activities to reduce flood risk. Consider development of a Plan for Public Involvement per *CRS User's Manual* that is coordinated with other community outreach programs.	
BACKGROUND INFORMATION	
Site and Location:	Floodprone areas throughout the town
Benefit Cost:	Currently rated as a Class 8 in the CRS, property owners in the town's SFHA receive a 10% discount on premiums.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding
Goal(s) Addressed:	Goal 1; Goal 2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Moderate (in southern portion of town) to Low
Estimated Cost:	Staff time
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Planning and Community Development
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

TOWN OF ASHLAND MITIGATION ACTION 3	
Finalize Continuity of Operations plan. New County/Town THIRA, COOP, and EOP are being completed together. Each department will have their own operational plans.	
BACKGROUND INFORMATION	
Site and Location:	Throughout the town, and coordinated with Hanover County
Benefit Cost:	All of these plans help identify and reduce vulnerabilities in the town's operational procedures.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 1; Goal 2; Goal 3: Objective 3.2; Goal 4
Priority (High, Moderate, Low):	Low
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	Costs of implementation are TBD.
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Police
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
These plans are substantially complete. COOP is awaiting approval.	

TOWN OF ASHLAND MITIGATION ACTION 4	
Continue to enhance capabilities to use GIS for emergency management.	
BACKGROUND INFORMATION	
Site and Location:	Throughout the Town
Benefit Cost:	Emergency Management and hazard response functionality are improved with high level data integration and geographic/spatial data.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.4; Goal 2; Goal 4: Objective 4.1
Priority (High, Moderate, Low):	Low
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	Minimal
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Planning and Community Development
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

TOWN OF ASHLAND MITIGATION ACTION 5	
Protect public and private structures from natural hazard damage, including acquiring, relocating, retrofitting or elevating floodprone property. This action may include minor structural flood control projects, retrofits to address critical infrastructure and facilities and stormwater management system improvements.	
BACKGROUND INFORMATION	
Site and Location:	Throughout the town, with particular emphasis on floodprone areas
Benefit Cost:	Structures and infrastructure can often be retrofitted to provide additional protection from hazards such as flood, thereby reducing average annual losses.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Severe Wind Events, Wildfires, Severe Winter Weather, Thunderstorms, Earthquakes, Landslides, Radon Exposure
Goal(s) Addressed:	Goal 1: Objective 1.4; Goal 3; Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	TBD
Potential Funding Sources:	DHS: BRIC, HMGP, FMA, RFC; ARPA; USACE: SFCP, FPMS; HUD: CDBG; Virginia CFPF
Lead Agency/Department Responsible:	Planning and Community Development; Department of Public Works
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
Potential projects include stream restorations, debris cleanup and the equipment necessary to assist, identification and removal of hazardous trees before wind and winter weather events.	

TOWN OF ASHLAND MITIGATION ACTION 6	
Continue participating in the National Flood Insurance Program, including enforcement of zoning and building codes.	
BACKGROUND INFORMATION	
Site and Location:	Throughout floodprone areas of the town
Benefit Cost:	NFIP regulations reduce flood damage by requiring elevation to the base flood elevation.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.4; Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Moderate (in southern portion of town) to Low
Estimated Cost:	Minimal
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Planning and Community Development
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

TOWN OF ASHLAND MITIGATION ACTION 7	
Distribute brochures and use other means (e.g., local media) to educate the public regarding preparedness and mitigation. Conduct annual preparedness days for hazards to include floods, tornados, wind, and earthquakes.	
BACKGROUND INFORMATION	
Site and Location:	Throughout the town
Benefit Cost:	FEMA, VDEM and other agencies maintain a large library of free paper and online materials to support this action. Social media is free for communities and has potential to reach large number of citizens in a short period of time, and at little cost.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Severe Wind Events, Tornadoes, Wildfires, Severe Winter Weather, Thunderstorms, Droughts and Extreme Heat, Earthquakes, Radon Exposure, Infectious Diseases
Goal(s) Addressed:	Goal 1: Objectives 1.2, 1.4; Goal 2: Objective 2.2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	Staff time
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Police
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
Activities focus on flooding, stormwater management, hurricanes, winter weather and other “stay safe” messaging.	

TOWN OF ASHLAND MITIGATION ACTION 8	
Coordinate emergency management plans and practices with Hanover County and Randolph-Macon College, including plans for debris management.	
BACKGROUND INFORMATION	
Site and Location:	Throughout the town
Benefit Cost:	Coordinated responses and pre-event planning reduce impacts and damages.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 1, Goal 2, Goal 3: Objective 3.2; Goal 4
Priority (High, Moderate, Low):	Low
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	Staff time
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Within 3 years of plan adoption
ADDITIONAL COMMENTS	

TOWN OF ASHLAND MITIGATION ACTION 9	
Integrate mitigation plan goals and actions into other appropriate planning mechanisms for the town and county, such as comprehensive plans and capital improvement plans. Add hazard mitigation discussion to the town's comprehensive plan, and include pertinent mitigation actions.	
BACKGROUND INFORMATION	
Site and Location:	Throughout the town
Benefit Cost:	Mitigation actions that are represented in various plans, budgets and programming are more likely to be funded sufficiently and implemented because the number of people engaged in making the actions happen increases.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 1; Goal 2; Goal 3
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	Minimal
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Planning and Community Development
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

TOWN OF ASHLAND MITIGATION ACTION 10	
Use available statewide, regional, or county advanced warning systems, weather gauging systems, evacuation planning tools, and public information resources to prepare community officials and residents in case of a hazard event. Acquire additional resources to supplement these systems, as required.	
BACKGROUND INFORMATION	
Site and Location:	Throughout the town
Benefit Cost:	When people have adequate time to prepare for a hazard event and know what actions to take ahead of time, damages are reduced.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Tornadoes, Severe Wind Events, Thunderstorms, Earthquakes, Severe Winter Weather
Goal(s) Addressed:	Goal 1; Goal 2; Goal 4
Priority (High, Moderate, Low):	Low
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	TBD
Potential Funding Sources:	DHS: HMGP, BRIC; Virginia CFPF; USACE
Lead Agency/Department Responsible:	Police, Planning and Community Development
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

TOWN OF ASHLAND MITIGATION ACTION 11	
Continue coordination between Planning and Community Development and County Building Services to ensure no structures are constructed in the SFHA without proper permitting.	
BACKGROUND INFORMATION	
Site and Location:	Throughout the town
Benefit Cost:	Code compliant designs are proven to reduce damage from flood, wind, snow and earthquake. The NFIP requires that all development in the SFHA is compliant with local floodplain management requirements implemented specifically to reduce flood damages.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding
Goal(s) Addressed:	Goal 1; Goal 2; Goal 3
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate (in southern portion of town) to Low
Estimated Cost:	Minimal
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Planning and Community Development, Hanover County
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

HENRICO COUNTY MITIGATION ACTION 1	
Implement all-inclusive hazard mitigation planning for schools, to include: 1) continue annual site multi-hazard inspections of schools to identify areas for use as tornado safe rooms, assessment of structure vulnerability to earthquake and flood based on floor elevations; 2) prepare Emergency Action Plan for each school; 3) incorporate building plans into GIS to enable first responders entering the schools for any reason; and 4) ensure sheltering sites meet all national shelter standards, have generator power, and are protected from wind and flood. Fund and fulfill required retrofits upon identification.	
BACKGROUND INFORMATION	
Site and Location:	All county schools
Benefit Cost:	Schools house a large number of people everyday, which increases exposure to a variety of hazards. Pre-disaster planning and structural inspections, as well as detailed knowledge about the school layout and construction, enable first responders to quickly respond to events and minimize damage.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Severe Wind Events, Tornadoes, Wildfires, Severe Winter Weather, Thunderstorms, Droughts and Extreme Heat, Earthquakes, Sinkholes, Infectious Diseases
Goal(s) Addressed:	Goal 1; Goal 2; Goal 4: Objectives 4.1, 4.3
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	TBD
Potential Funding Sources:	Existing budgets; DHS: HMGP, BRIC
Lead Agency/Department Responsible:	Emergency Management & Henrico County Public Schools

Implementation Schedule:	within 4 years of plan adoption, with ongoing annual inspections
ADDITIONAL COMMENTS	

HENRICO COUNTY MITIGATION ACTION 2	
Continue to implement drainage and stream channel maintenance program.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	Conveyances that are kept clean and maintained appropriately are less likely to cause flooding during periods of extreme precipitation.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding
Goal(s) Addressed:	Goal 4: Objective 4.2
Priority (High, Moderate, Low):	Low
Impact on Socially Vulnerable Populations:	Low to Moderate
Estimated Cost:	Staff time
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
This program is currently complaint-based.	

HENRICO COUNTY MITIGATION ACTION 3	
Expand existing comprehensive Public Outreach program through coordination of several ongoing efforts related to hazards: 1) operationalize Community Emergency Resource Team resources to enhance training availability to targeted populations; 2) continue participating in Great Shakeout (workplace safety drills) and other wide-scale disaster drills; 3) continue participation in the StormReady program; 4) continue outreach through brochure distribution and other means (e.g., utility bill messaging, local media, social media) to educate the public regarding preparedness and mitigation; 5) coordinate all messaging with CRS Plan for Public Information (PPI), which focuses on increasing flood insurance countywide; and 6) rebrand Dept. of Public Works outreach for flood and dam safety and tie into other EM initiatives.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	FEMA, VDEM and other agencies maintain a large library of free paper and online materials to support this action. Social media is free for communities and has potential to reach large number of citizens in a short period of time, and at little cost.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Severe Wind Events, Tornadoes, Severe Winter Weather, Thunderstorms, Extreme Heat
Goal(s) Addressed:	Goal 1; Goal 2
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	$10,000/year, plus staff time
Potential Funding Sources:	Existing resources, CERT
Lead Agency/Department Responsible:	Emergency Management, Finance, Public Works, Public Utilities, Public Relations
Implementation Schedule:	Ongoing

ADDITIONAL COMMENTS
Consider addition of Public Information Officer on staff of DPW to manage outreach on flood and dam safety. With proper training, CERT members can be used to help administer vaccine clinics, lead volunteer efforts, conduct damage assessments, provide information dissemination, canvas communities, prepare IEPs, serve as radio team leaders.

HENRICO COUNTY MITIGATION ACTION 4	
Upgrade/retrofit existing EOC and identify viable temporary EOCs that would suit the county's purposes. Expand options for public facilities that can receive generator backup and be used as temporary emergency shelters.	
BACKGROUND INFORMATION	
Site and Location:	Existing EOC and potential county-owned facilities countywide
Benefit Cost:	EOCs require sufficient protection from weather and manmade hazards to provide a safe operational platform for executing emergency response. Temporary EOCs for particular events may provide a lower cost way to address the vulnerabilities of the existing facility.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.4; Goal 4: Objective 4.2
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	TBD
Potential Funding Sources:	Existing resources; DHS, VDEM
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Within 10 years of plan adoption
ADDITIONAL COMMENTS	
Second floor of existing EOC building is vulnerable to wind damage and is located near major road and hospital with potential for hazardous materials exposure. Existing EOC is not a dedicated facility.	

HENRICO COUNTY MITIGATION ACTION 5	
Install electrical hook-ups, wiring, and switches to allow quick connects at county-owned critical facilities, including for example, shelters and pump stations.	
BACKGROUND INFORMATION	
Site and Location:	Critical facilities throughout the county
Benefit Cost:	Shelters and pump stations can stay operational throughout disaster events with provision of dependable generator power.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	TBD
Potential Funding Sources:	Existing resources; DHS: HMGP, UASI; ARPA
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

HENRICO COUNTY MITIGATION ACTION 6	
Provide continuous, ongoing training on hazard mitigation and the county's related initiatives to all county staff. Training will enhance ability to integrate mitigation objectives in all county programs.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	Available materials for training are readily available from state and Federal agencies free of charge. The benefits of hazard-focused training may be realized in small ways over a long period of time as mindsets change to think about the impact of everyday actions on long-term vulnerability.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 1: Objective 1.1; Goal 2: Objective 2.2; Goal 3: Objective 3.2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Staff time
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Public Works, Emergency Management
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

HENRICO COUNTY MITIGATION ACTION 7	
Expand existing local, regional, and county advanced warning systems, weather gauging systems, evacuation planning tools, and public information resources to prepare community officials and residents in case of a hazard event. Acquire additional resources to supplement these systems, including: 1) build a comprehensive stream gauge network that includes data on water elevation, water quality, precipitation measurement, and dam impoundment levels; 2) updated Emergency Action Plans based on rain gauge data; 3) warning system(s) that alert citizens; and 4) detailed evacuation planning tied to warning system and based on critical road elevations or other road obstructions.	
BACKGROUND INFORMATION	
Site and Location:	Countywide, with particular emphasis on county- and FEMA-identified flood hazard areas
Benefit Cost:	When people have adequate time to prepare for a hazard event and know what actions to take ahead of time, damages are reduced.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure
Goal(s) Addressed:	Goal 1, Goal 2
Priority (High, Moderate, Low):	Low
Impact on Socially Vulnerable Populations:	Low to Moderate
Estimated Cost:	TBD
Potential Funding Sources:	DHS: HMGP, BRIC; Virginia CFPF; USACE; USGS
Lead Agency/Department Responsible:	Public Utilities, Public Works, and Emergency Management, USGS
Implementation Schedule:	
ADDITIONAL COMMENTS	
USGS rain gauges have been installed at 5 of the county-owned dams, and USACE/NWS have completed inundation mapping on the James River.	

HENRICO COUNTY MITIGATION ACTION 8	
Maintain relationships with Dominion Energy, Comcast, Verizon (and other utility service providers), and VDOT to ensure swift removal of debris and continued maintenance of lines to minimize future debris.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	The critical element in maintaining these relationships is keeping contacts and contact information current and up to date on the county's actions. Cooperation with utility providers in post-disaster scenarios protects consumers and reduces damages.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 1; Goal 2; Goal 3: Objective 3.2; Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Staff time
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Dominion Energy, DPW, DPU, Fire and Police
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

HENRICO COUNTY MITIGATION ACTION 9	
Conduct annual review of repetitive loss, severe repetitive loss and all NFIP claims and policy coverage data from FEMA. Review will include verification of the geographic location of each property and determination if mitigated and by what means. Data analysis will inform other community mitigation efforts.	
BACKGROUND INFORMATION	
Site and Location:	Floodprone areas countywide
Benefit Cost:	Structures designated as repetitive flood losses are treated differently under NFIP rating procedures. Ensuring the list is correct is important for property owners in the county who have to pay for flood insurance. Data analysis will inform PPI which targets underinsured, flood-prone areas of the county in an effort to increase flood insurance coverage.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.4; Goal 3; Goal 4: Objective 4.1
Priority (High, Moderate, Low):	Low
Impact on Socially Vulnerable Populations:	Low to Moderate; Rep loss areas on Horsepen Branch, Rocky Branch, North Run, Trumpet Branch and along West Nine Mile Road near Highland Springs have highest relative NRI risk for flood in the county and should be prioritized to increase impacts of mitigation on socially vulnerable populations.
Estimated Cost:	Minimal
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Public Works, FEMA Region III
Implementation Schedule:	Annual, or as data are provided

ADDITIONAL COMMENTS
Each rep loss and severe rep loss structure will be assigned a flood risk score (using social vulnerability info) and ranked in order to prioritize areas for flood mitigation

HENRICO COUNTY MITIGATION ACTION 10	
Continue participating in the National Flood Insurance Program and Community Rating System, including enforcement of zoning and building codes.	
BACKGROUND INFORMATION	
Site and Location:	Throughout floodprone areas of the county
Benefit Cost:	NFIP regulations reduce flood damage by requiring elevation to the base flood elevation. CRS participation reduces flood insurance premiums for property owners in the SFHA.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.4; Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low to Moderate
Estimated Cost:	Staff time
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

HENRICO COUNTY MITIGATION ACTION 11	
Protect public and private structures from natural hazard damage, including acquiring, relocating, retrofitting or elevating floodprone property. This action may include minor structural flood control projects, retrofits to address critical infrastructure and facilities, and stormwater management system improvements.	
BACKGROUND INFORMATION	
Site and Location:	Countywide, with particular emphasis on floodprone areas.
Benefit Cost:	Structures and infrastructure can often be retrofitted to provide additional protection from hazards such as flood, thereby reducing average annual losses.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Severe Wind Events, Wildfires, Severe Winter Weather, Thunderstorms, Earthquakes, Landslides, Radon Exposure
Goal(s) Addressed:	Goal 1: Objective 1.4; Goal 3; Goal 4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate to Low for flood: Each rep loss and severe rep loss structure will be assigned a flood risk score (using social vulnerability info) and ranked in order to prioritize areas for flood mitigation
Estimated Cost:	TBD
Potential Funding Sources:	DHS: BRIC, HMGP, FMA, RFC; ARPA; USACE: SFCP, FPMS; HUD: CDBG; Virginia CFPF
Lead Agency/Department Responsible:	Emergency Management, Public Utilities, Public Works, Planning, Permit Center, Building Inspections, Police, Schools, Rec & Parks

Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
Acquisition of floodprone structures is the county's current priority for mitigation. Strategic acquisition of properties on the open market or available through trustee's sale is a long-term tactic.	

HENRICO COUNTY MITIGATION ACTION 12	
Prepare countywide hazard-related communications plan. Include general outreach regarding risk, county programs and dam safety. Provide information on regulations and permitting requirements. Tie messaging into the PPI focusing on flood insurance coverage. Prepare an annex to the Emergency Operations Plan that includes prescribed messages for pre- and post-disaster scenarios.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	Pre-prepared and pre-approved messages save precious moments in post-disaster scenarios when citizens need answers and officials need to disseminate information. The costs of preparing communications methodology and messaging ahead of time are minimal.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 1: Objectives 1.2, 1.4; Goal 2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Staff time
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Emergency Management, Public Works, Public Relations
Implementation Schedule:	Within 2 years of plan adoption
ADDITIONAL COMMENTS	

HENRICO COUNTY MITIGATION ACTION 13	
Provide training to realtors, insurance agents, builders, and surveyors, who operate in the county regarding floodplain management policies and procedures. Provide business resilience training to business owners, especially SWaM businesses. Tie messaging into the PPI.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	Effective floodplain management reduces future damages in floodprone areas but only if regulations are enforced. There are many measures businesses can implement to reduce damage from a variety of hazards.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundments
Goal(s) Addressed:	Goal 1, Objectives 1.2, 1.3, 1.4; Goal 2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low to Moderate
Estimated Cost:	Staff time
Potential Funding Sources:	Existing resources; DHS: HMGP, FMA;
Lead Agency/Department Responsible:	DPW
Implementation Schedule:	Within 2 years of plan adoption
ADDITIONAL COMMENTS	

HENRICO COUNTY MITIGATION ACTION 14	
Provide infrastructure upgrades (roads, water supply, sanitary sewer service) to improve emergency services response times in the county's east end. Ensure water supply is sufficient to meet firefighting needs, and water quality remains safe for residents.	
BACKGROUND INFORMATION	
Site and Location:	Eastern portion of the county, east and south of Richmond
Benefit Cost:	Response times for wildfire and other hazard events can reduce damage by removing people from harm's way.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfires, Flooding, Flooding due to Impoundment Failure, Severe Wind Events, Tornadoes, Severe Winter Weather, Earthquakes
Goal(s) Addressed:	Goal 1: Objective 1.4; Goal 4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	TBD
Potential Funding Sources:	Capital budgeting
Lead Agency/Department Responsible:	DPW, Public Utilities, Fire
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

CITY OF HOPEWELL MITIGATION ACTION 1	
Integrate mitigation goals into future capital improvement plans to ensure that new city facilities are located out of identified hazard areas. Relocate Fire Station 1/EOC/Headquarters outside of 0.5 mile evacuation zone for industrial plans and as far as possible from train yards/tracks.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Benefit Cost:	The vulnerability of public safety buildings and the location of the city's operational facilities in areas outside of high hazardous risk zones is a key element in reducing risk and increasing operational capabilities.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hazardous materials release, secondary to surrounding facilities impacted by natural disasters, i.e. tornado, hurricane, high winds.
Goal(s) Addressed:	Goal 4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	TBD
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Within 2 years of plan adoption and then ongoing
ADDITIONAL COMMENTS	

CITY OF HOPEWELL MITIGATION ACTION 2	
Continue participating in the National Flood Insurance Program, including enforcement of zoning and building ordinances. Update Article XV, Floodplain District, ordinance. Research joining the NFIP Community Rating System.	
BACKGROUND INFORMATION	
Site and Location:	Floodprone areas Citywide
Benefit Cost:	NFIP regulations reduce flood damage by requiring elevation to the base flood elevation.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.4; Goal 4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Minimal
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Development
Implementation Schedule:	Ongoing. Update floodplain ordinance within 2 years of plan adoption.
ADDITIONAL COMMENTS	

CITY OF HOPEWELL MITIGATION ACTION 3	
Target FEMA's repetitive loss property, and those in the surrounding repetitive loss area, for specialized outreach and mitigation activities.	
BACKGROUND INFORMATION	
Site and Location:	Structures are in an area outside the detailed-study 100-year floodplain and floodway of Bailey Creek, a tributary of the James River. Bailey Creek, in general, has a relatively flat watershed; the lower reaches are swampy, and flow is very sluggish.
Benefit Cost:	Structures designated as repetitive flood losses are treated differently under NFIP rating procedures. Ensuring structures designated as repetitive loss have flood insurance is important for protecting citizens occupying those structures.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding
Goal(s) Addressed:	Goal 1; Goal 3: Objective 3.2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Minimal
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
As of 2021, there is only 1 confirmed repetitive loss in Hopewell.	

CITY OF HOPEWELL MITIGATION ACTION 4	
Inspect and clear debris from stormwater drainage system. Increase capacity of Cabin Creek drainage system, including: 1) debris clearing and revetment, and 2) if necessary, re-alignment of channel. Increase capacity of Cattail Creek channel and culverts crossing CSX and Norfolk Southern Railroad to address repeated flooding and damage to infrastructure.	
BACKGROUND INFORMATION	
Site and Location:	Cabin Creek, and Cattail Creek at railroad crossing
Benefit Cost:	Benefits of improving the stormwater conveyances accrue to infrastructure and homes in the area flooded by undersized bridges and culverts. Ensuring culverts are sized appropriately for current and future conditions will help address climate change and increased precipitation in the future, as well.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure
Goal(s) Addressed:	Goal 1: Objective 1.1; Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	TBD
Potential Funding Sources:	DHS: HMGP; ARPA; Virginia CFPF
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
Cattail Creek improvements have been funded (partially by grant funding). Additional improvements to stabilize the stream channel and road embankment of the city's primary emergency route, Winston Churchill Dr, between High Ave & Arlington Rd, and to protect adjacent residences, is also substantially complete.	

CITY OF HOPEWELL MITIGATION ACTION 5	
Protect public and private structures from natural hazard damage, including acquiring, relocating, retrofitting or elevating floodprone property. This action may include minor structural flood control projects, and an engineering study to identify retrofits to address critical infrastructure vulnerabilities such as the need for generators, and quick-connects at the schools.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Benefit Cost:	Structures and infrastructure can often be retrofitted to provide additional protection from hazards such as flood, thereby reducing average annual losses.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Severe Wind Events, Severe Winter Weather, Thunderstorms, Earthquakes, Landslides, Radon Exposure
Goal(s) Addressed:	Goal 1: Objective 1.4; Goal 3; Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	TBD
Potential Funding Sources:	DHS: BRIC, HMGP, FMA, RFC; ARPA; USACE: SFCP, FPMS; HUD: CDBG; Virginia CFPF
Lead Agency/Department Responsible:	Emergency Management, Public Works
Implementation Schedule:	Ongoin
ADDITIONAL COMMENTS	
City Hall generator is under-sized to fulfill radio & other needs during disaster.	

CITY OF HOPEWELL MITIGATION ACTION 6	
Engage owners of the city's industrial businesses to discuss opportunities for retrofitting/hardening their facilities against flooding and severe weather, and developing business resilience plans.	
BACKGROUND INFORMATION	
Site and Location:	The City's floodprone industrial waterfront
Benefit Cost:	Targeted mitigation opportunities in this area can help dramatically reduce vulnerability by reducing damage to structures and infrastructure, and prepare businesses for managing disaster events.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Severe Wind Events, Tornadoes, Severe Winter Weather, Shoreline Erosion, Earthquakes
Goal(s) Addressed:	Goal 1: Objectives 1.3, 1.4; Goal 2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	Minimal planning costs; project/retrofit costs TBD
Potential Funding Sources:	DHS: HMGP, BRIC; Virginia CFPF; ARPA; USEDA: DMTA
Lead Agency/Department Responsible:	Emergency Management, private owners
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

CITY OF HOPEWELL MITIGATION ACTION 7	
Develop a debris removal plan.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Benefit Cost:	Both pre- and post-disaster debris removal is a key component in managing recovery and getting infrastructure (such as roads) back online.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Severe Wind Events, Tornadoes, Severe Winter Weather, Thunderstorms, Earthquakes, Landslides, Shoreline Erosion
Goal(s) Addressed:	Goal 1: Objectives 1.1; Goal 3: Objective 3.1; Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	Planning costs minimal; fees associated with on call contractors to perform services
Potential Funding Sources:	DHS; VDEM
Lead Agency/Department Responsible:	Public Works, Emergency Management
Implementation Schedule:	Within 1 year of plan adoption
ADDITIONAL COMMENTS	

CITY OF HOPEWELL MITIGATION ACTION 8	
Distribute brochures and use other means to educate the public regarding preparedness and mitigation.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Benefit Cost:	FEMA, VDEM and other agencies maintain a large library of free paper and online materials to support this action. Social media is free for communities and has potential to reach large number of citizens in a short period of time, and at little cost.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Severe Wind Events, Tornadoes, Severe Winter Weather, Thunderstorms, Droughts and Extreme Heat, Earthquakes, Radon Exposure, Infectious Diseases
Goal(s) Addressed:	Goal 1: Objectives 1.2, 1.4; Goal 2: Objective 2.2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	Minimal
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
City distributed FEMA brochures during COVID disaster.	

CITY OF HOPEWELL MITIGATION ACTION 9	
Install NWS-grade tide gauge at confluence of James and Appomattox Rivers. Include acoustic water-level sensor, protective well components, data collection platform, GOES satellite telemetry, enclosure, stand, batteries, antenna, and solar panels. Integrate IPAWS sensors with CodeRed alert system.	
BACKGROUND INFORMATION	
Site and Location:	Confluence of James and Appomattox Rivers
Benefit Cost:	The gauge data will be used to increase predictive capability, to build historical data to use for more reliable future predictions for industrial area and marina that will increase protective measures taken and aid evacuation efforts.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding
Goal(s) Addressed:	Goal 1; Goal 4
Priority (High, Moderate, Low):	Low
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	TBD
Potential Funding Sources:	DHS: HMGP; NWS; USACE; ARPA; Virginia CFPF
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Within 4 years of plan adoption
ADDITIONAL COMMENTS	

CITY OF HOPEWELL MITIGATION ACTION 10	
Implement continuity of operations plan.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Benefit Cost:	COOP helps identify and reduce vulnerabilities in the city's operational procedures.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 1; Goal 2; Goal 3: Objective 3.2; Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	Minimal
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Within 1 year of plan adoption
ADDITIONAL COMMENTS	
Since previous plan, City has completed the COOP.	

CITY OF HOPEWELL MITIGATION ACTION 11	
Integrate VDEM Crisis Track software (for post-disaster damage assessment) into local GIS platforms for data collection, storage and sharing. Add building plans from critical facilities into GIS to benefit first responders.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Benefit Cost:	Emergency Management and hazard response functionality are improved with high level data integration and geographic/spatial data.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.4; Goal 2; Goal 4: Objective 4.1
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	Minimal
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Development
Implementation Schedule:	Within 1 year of plan adoption
ADDITIONAL COMMENTS	

CITY OF HOPEWELL MITIGATION ACTION 12	
Retrofit Hopewell Marina infrastructure to minimize potential impacts from flooding and shoreline erosion, to include: power equipment, pumpout facility, and docks. Develop plan for debris management at the site. Ensure marina rules and regulations require boats to be operational and regularly-maintained, with insurance policies up to date.	
BACKGROUND INFORMATION	
Site and Location:	Hopewell Marina, on the south bank of the Appomattox River, just west of the Route 10 bridge
Benefit Cost:	Marina is vulnerable to flooding and shoreline erosion; retrofitting components and infrastructure will reduce future flood damages.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Shoreline Erosion, Severe Wind Events
Goal(s) Addressed:	Goal 1; Goal 4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	TBD
Potential Funding Sources:	ARPA; DHS: HMGP
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Within 2 years of plan adoption
ADDITIONAL COMMENTS	

CITY OF HOPEWELL MITIGATION ACTION 13	
Formalize process for tax sale properties, with special focus on those in hazardous locations (SFHA, 500-year floodplain, hazardous materials, etc.).	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Benefit Cost:	Determining best practices for divesting the city of hazardous properties and minimizing future private investment in those properties can reduce damages in the long-term.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Shoreline Erosion, Earthquakes, Severe Wind Events
Goal(s) Addressed:	Goal 1; Goal 3
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	Minimal cost for planning; future acquisition/disposal/demolition costs TBD. Demolition/rebuild may allow future, protected development.
Potential Funding Sources:	DHS: HMGP, BRIC, FMA, RFC
Lead Agency/Department Responsible:	Commissioner of Revenue, Emergency Management, Risk Management
Implementation Schedule:	Within 2 years of plan adoption
ADDITIONAL COMMENTS	

CITY OF HOPEWELL MITIGATION ACTION 14	
Develop local stormwater management resilience plan and incorporate identified upgrades into the State's Coastal Resilience Plan.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Benefit Cost:	A broad review and study of the city's stormwater conveyances is needed to identify upgrades/maintenance/retrofits necessary to ensure the system can perform as designed to handle existing and future precipitation conditions.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure
Goal(s) Addressed:	Goal 1: Objective 1.1; Goal 4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	TBD
Potential Funding Sources:	Virginia CFPF
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Within 1 year of plan adoption
ADDITIONAL COMMENTS	

CITY OF HOPEWELL MITIGATION ACTION 15	
Implement State Code requirement to adopt Capital Improvement Budget. As outlined in the Comprehensive Plan, a CIP would identify and prioritize projects for environmental protection, including funding for: critical RPA maintenance, mitigation and remediation; stormwater retrofits on City-owned properties; development of Small Area Plans in key areas of environmental vulnerability, and grant and investment support for high priority pollutant reduction projects.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Benefit Cost:	CIP is needed in order to determine City priorities for mitigation and to outline what local funds are available to support the most cost beneficial initiatives.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure; Shoreline Erosion, Severe Wind Events, Earthquakes
Goal(s) Addressed:	Goal 1: Objective 1.1; Goal 4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	Staff time
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	City Manager, Finance, Public Works
Implementation Schedule:	Within 2 years of plan adoption
ADDITIONAL COMMENTS	

CITY OF HOPEWELL MITIGATION ACTION 16	
Enact additional regulations to govern shoreline development, to include: require vegetation as an alternative to manmade structures; require all new shoreline development applications are accompanied by a Shoreline Protective Plan, in accordance with the *Virginia Department of Conservation and Recreation Chesapeake Bay Local Assistance Riparian Buffers Modification and Mitigation Guidance Manual*; ensure all newly delineated wetlands (resulting from review of development proposals) are added to the city's wetland resource inventory.	
BACKGROUND INFORMATION	
Site and Location:	Shorelines citywide
Benefit Cost:	Shoreline erosion is caused by a variety of forces in Hopewell, but controlling new development is an important element in reducing future damages.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Shoreline Erosion
Goal(s) Addressed:	Goal 1; Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	Staff time
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Development
Implementation Schedule:	Within 5 years of plan adoption
ADDITIONAL COMMENTS	
This action is also recommended in the comprehensive plan.	

CITY OF HOPEWELL MITIGATION ACTION 17	
Install comprehensive atmospheric monitoring equipment, including but not limited to: air temperature, road temperature, wind speed & direction, rainfall, lightning strike, humidity, road surface and bridge surfaces conditions. This comprehensive weather monitoring system includes remote monitoring of these sensors and conditions, and receives data from all monitors as well as cameras. Remote and automatic activation of automatic early warning system must also be included.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Benefit Cost:	Improved situational awareness of atmospheric conditions which allows for improved preparation, response and recovery before during and after inclement weather conditions. This allows City officials to make accurate informed decisions for the planning preparation and response to natural disasters, early warning and notification, orders of emergency evacuation/shelter in place.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Severe Wind Events, Tornadoes, Severe Winter Weather, Droughts and Extreme Heat, Thunderstorms
Goal(s) Addressed:	Goal 1: Objective 1.1, 1.2,1.4; Goal 2: Objective 2.1, 2.2, 2.3; Goal 3; Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	TBD
Potential Funding Sources:	DHS: HMGP; NWS; USACE; ARPA; Virginia CFPF
Lead Agency/Department Responsible:	Public Works, Emergency Management
Implementation Schedule:	Within 2 years of adoption
ADDITIONAL COMMENTS	
As a waterfront community we must monitor the conditions of roadways, bridges, the shoreline as well as current air temperatures, surface temperatures, wind and tidal activity. The City	

maintains over 276 miles of roadways; cost savings and waste reductions would be secondary benefits of implementing this program. Accurate atmospheric monitoring or air and road surface temperature information allows the personnel responsible for surface pre-treatment, treatment, repairs, and maintenance to respond appropriately to the current conditions, monitor trends, and respond accordingly. This prevents waste and the misapplication of treatment products.

CITY OF HOPEWELL MITIGATION ACTION 18	
Implement the projects identified in the local stormwater resilience plan. Projects are categorized from short range to long range based on size, cost, complexity and risk area.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Benefit Cost:	This effort will address potential climate hazards that are not only felt today but also will affect every aspect of life over the coming decades. Project implementation will mitigate risk areas identified in stormwater resilience plan, reducing the occurrence of flood damage to public infrastructure and private property.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding
Goal(s) Addressed:	Goal 1: Objective 1.1; Goal 4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	TBD
Potential Funding Sources:	VDOT Revenue Sharing Program, Virginia DCR CFPF, Virginia DEQ Stormwater Local Assistance Fund
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Within 5 Years of plan adoption
ADDITIONAL COMMENTS	
The local stormwater resilience plan is a living document that will be updated each year to account for completed projects and new projects added as categorized.	

NEW KENT COUNTY MITIGATION ACTION 1	
Conduct regular review of repetitive loss and severe repetitive flood loss properties from FEMA. Review will include verification of the geographic location of each property and determination if mitigated and by what means. Corrections can be made to FEMA by filing form FEMA AW-501.	
BACKGROUND INFORMATION	
Site and Location:	Repetitively flooded areas in the county
Benefit Cost:	Structures designated as repetitive flood losses are treated differently under NFIP rating procedures. Ensuring the list is correct is important for property owners in the county who have to pay for flood insurance.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.4; Goal 3; Goal 4: Objective 4.1
Priority (High, Moderate, Low):	Low
Impact on Socially Vulnerable Populations:	Moderate – 2 rep loss areas in the southeastern part of county along the Chickahominy River
Estimated Cost:	Staff time
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

NEW KENT COUNTY MITIGATION ACTION 2	
Maintain floodplain protection ordinances and policies that allow the county to fully participate in the National Flood Insurance Program..	
BACKGROUND INFORMATION	
Site and Location:	Throughout floodprone areas of the county
Benefit Cost:	NFIP regulations reduce flood damage by requiring elevation to the base flood elevation.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.4; Goal 3, Goal 4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low to Moderate
Estimated Cost:	Staff time
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Inspections
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
Floodplain management ordinance was updated in September 2021. A floodplain manager position was created and staffed in Environmental in 2019. This action is also expressed in the county's comprehensive plan.	

NEW KENT COUNTY MITIGATION ACTION 3	
Distribute brochures and other literature to educate the public regarding preparedness and mitigation. Use a variety of means to disseminate hazard-related information, including social media and workshops. Prepare transferable lesson plans for delivery in schools and summer camps (Storm Camp). Incorporate the NWS "Turn Around, Don't Drown" campaign.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	FEMA, VDEM and other agencies maintain a large library of free paper and online materials to support this action. Social media is free for communities and has potential to reach large number of citizens in a short period of time, and at little cost.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Severe Wind Events, Tornadoes, Wildfires, Severe Winter Weather, Thunderstorms, Droughts and Extreme Heat, Earthquakes, Radon Exposure, Infectious Diseases
Goal(s) Addressed:	Goal 1: Objectives 1.2, 1.4; Goal 2: Objective 2.2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Staff time + materials (~$2500/year printing costs)
Potential Funding Sources:	DHS: HMGP; NWS; ARPA
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
County currently distributes information at all special events, such as Grand Illumination, National Night Out, and the County Fair.	

NEW KENT COUNTY MITIGATION ACTION 4	
Encourage new community support facilities, such as banks, gas stations, and pharmacies, to have back-up generators, cell phone charging stations, and electric vehicle charging stations as they are developed.	
BACKGROUND INFORMATION	
Site and Location:	Countywide population centers
Benefit Cost:	Long-term power outages can have impacts beyond climate control. Emergency Management disseminates post-disaster messaging via social media, which requires cell service. Citizens need urgent access to money, gas and medicines.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 2; Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	TBD. If mandated, cost is minimal. If incentives are provided, county could cover part of the cost.
Potential Funding Sources:	DHS; Dominion Energy
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

NEW KENT COUNTY MITIGATION ACTION 5	
Identify and replace vulnerable or undersized structures with bridges, larger culverts or other measures to reduce flood hazards.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	Benefits of improving the stormwater conveyances accrue to infrastructure and homes in the area flooded by undersized bridges and culverts.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure
Goal(s) Addressed:	Goal 1: Objective 1.1; Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low to Moderate
Estimated Cost:	~$175,000-$250,000 for single stormwater master plan
Potential Funding Sources:	DHS: HMGP; ARPA; USDA: WPFP
Lead Agency/Department Responsible:	Planning, Environmental, General Services
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

NEW KENT COUNTY MITIGATION ACTION 6	
Pursue opportunities and funding to harden local utilities and infrastructure to improve recovery time, including fulfilling any equipment and heavy machinery needs to accomplish this, and retrofitting critical facilities and systems.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	Infrastructure can often be retrofitted at low to moderate cost to provide additional protection from hazards such as flood, thereby reducing average annual losses.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Severe Wind Events, Tornadoes, Wildfires, Severe Winter Weather, Thunderstorms, Droughts and Extreme Heat, Earthquakes, Landslides, Shoreline Erosion, Sinkholes, Radon Exposure
Goal(s) Addressed:	Goal 1: Objective 1.1; Goal 4: Objectives 4.1 and 4.2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	TBD
Potential Funding Sources:	DHS: BRIC, HMGP, FMA, RFC; ARPA; USACE: SFCP, FPMS; HUD: CDBG; Virginia CFPF
Lead Agency/Department Responsible:	Public Utilities, Emergency Management
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

NEW KENT COUNTY MITIGATION ACTION 7	
Protect public and private structures from natural hazard damage, including acquiring, relocating, retrofitting or elevating floodprone property. This action may include minor structural flood control projects.	
BACKGROUND INFORMATION	
Site and Location:	Countywide, with particular emphasis on floodprone areas and repetitive loss areas as identified in Section 5
Benefit Cost:	Structures and infrastructure can often be retrofitted to provide additional protection from hazards such as flood, thereby reducing average annual losses.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Severe Wind Events, Wildfires, Severe Winter Weather, Thunderstorms, Earthquakes, Landslides, Radon Exposure
Goal(s) Addressed:	Goal 1: Objective 1.4; Goal 3; Goal 4
Priority (High, Moderate, Low):	Low
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	TBD
Potential Funding Sources:	DHS: BRIC, HMGP, FMA, RFC; ARPA; USACE: SFCP, FPMS; HUD: CDBG; Virginia CFPF
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

NEW KENT COUNTY MITIGATION ACTION 8	
Identify additional shelter mass care locations.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	Sheltering requirements are evolving and communities must adjust to meet the needs of citizens for a variety of short- and longer-term disaster duration events in order to minimize adverse impacts when evacuation is necessary.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 1; Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	TBD
Potential Funding Sources:	DHS; VDEM
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Annual needs assessment
ADDITIONAL COMMENTS	
Shelter demand, availability and options are reviewed annually. COVID impacted mass care options requiring Federal and state agencies to adopt interim strategies including non-congregate shelter options.	

NEW KENT COUNTY MITIGATION ACTION 9	
Use available statewide, regional, or county advanced warning systems, weather gauging systems, evacuation planning tools, and public information resources to prepare community officials and residents in case of a hazard event. Acquire additional resources to supplement these systems, as required. Consider countywide flood warning system and evacuation plan.	
BACKGROUND INFORMATION	
Site and Location:	Countywide; I-Flow gauges particularly needed for Colonies and campground areas near Chickahominy River
Benefit Cost:	When people have adequate time to prepare for a hazard event and know what actions to take ahead of time, damages are reduced.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Tornadoes, Severe Wind Events, Thunderstorms, Earthquakes, Severe Winter Weather
Goal(s) Addressed:	Goal 1; Goal 2; Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	TBD
Potential Funding Sources:	DHS: HMGP, BRIC; Virginia CFPF; USACE; USGS
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

NEW KENT COUNTY MITIGATION ACTION 10	
Create a culture within New Kent County government focused on hazard mitigation objectives: 1) integrate mitigation plan goals and actions into other appropriate planning mechanisms, such as the comprehensive plan and capital improvement plan; 2) review processes and procedures across all functions to ensure objectives are met (Development Review Committee hazard reviews, for example); and 3) regularly brief elected officials on mitigation plan status and priorities. Within Emergency Management, conduct and receive training to stay current on grant opportunities and identify new opportunities for data sharing within the county, region and state. Work to focus mitigation actions on specific structures, neighborhoods and problem areas. Incorporate mitigation objectives into recovery planning and regular exercises.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	Mitigation actions require integration with other county functions to be implemented effectively.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 1; Goal 2; Goal 3
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Minimal; some training costs may be incurred
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

NEW KENT COUNTY MITIGATION ACTION 11	
Periodically inventory existing dams in the county, assess their hazard potential, and seek funding for preparation of dam inundation zone maps. Ensure Emergency Action Plans (EAPs) are up to date, identify necessary maintenance or retrofits, and conduct exercises to reinforce EAP procedures.	
BACKGROUND INFORMATION	
Site and Location:	All dams countywide
Benefit Cost:	Local engineering expertise and regional knowledge may prove effective in supplementing existing, limited state resources for inspecting and rating dams. Dam inundation planning is similarly impacted.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding due to Impoundment Failure
Goal(s) Addressed:	Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low to Moderate
Estimated Cost:	TBD
Potential Funding Sources:	DHS: HHPD; USACE; VaDCR
Lead Agency/Department Responsible:	Environmental; Emergency Management
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
This action is also expressed in the county's comprehensive plan. There are no high hazard potential dams in New Kent County.	

NEW KENT COUNTY MITIGATION ACTION 12	
Promote native and drought-tolerant grass species and landscaping as an alternative to traditional fescue-based lawns.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	This measure provides protection from a variety of hazards; reduced runoff and erosion, and more cooling on high temperature days are advantages of these alternatives.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Shoreline Erosion, Extreme Heat
Goal(s) Addressed:	Goal 3
Priority (High, Moderate, Low):	Low
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Minimal
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Emergency Management and County Extension Services
Implementation Schedule:	Within 4 years of plan adoption
ADDITIONAL COMMENTS	
This action is also expressed in the county's comprehensive plan.	

CITY OF PETERSBURG MITIGATION ACTION 1	
Continue participating in the National Flood Insurance Program, including enforcement of zoning and building codes.	
BACKGROUND INFORMATION	
Site and Location:	Throughout floodprone areas of the city
Benefit Cost:	NFIP regulations reduce flood damage by requiring elevation to the base flood elevation.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.4; Goal 4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low to Moderate
Estimated Cost:	Staff time
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Building Department
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

CITY OF PETERSBURG MITIGATION ACTION 2	
Partner with parent-teacher associations and local schools to implement existing curriculum related to natural hazards (e.g., Masters of Disaster, Risk Watch).	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Benefit Cost:	Children and parents that are informed and know what actions to take in the event of hazard events can help reduce damages and save lives.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 1; Goal 2: Objective 2.2
Priority (High, Moderate, Low):	Low
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	Staff time
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

CITY OF PETERSBURG MITIGATION ACTION 3	
Complete application for StormReady Program.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Benefit Cost:	StormReady helps arm communities with the communication and safety skills needed to save lives and property--before, during and after the event. StormReady helps community leaders and emergency managers strengthen local safety programs.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Severe Wind Events, Tornadoes, Severe Winter Weather, Thunderstorms, Extreme Heat
Goal(s) Addressed:	Goal 1; Goal 2
Priority (High, Moderate, Low):	Low
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	Staff time
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Within 2 years of plan adoption
ADDITIONAL COMMENTS	
City is not certified StormReady as of January 2022.	

CITY OF PETERSBURG MITIGATION ACTION 4	
Consider participating in FEMA's Community Rating System.	
BACKGROUND INFORMATION	
Site and Location:	Citywide, with particular benefits to flood prone areas
Benefit Cost:	CRS actions help reenforce existing floodplain management initiatives, including the floodplain zoning overlay ordinance. These measures reduce average annual damages from flooding in the future, and participation in the CRS results in premium savings that stay in homeowners' pockets.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure
Goal(s) Addressed:	Goal 1
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low to Moderate
Estimated Cost:	Considerable staff time
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

CITY OF PETERSBURG MITIGATION ACTION 5	
Inspect and clear debris from stormwater drainage system. Partner with VDOT to ensure non-City owned ROWs are also clear.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Benefit Cost:	Clear drainage systems help to alleviate local or urban flooding and associated damage resulting from severe precipitation events.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure
Goal(s) Addressed:	Goal 1: Objective 1.1; Goal 4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low to Moderate
Estimated Cost:	$20,000/year
Potential Funding Sources:	Existing CIP; DHS: BRIC, HMGP; VDOT
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

CITY OF PETERSBURG MITIGATION ACTION 6	
Finish implementation of Reverse 911 system.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Benefit Cost:	Other methods of notifying citizens require massive amounts of staff time which exceeds budgetary restraints. Reverse 911 quickly and efficiently uses existing infrastructure to notify property owners of appropriate pre- and post-disaster mitigation actions.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.2, 1.4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	TBD
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

CITY OF PETERSBURG MITIGATION ACTION 7	
Install high water mark signage along bridges and other structures to indicate dangerous water levels along creeks and rivers in flood-prone areas.	
BACKGROUND INFORMATION	
Site and Location:	Flood-prone crossings Citywide
Benefit Cost:	Signage that notifies drivers about how high the water is helps reduce water rescues and save lives.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding; Flooding due to Impoundment Failure
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.2, 1.4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low to Moderate
Estimated Cost:	$15,000
Potential Funding Sources:	DHS: HMGP, FMA; USACE: FPMS; ARPA; FOLAR
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

CITY OF PETERSBURG MITIGATION ACTION 8	
Investigate all public utility lines to evaluate their resistance to flood, wind, and winter storm hazards. Retrofit or relocate lines, as necessary, to reduce vulnerabilities.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Benefit Cost:	Provision of public utilities during and after disasters is critical to public safety.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Severe Wind Events, Tornadoes, Wildfires, Severe Winter Weather, Thunderstorms, Earthquakes, Landslides, Shoreline Erosion, Sinkholes
Goal(s) Addressed:	Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	$75,000 for inspection & report; retrofit costs TBD
Potential Funding Sources:	DHS: HMGP, BRIC; ARPA
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

CITY OF PETERSBURG MITIGATION ACTION 9	
Work with VDOT, private utilities, and/or private homeowners to trim or remove trees that could down power lines.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Benefit Cost:	Provision of utilities during and after disasters is critical to public safety.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Severe Wind Events, Tornadoes, Wildfires, Severe Winter Weather, Thunderstorms, Earthquakes, Landslides, Shoreline Erosion, Sinkholes
Goal(s) Addressed:	Goal 2; Goal 4
Priority (High, Moderate, Low):	Low
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	$25,000
Potential Funding Sources:	ARPA; DHS: HMGP;
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

CITY OF PETERSBURG MITIGATION ACTION 10	
Distribute brochures and use other means to educate the public regarding preparedness and mitigation.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Benefit Cost:	FEMA, VDEM and other agencies maintain a large library of free paper and online materials to support this action. Social media is free for communities and has potential to reach large number of citizens in a short period of time, and at little cost.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Severe Wind Events, Tornadoes, Wildfires, Severe Winter Weather, Thunderstorms, Droughts and Extreme Heat, Earthquakes, Radon Exposure, Infectious Diseases
Goal(s) Addressed:	Goal 1: Objectives 1.2, 1.4; Goal 2: Objective 2.2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	Minimal
Potential Funding Sources:	DHS: HMGP
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

CITY OF PETERSBURG MITIGATION ACTION 11	
Conduct regular review of repetitive loss and severe repetitive flood loss properties from FEMA. Review will include verification of the geographic location of each property and determination if mitigated and by what means. Corrections can be made to FEMA by filing form FEMA AW-501.	
BACKGROUND INFORMATION	
Site and Location:	Repetitive flood loss areas throughout the City as discussed in Section 5 of this plan
Benefit Cost:	Structures designated as repetitive flood losses are treated differently under NFIP rating procedures. Ensuring the list is correct is important for property owners in the City who have to pay for flood insurance.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.4; Goal 3; Goal 4: Objective 4.1
Priority (High, Moderate, Low):	Low
Impact on Socially Vulnerable Populations:	Low to Moderate
Estimated Cost:	Staff time
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Planning Department, Tax Assessor
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

CITY OF PETERSBURG MITIGATION ACTION 12	
Install quick connects for generators at critical facilities. Ensure existing generators are working at all times with regular maintenance and inspections. Replace generators, as necessary.	
BACKGROUND INFORMATION	
Site and Location:	Citywide facilities
Benefit Cost:	Continuity of operations after a hazard event is dependent upon operational utilities, shelters, communications and medical services.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	$8000/year
Potential Funding Sources:	DHS: HMGP; Existing CIP budgets
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

CITY OF PETERSBURG MITIGATION ACTION 13	
Work with state partners and neighboring localities to monitor and implement Next Generation 911 GIS data standards.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Benefit Cost:	Emergency Management and hazard response functionality are improved with high level data integration and geographic/spatial data.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.4; Goal 2; Goal 4: Objective 4.1
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	TBD
Potential Funding Sources:	DHS: HMGP; existing resources
Lead Agency/Department Responsible:	GIS Manager, Crater PDC
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

CITY OF PETERSBURG MITIGATION ACTION 14	
Protect public and private structures from natural hazard damage, including acquiring, relocating, retrofitting or elevating floodprone property. This action may include minor structural flood control projects, retrofits to address critical infrastructure and facilities and stormwater management system improvements.	
BACKGROUND INFORMATION	
Site and Location:	Citywide, with particular emphasis on the city's repetitive flood loss areas as identified in Section 5
Benefit Cost:	Structures and infrastructure can often be retrofitted to provide additional protection from hazards such as flood, thereby reducing average annual losses.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Severe Wind Events, Wildfires, Severe Winter Weather, Thunderstorms, Earthquakes, Landslides, Radon Exposure
Goal(s) Addressed:	Goal 1: Objective 1.4; Goal 3; Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	TBD
Potential Funding Sources:	DHS: BRIC, HMGP, FMA, RFC; ARPA; USACE: SFCP, FPMS; HUD: CDBG; Virginia CFPF
Lead Agency/Department Responsible:	Fire-Rescue
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

CITY OF PETERSBURG MITIGATION ACTION 15	
Use available statewide, regional, or county advanced warning systems, weather gauging systems, evacuation planning tools, and public information resources to prepare community officials and residents in case of a hazard event. Acquire additional resources to supplement these systems, as required.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Benefit Cost:	When people have adequate time to prepare for a hazard event and know what actions to take ahead of time, damages are reduced.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Tornadoes, Severe Wind Events, Thunderstorms, Earthquakes, Severe Winter Weather
Goal(s) Addressed:	Goal 1; Goal 2; Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	TBD
Potential Funding Sources:	DHS: HMGP, BRIC; Virginia CFPF; USACE
Lead Agency/Department Responsible:	Fire-Rescue
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

POWHATAN COUNTY MITIGATION ACTION 1	
Protect public and private structures from natural hazard damage, including acquiring, relocating, retrofitting or elevating floodprone property. This action may include minor structural flood control projects, retrofits to address critical infrastructure and facilities, mapping to determine detailed flood hazards, and stormwater management system improvements.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	Structures and infrastructure can often be retrofitted to provide additional protection from hazards such as flood, thereby reducing average annual losses.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Severe Wind Events, Wildfires, Severe Winter Weather, Thunderstorms, Earthquakes, Landslides, Radon Exposure
Goal(s) Addressed:	Goal 1: Objective 1.4; Goal 3; Goal 4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	TBD
Potential Funding Sources:	DHS: BRIC, HMGP, FMA, RFC; ARPA; USACE: SFCP, FPMS; HUD: CDBG; Virginia CFPF
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
Quick connects for all permanently-installed generators on critical facilities are needed.	

POWHATAN COUNTY MITIGATION ACTION 2	
Continue participating in the National Flood Insurance Program, including enforcement of zoning and building codes. Continue to require minimum non-disturbance (vegetated) buffers from the edge of all wetlands and streams.	
BACKGROUND INFORMATION	
Site and Location:	Throughout floodprone areas of the county
Benefit Cost:	NFIP regulations reduce flood damage by requiring elevation to the base flood elevation.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.4; Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low, to Moderate in the eastern two-thirds of the county
Estimated Cost:	Minimal
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Planning and Community Development
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
County does not allow new development in the SFHA. The buffer continuance is also expressed in the existing comprehensive plan, which is currently being updated.	

POWHATAN COUNTY MITIGATION ACTION 3	
Maximize use of VDEM's Crisis Track system to collect and transmit damage assessment information post-disaster.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	Emergency Management and hazard response functionality are improved with high level data integration and geographic/spatial data.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.4; Goal 2; Goal 4: Objective 4.1
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low to Moderate
Estimated Cost:	Minimal
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Within 3 years of plan adoption
ADDITIONAL COMMENTS	

POWHATAN COUNTY MITIGATION ACTION 4	
Distribute brochures and use other means to educate the public regarding preparedness and mitigation. Increase situational awareness on behalf of citizens and maximize use of social media, Yammer, county employees, CodeRed/R911 to communicate important hazard-related messages.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	FEMA, VDEM and other agencies maintain a large library of free paper and online materials to support this action. Social media is free for communities and has potential to reach large number of citizens in a short period of time, and at little cost.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Severe Wind Events, Tornadoes, Wildfires, Severe Winter Weather, Thunderstorms, Droughts and Extreme Heat, Earthquakes, Radon Exposure, Infectious Diseases, Shoreline Erosion
Goal(s) Addressed:	Goal 1: Objectives 1.2, 1.4; Goal 2: Objective 2.2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Minimal
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Emergency Management, County Public Information Officer
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

POWHATAN COUNTY MITIGATION ACTION 5	
Conduct regular review of repetitive loss and severe repetitive flood loss properties from FEMA, if any arise. Review will include verification of the geographic location of each property and determination if mitigated and by what means. Corrections can be made to FEMA by filing form FEMA AW-501.	
BACKGROUND INFORMATION	
Site and Location:	Repetitively flooded areas in the county
Benefit Cost:	Structures designated as repetitive flood losses are treated differently under NFIP rating procedures. Ensuring the list is correct is important for property owners in the county who have to pay for flood insurance.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.4; Goal 3; Goal 4: Objective 4.1
Priority (High, Moderate, Low):	Low
Impact on Socially Vulnerable Populations:	Low to Moderate
Estimated Cost:	Staff time
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Planning and Community Development
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
There are currently no properties on the NFIP list of repetitive flood losses for Powhatan County.	

POWHATAN COUNTY MITIGATION ACTION 6	
Use available statewide, regional, or county advanced warning systems, weather gauging systems, evacuation planning tools, and public information resources to prepare community officials and residents in case of a hazard event. Acquire additional resources to supplement these systems, as required.	
BACKGROUND INFORMATION	
Site and Location:	Floodprone areas countywide
Benefit Cost:	When people have adequate time to prepare for a hazard event and know what actions to take ahead of time, damages are reduced.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Tornadoes, Severe Wind Events, Thunderstorms, Earthquakes, Severe Winter Weather
Goal(s) Addressed:	Goal 1; Goal 2; Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	TBD
Potential Funding Sources:	DHS: HMGP, BRIC; Virginia CFPF; USACE
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

POWHATAN COUNTY MITIGATION ACTION 7	
Implement measures to reduce wildfire damages, including: 1) mandate Fire Department review for defensible space and wildfire interface in development review process; 2) provide wildfire mitigation training to landowners and other county staff.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	Damage from wildfire can be reduced by ensuring new development has protective measures in place. The VDOF has several tools available for training measures, free of charge.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Goal(s) Addressed:	Goal 1; Goal 3
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Staff time
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Planning and Community Development, VDOF
Implementation Schedule:	Within 3 years of plan adoption
ADDITIONAL COMMENTS	

POWHATAN COUNTY MITIGATION ACTION 8	
Finalize Post-Disaster Redevelopment plan that documents plans and procedures for recovery, including development/designation of a Recovery Operations Center.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	Covering a broad array of hazard events, this plan lays out a plan for recovery that will help align redevelopment efforts with current standards for hazard mitigation, thereby reducing future vulnerability.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 3: Objective 3.2
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Minimal
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Within 1 year of plan adoption
ADDITIONAL COMMENTS	

PRINCE GEORGE COUNTY MITIGATION ACTION 1	
Continue participating in the National Flood Insurance Program, including enforcement of zoning and building codes.	
BACKGROUND INFORMATION	
Site and Location:	Throughout floodprone areas of the county
Benefit Cost:	NFIP regulations reduce flood damage by requiring elevation to the base flood elevation.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.4; Goal 4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	Minimal
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Building Department
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

PRINCE GEORGE COUNTY MITIGATION ACTION 2	
In future updates to the 2018 comprehensive plan, include hazard vulnerability summary and include mitigation actions in the plan.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	Repetition of mitigation actions and consistency throughout county plans helps ensure implementation of the plan and subsequent reduction in vulnerability.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 3
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Staff time
Potential Funding Sources:	Existing budgets
Lead Agency/Department Responsible:	Planning Department
Implementation Schedule:	Within 1 year of plan adoption
ADDITIONAL COMMENTS	

PRINCE GEORGE COUNTY MITIGATION ACTION 3	
Protect public and private structures from natural hazard damage, including acquiring, relocating, retrofitting or elevating floodprone property. This action may include minor structural flood control projects, retrofits to address critical infrastructure and facilities and stormwater management system improvements.	
BACKGROUND INFORMATION	
Site and Location:	Countywide, with particular emphasis on floodprone areas.
Benefit Cost:	Structures and infrastructure can often be retrofitted to provide additional protection from hazards such as flood, thereby reducing average annual losses.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Severe Wind Events, Wildfires, Severe Winter Weather, Thunderstorms, Earthquakes, Landslides, Radon Exposure
Goal(s) Addressed:	Goal 1: Objective 1.4; Goal 3; Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	TBD
Potential Funding Sources:	DHS: BRIC, HMGP, FMA, RFC; ARPA; USACE: SFCP, FPMS; HUD: CDBG; Virginia CFPF
Lead Agency/Department Responsible:	Planning and Emergency Management
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

PRINCE GEORGE COUNTY MITIGATION ACTION 4	
Develop stormwater master plan to study capacity of existing culverts and other structures to determine if sizing is sufficient for current conditions. Identify and replace vulnerable or undersized culvert stream crossings with bridges or larger culverts to reduce flood hazards, where feasible. Implement program for regular inspections and maintenance of roadside ditches and stream channels.	
BACKGROUND INFORMATION	
Site and Location:	Countywide; however, certain areas along Rte 460 and Rte10 (near Deep Bottom)
Benefit Cost:	Benefits of improving the stormwater conveyances accrue to infrastructure and homes in the area flooded by undersized bridges and culverts. Ensuring culverts are sized appropriately for flooding conditions will help address climate change and increased precipitation in the future, as well.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure
Goal(s) Addressed:	Goal 1: Objective 1.1; Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	TBD
Potential Funding Sources:	DHS: HMGP, FMA, BRIC; ARPA
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Within 4 years of plan adoption
ADDITIONAL COMMENTS	

PRINCE GEORGE COUNTY MITIGATION ACTION 5	
Maximize use of VDEM's Crisis Track system to collect and transmit damage assessment information post-disaster.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	Emergency Management and hazard response functionality are improved with high level data integration and geographic/spatial data.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.4; Goal 2; Goal 4: Objective 4.1
Priority (High, Moderate, Low):	Low
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Minimal
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Within 3 years of plan adoption
ADDITIONAL COMMENTS	

PRINCE GEORGE COUNTY MITIGATION ACTION 6	
Coordinate drought contingency plans with County Extension Office.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	Maintaining contingency plans for predicting and addressing drought conditions can help reduce losses, especially in the agricultural sectors.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Droughts and Extreme Heat
Goal(s) Addressed:	Goal 1; Goal 2; Goal 4
Priority (High, Moderate, Low):	Low
Impact on Socially Vulnerable Populations:	Low to Moderate
Estimated Cost:	Staff time
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

PRINCE GEORGE COUNTY MITIGATION ACTION 7	
Distribute brochures and use other means to educate the public regarding preparedness and mitigation. Target FEMA's repetitive flood loss properties for specialized outreach and mitigation activities to encourage purchase of flood insurance and flood preparedness measures.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	FEMA, VDEM and other agencies maintain a large library of free paper and online materials to support this action. Social media is free for communities and has potential to reach large number of citizens in a short period of time, and at little cost.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Severe Wind Events, Tornadoes, Wildfires, Severe Winter Weather, Thunderstorms, Droughts and Extreme Heat, Earthquakes, Radon Exposure, Infectious Diseases
Goal(s) Addressed:	Goal 1: Objectives 1.2, 1.4; Goal 2: Objective 2.2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Minimal
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
County has active Survivor Day programming, outreach tables at events, and CERT programs, all of which will continue.	

PRINCE GEORGE COUNTY MITIGATION ACTION 8	
Hire appropriately-trained personnel for Emergency Management Office, Building Inspections Office, and Zoning Office to ensure adequate levels of staffing to administer county programs.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	Staff who are well-versed in administration of county requirements related to hazard mitigation help make sure that existing standards are enforced and new standards do not increase the impacts of hazards.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 1: Objective 1.1
Priority (High, Moderate, Low):	Low
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	~$150,000/year (salaries) + ~$2000/year (training)
Potential Funding Sources:	DHS; Existing budgets
Lead Agency/Department Responsible:	County Administration and Agency Heads
Implementation Schedule:	Within 4 years of plan adoption
ADDITIONAL COMMENTS	

PRINCE GEORGE COUNTY MITIGATION ACTION 9	
Conduct regular review of repetitive loss and severe repetitive flood loss properties from FEMA. Review will include verification of the geographic location of each property and determination if mitigated and by what means. Corrections can be made to FEMA by filing form FEMA AW-501.	
BACKGROUND INFORMATION	
Site and Location:	Repetitively flooded areas in the county
Benefit Cost:	Structures designated as repetitive flood losses are treated differently under NFIP rating procedures. Ensuring the list is correct is important for property owners in the county who have to pay for flood insurance.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.4; Goal 3; Goal 4: Objective 4.1
Priority (High, Moderate, Low):	Low
Impact on Socially Vulnerable Populations:	Moderate
Estimated Cost:	Staff time
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

PRINCE GEORGE COUNTY MITIGATION ACTION 10	
Build new Fire Department burn building.	
BACKGROUND INFORMATION	
Site and Location:	Benefits accrue regionally; proposed site is off of Wells Station Road close to Route 460
Benefit Cost:	This project is critical for maintaining a competently-trained and coordinated fire and EMS system.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfires
Goal(s) Addressed:	Goal 1: Objective 1.1
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	$718,306
Potential Funding Sources:	Capitol funds; Virginia Department of Fire Programs; regional partners (tri-cities, Fort Lee)
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Within 2 years of plan adoption
ADDITIONAL COMMENTS	

PRINCE GEORGE COUNTY MITIGATION ACTION 11	
Continue implementation of aid agreement with the City of Hopewell.	
BACKGROUND INFORMATION	
Site and Location:	Countywide, including Hopewell
Benefit Cost:	Mutual aid agreements expand the capabilities of both jurisdictions to respond to and manage hazard events.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Minimal; some costs accrue if agreement is enacted for an event
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

PRINCE GEORGE COUNTY MITIGATION ACTION 12	
Use available statewide, regional, or county advanced warning systems, weather gauging systems, evacuation planning tools, and public information resources to prepare community officials and residents in case of a hazard event. Acquire additional resources to supplement these systems, as required.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	When people have adequate time to prepare for a hazard event and know what actions to take ahead of time, damages are reduced.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Tornadoes, Severe Wind Events, Thunderstorms, Earthquakes, Severe Winter Weather
Goal(s) Addressed:	Goal 1; Goal 2; Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	TBD
Potential Funding Sources:	DHS: HMGP, BRIC; Virginia CFPF; USACE
Lead Agency/Department Responsible:	Emergency Services, Planning
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

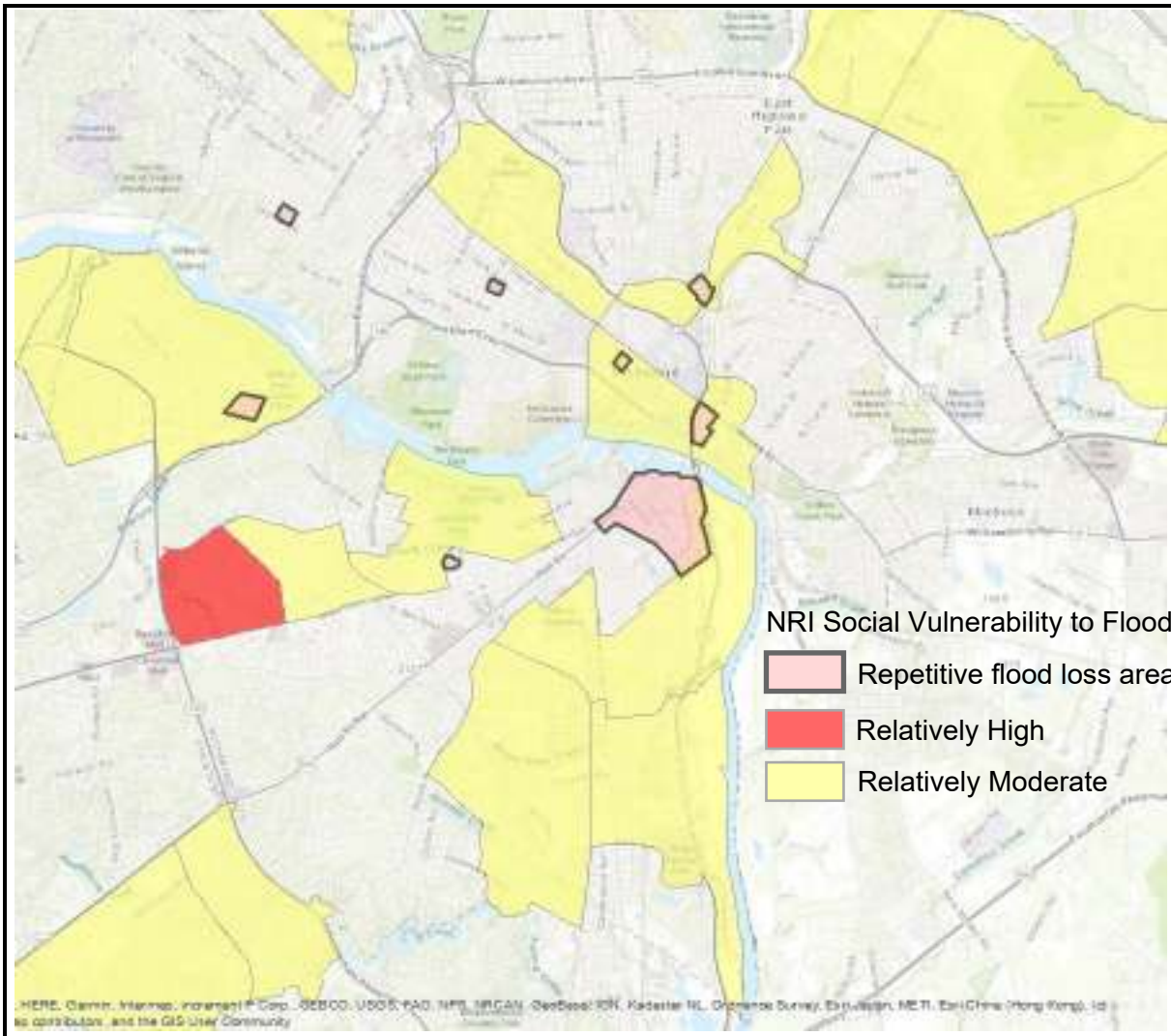
CITY OF RICHMOND MITIGATION ACTION 1	
Re-establish independent Office of Emergency Management.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Benefit Cost:	Make the existing Office of Emergency Management an independent entity within the City of Richmond's governance structure to support and enhance staff's ability to implement citywide priority actions and exercises.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 1: Objective 1.1; Goal 3
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	TBD
Potential Funding Sources:	CIP & General Fund Budget
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	within 2 years of plan adoption
ADDITIONAL COMMENTS	

CITY OF RICHMOND MITIGATION ACTION 2	
Establish a dedicated, independent EOC to fully support response and recovery efforts, and new technology for Emergency Management.	
BACKGROUND INFORMATION	
Site and Location:	Downtown Richmond
Benefit Cost:	The city's existing EOC is a shared space which inhibits timely coordination and response.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 1: Objective 1.1; Goal 3
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	TBD
Potential Funding Sources:	CIP
Lead Agency/Department Responsible:	City Administration
Implementation Schedule:	Within 4 years of plan adoption
ADDITIONAL COMMENTS	

CITY OF RICHMOND MITIGATION ACTION 3	
Continue to update emergency response plan and educate the public on hazard resiliency and emergency preparedness. Conduct emergency planning, climate, and resiliency engagement and outreach, particularly in communities with high vulnerability to hazards that have been traditionally underrepresented in city planning processes: Black and African American, Hispanic and Latino, lower-income, and those with limited English proficiency.	
BACKGROUND INFORMATION	
Site and Location:	Citywide, with emphasis on areas with high social vulnerability
Benefit Cost:	By purposefully engaging specific communities, equity in city services is more fully realized.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 1: Objectives 1.2, 1.3, 1.4; Goal 2
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	Minimal; estimated <$15,000/year
Potential Funding Sources:	DHS: HMGP; Virginia CFPF; HUD: CDBG
Lead Agency/Department Responsible:	Office of Sustainability, Emergency Management
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
Includes conducting annual preparedness days for hazards to include floods, wind, and earthquakes.	

CITY OF RICHMOND MITIGATION ACTION 4	
Conduct regular review of repetitive loss and severe repetitive flood loss properties from FEMA. Review will include verification of the geographic location of each property and determination if mitigated and by what means. Corrections can be made to FEMA by filing form FEMA AW-501.	
BACKGROUND INFORMATION	
Site and Location:	Repetitively flooded areas in the city
Benefit Cost:	Structures designated as repetitive flood losses are treated differently under NFIP rating procedures. Ensuring the list is correct is important for property owners in the city who have to pay for flood insurance.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.4; Goal 3; Goal 4: Objective 4.1
Priority (High, Moderate, Low):	Low
Impact on Socially Vulnerable Populations:	Moderate – 5 rep loss areas near downtown Low – 3 rep loss areas near downtown
Estimated Cost:	Staff time
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Public Utilities
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

CITY OF RICHMOND MITIGATION ACTION 5	
Continue participating in the NFIP and identify additional Community Rating System activities to reduce flood risk.	
BACKGROUND INFORMATION	
Site and Location:	Throughout flood-prone areas of the city
Benefit Cost:	NFIP regulations reduce flood damage by requiring elevation to the base flood elevation.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding; Flooding due to Impoundment Failure
Goal(s) Addressed:	Goal 1; Goal 2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	NRI flood risk ranges from Low to Moderate to High. See figure in comments below for additional information.
Estimated Cost:	Staff time
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Public Utilities
Implementation Schedule:	Long-term
ADDITIONAL COMMENTS	


NRI Social Vulnerability to Flood
Repetitive flood loss area
Relatively High
Relatively Moderate

CITY OF RICHMOND MITIGATION ACTION 6	
Improve existing flood warning system to increase the ability to forecast flood events and flood depths. Acquire additional resources to build components of a local evacuation plan, including: improved IFLOWS gauges, high hazard water crossing elevations for city and state-owned roads, and a flood alert system (using GIS and the City's public warning system).	
BACKGROUND INFORMATION	
Site and Location:	Floodprone areas citywide
Benefit Cost:	When people have adequate time to prepare for a hazard event and know what actions to take ahead of time, damages are reduced.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding; Flooding due to Impoundment Failure
Goal(s) Addressed:	Goal 1
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	NRI flood risk ranges from Low to Moderate to High.
Estimated Cost:	TBD
Potential Funding Sources:	DHS: HMGP, BRIC; Virginia CFPF; USACE; USGS
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Long-term
ADDITIONAL COMMENTS	
Partner with other organizations including the NWS, USGS, local watershed organizations and the Flood Wall Manager.	

CITY OF RICHMOND MITIGATION ACTION 7	
Distribute NOAA weather radios to residents.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Benefit Cost:	By alerting the public to impending threats, weather radios reduce injuries and damage during disasters.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Severe Wind Events, Tornadoes, Severe Winter Weather, Thunderstorms, Droughts and Extreme Heat
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.2, 1.4; Goal 4: Objectives 4.1, 4.2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	Radios are $35 to $80 each
Potential Funding Sources:	DHS; Existing budgets
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

CITY OF RICHMOND MITIGATION ACTION 8	
Enhance use of GIS for urgent emergency needs.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Benefit Cost:	Emergency Management and hazard response functionality are improved with high level data integration and geographic/spatial data.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.4; Goal 2; Goal 4: Objective 4.1
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	TBD
Potential Funding Sources:	DHS: HMGP; Virginia CFPF; General Fund Budget
Lead Agency/Department Responsible:	Emergency Management, DPW, DIT
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

CITY OF RICHMOND MITIGATION ACTION 9	
Expand facility assessment inventory of all City-owned facilities, including primary and secondary schools, to evaluate their resistance to all natural hazards. Identify and implement necessary retrofits or relocations to increase facility hardening, including addressing backup power needs through generators or micro-grids. Invest in data management system to allow local GIS/CAD storage archive of building plans for first responders and emergency planners.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Benefit Cost:	Hazard response needs are evolving: an up-to-date inventory of City buildings and capabilities will add needed flexibility to response and recovery. Temporary response and recovery structures operating near a contained disaster site can make response management easier and more cost effective.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 1; Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	TBD
Potential Funding Sources:	Existing budgets, CIP
Lead Agency/Department Responsible:	Emergency Management and DPW
Implementation Schedule:	Long-term
ADDITIONAL COMMENTS	
City has conducted wind study on many City-owned facilities. An assessment inventory of City-owned facilities is identified in Richmond 300. This HMA would include collection of structural and elevation data, as well.	

CITY OF RICHMOND MITIGATION ACTION 10	
Perform hazard prevention activities to increase the protection of public and private structures from natural hazard damage, such as maintenance of floodwall, acquiring, relocating, retrofitting or elevating flood prone property, upgrading public infrastructure near hazard prone areas or other flood control projects.	
BACKGROUND INFORMATION	
Site and Location:	Citywide, with particular emphasis on flood-prone areas.
Benefit Cost:	Structures and infrastructure can often be retrofitted to provide additional protection from hazards such as flood, thereby reducing average annual losses.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Severe Wind Events, Wildfires, Severe Winter Weather, Thunderstorms, Earthquakes, Landslides, Radon Exposure
Goal(s) Addressed:	Goal 1: Objective 1.4; Goal 3; Goal 4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	TBD
Potential Funding Sources:	DHS: BRIC, HMGP, FMA, RFC; ARPA; USACE: SFCP, FPMS; HUD: CDBG; Virginia CFPF
Lead Agency/Department Responsible:	DPU (floodwall) Emergency Management (other)
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

CITY OF RICHMOND MITIGATION ACTION 11	
Provide targeted outreach to business owners (particularly those with hazardous materials stored on site) to discuss hazards and mitigation alternatives.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Benefit Cost:	Businesses are a key element in resiliency as they provide services that allow residents to acquire necessary items during recovery. Showing businesses how to plan for recovery and reduce future damages contributes to a shorter recovery period for the whole community.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 1; Goal 2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	<$8000/year
Potential Funding Sources:	DHS: HMGP; EDA: DMTA; ARPA; Virginia CFPF
Lead Agency/Department Responsible:	Richmond Fire and Emergency Services, Economics Portfolio
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

CITY OF RICHMOND MITIGATION ACTION 12	
Continue to maintain existing Continuity of Operations Plans with emphasis on redundant power needs for specific critical facilities, and mitigation actions to address the water supply system.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Benefit Cost:	Effective COOPs help identify and reduce vulnerabilities in the city's operational procedures. These plans require continuous refinement and updating, especially post-disaster when memories are fresh regarding how the plan can be improved.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 1; Goal 2; Goal 3: Objective 3.2; Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	Staff time
Potential Funding Sources:	Existing budgets; DHS
Lead Agency/Department Responsible:	Emergency Management; Citywide
Implementation Schedule:	Within 3 years of plan adoption
ADDITIONAL COMMENTS	

CITY OF RICHMOND MITIGATION ACTION 13	
Develop plan for community resilience hubs to serve as "one stop shops" for information on hazard and climate resilience and services before, during, and after hazard-related events. Services provided after hazard-related events may include device charging, shower and clothes washing facilities, and cooling/heating refuge.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Benefit Cost:	Multiple hubs for promoting community resilience post disaster are less costly and more efficient than activating full-fledged shelters. These hubs can be spread strategically throughout a disaster area.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 1; Goal 2; Goal 3: Objective 3.2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	TBD
Potential Funding Sources:	DHS; VDEM
Lead Agency/Department Responsible:	Emergency Management; Office of Sustainability
Implementation Schedule:	Within 3 years of plan adoption
ADDITIONAL COMMENTS	

CITY OF RICHMOND MITIGATION ACTION 14	
Integrate equity-centered hazard and climate change planning into all city plans, to include special event planning, operational exercises, and disaster management planning.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Benefit Cost:	Mitigation actions require integration with other city functions and planning efforts to be implemented effectively.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 1; Goal 2; Goal 3
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	Staff time
Potential Funding Sources:	Existing budgets
Lead Agency/Department Responsible:	Citywide
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

CITY OF RICHMOND MITIGATION ACTION 15	
Conduct detailed climate change vulnerability and risk assessments for Richmond's population, natural resources, built assets, and municipal facilities and operations.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Benefit Cost:	While the hazard mitigation plan has a vulnerability and risk assessment for the entire study area, a more detailed and thorough development of data specifically for Richmond would provide better tools for analyzing the costs and benefits of specific projects.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 1; Goal 4: Objective 4.1
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	~$75,000
Potential Funding Sources:	CIP; Virginia CFPF; DHS
Lead Agency/Department Responsible:	Office of Sustainability
Implementation Schedule:	Within 4 years of adoption
ADDITIONAL COMMENTS	

CITY OF RICHMOND MITIGATION ACTION 16	
Increase staffing levels for hazard mitigation planning and implementation in Emergency Management, Public Utilities, Office of Sustainability, and/or other relevant departments. Establish as part of this a cross-departmental team for coordinating citywide hazard and resilience planning and service delivery.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Benefit Cost:	Establishing mitigation actions, prioritizing and then implementing them requires input from various departments in the city. Staff dedicated to this process are required in more than one department to realize the benefits of mitigation projects in the near term.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 1: Objective 1.1
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	TBD
Potential Funding Sources:	CIP; Virginia CFPF
Lead Agency/Department Responsible:	City Administration
Implementation Schedule:	Within 3 years of plan adoption
ADDITIONAL COMMENTS	

CITY OF RICHMOND MITIGATION ACTION 17	
Adopt and implement the RVAgreen 2050 equitable climate action and resilience plan. Implement strategies to reduce vulnerability and increase resilience to the impacts of climate change (extreme heat, extreme precipitation, and flooding).	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Benefit Cost:	Since 2017, Richmond has invested significantly in understanding the impacts of climate change and the actions needed to reduce vulnerability. Formally adopting the RVAgreen plan commits city officials to implementing actions to fulfill plan objectives.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Droughts and Extreme Heat, Flooding, Flooding due to Impoundment Failure
Goal(s) Addressed:	Goal 1; Goal 3; Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	Strategy costs vary
Potential Funding Sources:	Funding sources vary by action.
Lead Agency/Department Responsible:	Office of Sustainability
Implementation Schedule:	Adopt and implement in 2022
ADDITIONAL COMMENTS	
RVAgreen 2050 builds on the foundation set by Richmond 300, the city's master planning process that engaged thousands of Richmonders in identifying objectives.	

CITY OF RICHMOND MITIGATION ACTION 18	
Upon completion, implement the RVAH2O Green Infrastructure Master Plan to expand green infrastructure on public lands and rights-of-way to improve stormwater quality and reduce runoff through City projects and community partnerships, including public engagement and education programs.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Benefit Cost:	The city has invested considerably in identifying opportunities to improve existing stormwater systems with green infrastructure. Implementation of individual projects will provide reduce flood damages into the future.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding
Goal(s) Addressed:	Goal 1; Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	NRI flood risk ranges from Low to Moderate to High.
Estimated Cost:	Multiple projects identified; costs vary
Potential Funding Sources:	Funding sources vary; many funded by CIP; Virginia CFPF
Lead Agency/Department Responsible:	Public Utilities
Implementation Schedule:	Plan currently in draft format; due mid/late 2023. Implementation thereafter.
ADDITIONAL COMMENTS	

CITY OF RICHMOND MITIGATION ACTION 19	
Develop, fund, and implement an urban heat island reduction plan and program with a focus on vulnerable populations and ecosystems as part of implementation of the RVAgreen 2050 equity-centered climate action and resilience plan. Include depaving initiatives and other actions to reduce impervious surface.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Benefit Cost:	Urban heat islands contribute to the city's vulnerability for extreme heat. Addressing the types and expanse of impervious surface can provide benefits for reducing flooding and the impacts of extreme heat and drought.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Droughts and Extreme Heat
Goal(s) Addressed:	Goal 1; Goal 3
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low to Moderate
Estimated Cost:	TBD
Potential Funding Sources:	DHS; Virginia CFPF; CIP
Lead Agency/Department Responsible:	Office of Sustainability
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

CITY OF RICHMOND MITIGATION ACTION 20	
Expand the Community Emergency Response Team (CERT). Hire a full-time coordinator for the CERT program.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Benefit Cost:	The city's CERT members contribute to response and recovery and could benefit implementation of mitigation actions, as well. Focused coordination of the team is necessary to maximize benefits.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 1; Goal 2; Goal 3
Priority (High, Moderate, Low):	Low
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	~$75,000/year
Potential Funding Sources:	General Fund Budget
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Within 4 years of adoption
ADDITIONAL COMMENTS	

CITY OF RICHMOND MITIGATION ACTION 21	
Increase the proportion of Richmonders within a 10-minute walk of a public green space with amenities such as shade structures and tree canopy, public water fountains, and community garden space.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Benefit Cost:	Public green spaces and their amenities benefit residents during times of extreme heat, and if co-located with floodplains, may provide flood reduction benefits, as well.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding
Goal(s) Addressed:	Goal 1, Goal 3: Objective 3.1
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	NRI flood risk ranges from Low to Moderate to High.
Estimated Cost:	TBD – studies underway
Potential Funding Sources:	DHS; ARPA; Virginia CFPF; DOI; EPA
Lead Agency/Department Responsible:	Parks, Recreation, and Community Facilities
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
This recommendation is a result of community surveys and is included in several community plans.	

CITY OF RICHMOND MITIGATION ACTION 22	
Increase and enhance the resilience and health of Richmond's urban forest. Increase tree canopy.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Benefit Cost:	Increased tree canopy can achieve co-benefits of improved stormwater management, improved air quality, and reduced urban heat island impacts.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Severe Wind Events, Tornadoes, Wildfires, Severe Winter Weather, Droughts and Extreme Heat
Goal(s) Addressed:	Goal 1; Goal 3; Goal 4: Objectives 4.1 and 4.2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	TBD
Potential Funding Sources:	DHS; ARPA; Virginia CFPF; DOI; EPA
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Long-term
ADDITIONAL COMMENTS	

CITY OF RICHMOND MITIGATION ACTION 23	
Adopt an ordinance to require the city to use the Institute for Sustainable Infrastructure Envision framework to assess sustainability, resiliency, and equity in all new infrastructure projects.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Benefit Cost:	Envision is a decision-making guide that provides industry-wide sustainability metrics for all types and sizes of infrastructure to help users assess and measure the extent to which their project contributes to conditions of sustainability across the full range of social, economic, and environmental indicators. Furthermore, the Envision framework recognizes that these sustainability factors are variable across a project's life cycle. Envision helps users optimize project resilience for both short-term and long-term impacts.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	Staff time
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Office of Sustainability; Public Works
Implementation Schedule:	Within 2 years of plan adoption
ADDITIONAL COMMENTS	

CITY OF RICHMOND MITIGATION ACTION 24	
Develop Resilient Design Guidelines and require builders to incorporate design measures to reflect a changing climate, increased precipitation and flooding in concert with a public education campaign to convey the benefits of adaptive and resilient buildings.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Benefit Cost:	Resilient design guidelines help ensure that future construction is resilient and provides benefits for managing multiple issues, including hazards such as flooding.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Severe Wind Events, Severe Winter Weather, Droughts and Extreme Heat, Earthquakes, Radon Exposure
Goal(s) Addressed:	Goal 1: Objectives 1.2, 1.3, 1.4; Goal 3
Priority (High, Moderate, Low):	Low
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	TBD
Potential Funding Sources:	CIP; Virginia CFPF
Lead Agency/Department Responsible:	Office of Sustainability; Planning and Development Review
Implementation Schedule:	Within 4 years of adoption
ADDITIONAL COMMENTS	

CITY OF RICHMOND MITIGATION ACTION 25	
Increase resilience of transit systems as part of implementation of the RVAgreen 2050 equity-centered climate action and resilience plan. Integrate and connect street trees with public transit and biking infrastructure.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Benefit Cost:	These actions would increase shade to mitigate extreme heat, and improve storm water management to mitigate flooding.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Severe Wind Events, Tornadoes, Wildfires, Severe Winter Weather, Droughts and Extreme Heat
Goal(s) Addressed:	Goal 1; Goal 3; Goal 4: Objectives 4.1 and 4.2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	TBD
Potential Funding Sources:	Virginia CFPF; ARPA
Lead Agency/Department Responsible:	Public Works, Office of Sustainability, GRTC, Office of Equitable Transit and Mobility
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

CITY OF RICHMOND MITIGATION ACTION 26	
Continue to manage industrial processes and waste streams to protect the community and natural resources from hazardous and other materials.	
BACKGROUND INFORMATION	
Site and Location:	Citywide industrial areas, particularly those intersecting with the city's floodplains
Benefit Cost:	Ensuring industrial waste is managed appropriately is critical to protecting river components, including floodplains.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Earthquakes, Landslides, Shoreline Erosion
Goal(s) Addressed:	Goal 1, Goal 2; Goal 3
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	TBD
Potential Funding Sources:	EPA; DHS; ARPA; Virginia CFPF
Lead Agency/Department Responsible:	DPW, DPU, Fire and Emergency Services
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

CITY OF RICHMOND MITIGATION ACTION 27	
Establish a community response fund for direct and immediate assistance to community organizations that provide services to residents to enhance resilience to climate change hazards as part of implementation of the RVAgreen 2050 equity-centered climate action and resilience plan.	
BACKGROUND INFORMATION	
Site and Location:	Citywide
Benefit Cost:	This action would benefit residents directly by connecting them with organizations that provide services.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Severe Wind Events, Tornadoes, Wildfires, Severe Winter Weather, Droughts and Extreme Heat, Landslides, Shoreline Erosion, Infectious Diseases
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.4; Goal 3
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	TBD
Potential Funding Sources:	CIP
Lead Agency/Department Responsible:	Office of Sustainability
Implementation Schedule:	Within 2 years of plan adoption
ADDITIONAL COMMENTS	

TOWN OF SURRY MITIGATION ACTION 1	
Protect public and private structures from natural hazard damage, including acquiring, relocating, retrofitting or elevating floodprone property. This action may include minor structural flood control projects, retrofits to address critical infrastructure and facilities, mapping to determine detailed flood hazards, and stormwater management system improvements.	
BACKGROUND INFORMATION	
Site and Location:	Throughout the Town
Benefit Cost:	Structures and infrastructure can often be retrofitted to provide additional protection from hazards such as flood, thereby reducing average annual losses.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Severe Wind Events, Wildfires, Severe Winter Weather, Thunderstorms, Earthquakes, Landslides, Radon Exposure
Goal(s) Addressed:	Goal 1: Objective 1.4; Goal 3; Goal 4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	TBD
Potential Funding Sources:	DHS: BRIC, HMGP, FMA, RFC; ARPA; USACE: SFCP, FPMS; HUD: CDBG; Virginia CFPF
Lead Agency/Department Responsible:	Emergency Services/Safety, Utilities
Implementation Schedule:	Immediately upon adoption
ADDITIONAL COMMENTS	

TOWN OF SURRY MITIGATION ACTION 2	
Use available statewide, regional, or county advanced warning systems, weather gauging systems, evacuation planning tools, and public information resources to prepare community officials and residents in case of a hazard event.	
BACKGROUND INFORMATION	
Site and Location:	Throughout the Town
Benefit Cost:	When people have adequate time to prepare for a hazard event and know what actions to take ahead of time, damages are reduced.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Tornadoes, Severe Wind Events, Thunderstorms, Earthquakes, Severe Winter Weather
Goal(s) Addressed:	Goal 1; Goal 2; Goal 4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	Existing budgets
Potential Funding Sources:	DHS: HMGP, BRIC; USACE
Lead Agency/Department Responsible:	Emergency Services/Safety, Utilities
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

SUSSEX COUNTY MITIGATION ACTION 1	
Add trained staff to Emergency Management, Building Inspections, and Planning and Zoning, to include a Certified Floodplain Manager in Planning & Zoning.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	Staff who are well-versed in administration of county requirements related to hazard mitigation help make sure that existing standards are enforced and new standards do not increase the impacts of hazards.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 1: Objective 1.1; Goal 3
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	3 annual salaries (~$180,000/year) + training (~$2000/year)
Potential Funding Sources:	DHS
Lead Agency/Department Responsible:	Public Safety
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
While some staff changes have occurred, additional personnel are still required.	

SUSSEX COUNTY MITIGATION ACTION 2	
Continue participating in the National Flood Insurance Program through: 1) enforce of zoning and building codes; 2) pursue memorandum of agreement between towns and the county to provide flood ordinance administration, as necessary; and, 3) review and update 2009 flood ordinance.	
BACKGROUND INFORMATION	
Site and Location:	Throughout floodprone areas of the county
Benefit Cost:	NFIP regulations reduce flood damage by requiring elevation to the base flood elevation.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.4; Goal 2; Goal 4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High – western part of the county, and Stony Creek Moderate – middle part of the county Low – far eastern part of the county
Estimated Cost:	Staff time
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Planning and Zoning, Building Inspections, USACE, Va DCR, Wakefield and Waverly Administration
Implementation Schedule:	
ADDITIONAL COMMENTS	
This action is also a comprehensive plan recommended action.	

SUSSEX COUNTY MITIGATION ACTION 3	
Develop stormwater master plan to study capacity of existing culverts and other structures to determine if sizing is sufficient for future conditions. Identify and replace vulnerable or undersized culvert stream crossings with bridges or larger culverts to reduce flood hazards, where feasible. Implement program for regular inspections and maintenance of roadside ditches and stream channels.	
BACKGROUND INFORMATION	
Site and Location:	Countywide; however, areas in and near the towns of Wakefield and Stony Creek are of particular concern.
Benefit Cost:	Benefits of improving the stormwater conveyances accrue to infrastructure and homes in the area flooded by undersized bridges and culverts. Ensuring culverts are sized for future flooding will help address climate change and increased precipitation.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure
Goal(s) Addressed:	Goal 1: Objective 1.1; Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	High – western part of the county, and Stony Creek Moderate – middle part of the county Low – far eastern part of the county
Estimated Cost:	TBD
Potential Funding Sources:	DHS: HMGP, FMA, BRIC; ARPA
Lead Agency/Department Responsible:	Public Safety, VDOT
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

SUSSEX COUNTY MITIGATION ACTION 4	
Advocate for a Federal/state project to elevate I-95 bridge and widen channel at Stony Creek.	
BACKGROUND INFORMATION	
Site and Location:	I-95 bridge over Stony Creek, just north of Rte 40 outside of Stony Creek
Benefit Cost:	Bridge is older and appears to constrict the floodway at the crossing during the base flood. SFHA impacts large portion of Stony Creek.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding
Goal(s) Addressed:	Goal 1, Goal 2, Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	TBD
Potential Funding Sources:	PDC, VDOT, USDOT
Lead Agency/Department Responsible:	Public Safety, County Administration
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

SUSSEX COUNTY MITIGATION ACTION 5	
Expand GIS capabilities. Acquisition of detailed floodplain BFEs and roadway crossing elevations are particular areas of interest for evacuation and emergency access planning.	
BACKGROUND INFORMATION	
Site and Location:	Countywide; however, area outside of Stony Creek along the Nottaway River are of particular interest.
Benefit Cost:	Emergency Management and hazard response functionality are improved with high level data integration and geographic/spatial data.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.4; Goal 2; Goal 4: Objective 4.1
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Staff time
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Public Safety, VDOT, USACE, VaDCR
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

SUSSEX COUNTY MITIGATION ACTION 6	
Increase capacity of stormwater system in conjunction with towns of Wakefield and Waverly.	
BACKGROUND INFORMATION	
Site and Location:	Wakefield and Waverly
Benefit Cost:	Properly sized and maintained culverts and other stormwater structures can help alleviate flooding and minimize damages to nearby infrastructure and buildings.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding
Goal(s) Addressed:	Goal 1: Objective 1.1; Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	TBD
Potential Funding Sources:	DHS: HMGP, BRIC; ARPA; VDOT
Lead Agency/Department Responsible:	Public Safety
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

SUSSEX COUNTY MITIGATION ACTION 7	
Increase outreach to citizens regarding preparation and response to hazard events, to include: promote the "Turn Around, Don't Drown" public education campaign; install high water marks at key crossings; social media information ahead of rain/wind/winter storms; temporary digital signage on critical roadways; and other permanent signage to warn of known driving hazards.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	FEMA, VDEM and other agencies maintain a large library of free paper and online materials to support this action. Social media is free for communities and has potential to reach large number of citizens in a short period of time, and at little cost.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Severe Wind Events, Severe Winter Weather
Goal(s) Addressed:	Goal 1
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Staff time; digital signage cost is $15,000 - $30,000 per sign
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Emergency Management, NWS
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

SUSSEX COUNTY MITIGATION ACTION 8	
Protect public and private structures from natural hazard damage, including acquiring, relocating, retrofitting or elevating floodprone property. This action may include minor structural flood control projects, retrofits to address critical infrastructure and facilities, mapping to determine detailed flood hazards, and stormwater management system improvements. Target repetitive flood loss areas identified in Section 5, two of which have high risk and social vulnerability.	
BACKGROUND INFORMATION	
Site and Location:	Repetitive flood loss areas, particularly the two near Stony Creek Stony Creek Wastewater Treatment Plant Generators for county evacuation shelters
Benefit Cost:	Structures and infrastructure can often be retrofitted to provide additional protection from hazards such as flood, thereby reducing average annual losses.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Severe Wind Events, Wildfires, Severe Winter Weather, Thunderstorms, Earthquakes, Landslides, Radon Exposure
Goal(s) Addressed:	Goal 1: Objective 1.4; Goal 3; Goal 4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	TBD
Potential Funding Sources:	DHS: BRIC, HMGP, FMA, RFC; ARPA; USACE: SFCP, FPMS; HUD: CDBG; Virginia CFPF
Lead Agency/Department Responsible:	Public Safety
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

SUSSEX COUNTY MITIGATION ACTION 9	
Distribute brochures and use other means to educate the public regarding preparedness and mitigation. Conduct annual preparedness days for hazards to include floods, wind, tornado, and earthquakes.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	FEMA, VDEM and other agencies maintain a large library of free paper and online materials to support this action. Social media is free for communities and has potential to reach large number of citizens in a short period of time, and at little cost.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Severe Wind Events, Tornadoes, Wildfires, Severe Winter Weather, Thunderstorms, Droughts and Extreme Heat, Earthquakes, Radon Exposure, Infectious Diseases
Goal(s) Addressed:	Goal 1: Objectives 1.2, 1.4; Goal 2: Objective 2.2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Minimal
Potential Funding Sources:	Existing budgets
Lead Agency/Department Responsible:	Public Safety
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

SUSSEX COUNTY MITIGATION ACTION 10	
Conduct regular review of repetitive loss and severe repetitive flood loss properties from FEMA. Review will include verification of the geographic location of each property and determination if mitigated and by what means. Corrections can be made to FEMA by filing form FEMA AW-501.	
BACKGROUND INFORMATION	
Site and Location:	Repetitively flooded areas in the county
Benefit Cost:	Structures designated as repetitive flood losses are treated differently under NFIP rating procedures. Ensuring the list is correct is important for property owners in the county who have to pay for flood insurance.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure
Goal(s) Addressed:	Goal 1: Objectives 1.1, 1.4; Goal 3; Goal 4: Objective 4.1
Priority (High, Moderate, Low):	
Impact on Socially Vulnerable Populations:	High – 2 rep loss areas along I-95 Low – 1 rep loss area in northeast corner of county
Estimated Cost:	Staff time
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Planning and Zoning
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

SUSSEX COUNTY MITIGATION ACTION 11	
Develop and implement detailed tornado response and recovery plan, to include safe rooms for manufactured home parks, and post-event housing considerations for impacted residents (with HUD).	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	This targeted mitigation action will help reduce impacts to citizens in a post disaster scenario. Safe rooms can save lives, particularly in highly vulnerable manufactured home parks.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado
Goal(s) Addressed:	Goal 1: Objectives 1.2, 1.4; Goal 3: Objective 3.2
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	TBD
Potential Funding Sources:	DHS: HMGP; HUD: CDBG (see 2003 Tornado Shelters Act)
Lead Agency/Department Responsible:	Sussex County/Towns
Implementation Schedule:	

ADDITIONAL COMMENTS
On December 3, 2003, the President signed into law the Tornado Shelters Act (Public Law 108-146), which amends the Housing and Community Development Act of 1974, authorizing communities to use community development block grant funds to construct tornado-safe shelters in manufactured home parks. It allows construction or improvement of tornado-safe shelters for manufactured housing including loans and grants to non-profit or for-profit entities. Shelters built under the auspices of the Act must be located in a neighborhood or park that contains at least 20 units, consists predominately of low- and moderate-income households, and is in a state where a tornado has occurred within the current or last 3 years. Further, each constructed shelter must comply with the Department of Housing and Urban Development's (HUD's) standards for construction and safety, and be large enough to accommodate all members of the park/neighborhood, and be located in a park/neighborhood that has a warning siren.

SUSSEX COUNTY MITIGATION ACTION 12	
Develop/update county capital improvements plan to include timelines and appropriations for projects identified under this hazard mitigation planning effort.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	Several mitigation actions identified in the plan cannot be implemented without grant funding and/or county appropriations.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Goal(s) Addressed:	Goal 1, Goal 3
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	Staff time
Potential Funding Sources:	Existing budgets
Lead Agency/Department Responsible:	Unknown, no response
Implementation Schedule:	Within 1 year of plan adoption
ADDITIONAL COMMENTS	
This action is also a comprehensive plan recommended action.	

SUSSEX COUNTY MITIGATION ACTION 13	
Reduce physical vulnerability of County staff with offices currently in temporary modular units from wind, snow and rain. Provide freestanding building with structural protections that meet or exceed current building code standards.	
BACKGROUND INFORMATION	
Site and Location:	County complex in Sussex
Benefit Cost:	Some county staff currently have offices in manufactured buildings outside of the main building. These structures are temporary in nature and may be more vulnerable to damage during weather extremes.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Severe Wind Events, Tornadoes, Severe Winter Weather, Thunderstorms, Droughts and Extreme Heat, Earthquakes
Goal(s) Addressed:	Goal 1; Goal 4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	TBD – new building is more expensive than reconfiguring existing space
Potential Funding Sources:	Existing county revenues
Lead Agency/Department Responsible:	County Administration
Implementation Schedule:	Within 2 years of plan adoption
ADDITIONAL COMMENTS	

SUSSEX COUNTY MITIGATION ACTION 14	
Establish development criteria and requirements to include density and intensity criteria, cluster subdivision design, stream buffers, impervious surface limits and innovative stormwater management alternatives.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	Existing design and development criteria for subdivisions are minimal. Beneficial design that accounts for existing and future hazards reduces damage from disasters in the future.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure
Goal(s) Addressed:	Goal 1: Objective 1.4; Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	High – western part of the county, and Stony Creek Moderate – middle part of the county Low – far eastern part of the county
Estimated Cost:	Staff time
Potential Funding Sources:	Existing resources
Lead Agency/Department Responsible:	Planning and Zoning
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
This action is also a comprehensive plan recommended action.	

SUSSEX COUNTY MITIGATION ACTION 15	
Provide improved healthcare facilities for county residents, to include services before during and after all types of hazard events, to ensure continuity of operations. Options may include coordination and consolidation of existing health facilities and other county functions.	
BACKGROUND INFORMATION	
Site and Location:	Countywide
Benefit Cost:	Maintaining functionality of county resources during and after the pandemic proved challenging.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Infectious Diseases, Radon Exposure, Tornadoes, Flooding, Flooding due to Impoundment Failure, Severe Wind Events, Droughts and Extreme Heat, Earthquakes
Goal(s) Addressed:	Goal 1; Goal 2; Goal 3: Objective 3.2
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	Low
Estimated Cost:	TBD
Potential Funding Sources:	DHS: HMGP, other; ARPA
Lead Agency/Department Responsible:	Health Department, Public Safety
Implementation Schedule:	Within 2 years of plan adoption
ADDITIONAL COMMENTS	
This action is also a comprehensive plan recommended action.	

TOWN OF STONY CREEK MITIGATION ACTION 1	
Protect public and private structures from natural hazard damage, including acquiring, relocating, retrofitting or elevating floodprone property. This action may include minor structural flood control projects, retrofits to address critical infrastructure and facilities and stormwater management system improvements.	
BACKGROUND INFORMATION	
Site and Location:	Repetitive loss area along south bank of creek and Halifax Road; floodway area north of the intersection of Rte 301 and Halifax Road (restaurant); structures at the intersection of Main Street and Halifax Road, just south of the Main Street bridge over Stony Creek
Benefit Cost:	Structures and infrastructure can often be retrofitted to provide additional protection from hazards such as flood, thereby reducing average annual losses.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Severe Wind Events, Wildfires, Severe Winter Weather, Thunderstorms, Earthquakes, Landslides, Radon Exposure
Goal(s) Addressed:	Goal 1: Objective 1.4; Goal 3; Goal 4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	TBD
Potential Funding Sources:	DHS: BRIC, HMGP, FMA, RFC; ARPA; USACE: SFCP, FPMS; HUD: CDBG; Virginia CFPF
Lead Agency/Department Responsible:	Mayor, with assistance from Crater PDC
Implementation Schedule:	Ongoing

ADDITIONAL COMMENTS
Small flood control structure (*e.g.,* kneewall) may be cost-beneficial along Halifax Road, outside of floodway. Elevation of residential structures, or floodproofing of commercial structures may be feasible options at the east and west ends of town. Request assistance from USACE, Norfolk District. FPMS division could conduct study to determine feasibility of various alternatives in the town to alleviate repetitive flooding.

TOWN OF STONY CREEK MITIGATION ACTION 2	
Use available statewide, regional, or county advanced warning systems, weather gauging systems, evacuation planning tools, and public information resources to prepare community officials and residents in case of a hazard event. Acquire additional resources to supplement these systems, as required.	
BACKGROUND INFORMATION	
Site and Location:	Throughout the town
Benefit Cost:	When people have adequate time to prepare for a hazard event and know what actions to take ahead of time, damages are reduced.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Tornadoes, Severe Wind Events, Thunderstorms, Earthquakes, Severe Winter Weather
Goal(s) Addressed:	Goal 1; Goal 2; Goal 4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	TBD
Potential Funding Sources:	DHS: HMGP, BRIC; Virginia CFPF; USACE
Lead Agency/Department Responsible:	Mayor & Town Clerk
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

TOWN OF STONY CREEK MITIGATION ACTION 3	
Advocate for a Federal/state project to elevate I-95 bridge and widen channel at Stony Creek.	
BACKGROUND INFORMATION	
Site and Location:	I-95 bridge over Stony Creek, just north of Rte 40 outside of Stony Creek
Benefit Cost:	Bridge is older and appears to constrict the floodway at the crossing during the base flood. SFHA impacts large portion of the Town of Stony Creek.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding
Goal(s) Addressed:	Goal 1, Goal 2, Goal 4
Priority (High, Moderate, Low):	Moderate
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	TBD
Potential Funding Sources:	PDC, VDOT, USDOT
Lead Agency/Department Responsible:	Mayor
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

TOWN OF STONY CREEK MITIGATION ACTION 4	
Install high water signage to warn drivers and pedestrians of dangerous crossing during flooding. Use Turn Around, Don't Drown campaign materials to further warn drivers of hazards.	
BACKGROUND INFORMATION	
Site and Location:	Main Street bridge over Stony Creek, Halifax Road and Route 301 near I-95.
Benefit Cost:	Signage warning drivers helps prevent water rescues and saves lives.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding
Goal(s) Addressed:	Goal 1, Goal 2
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	~$5000
Potential Funding Sources:	PDC, USACE, ARPA, FEMA: HMGP
Lead Agency/Department Responsible:	Mayor
Implementation Schedule:	Within 2 years of plan adoption
ADDITIONAL COMMENTS	

TOWN OF WAKEFIELD MITIGATION ACTION 1	
Protect public and private structures from natural hazard damage, including acquiring, relocating, retrofitting or elevating floodprone property. This action may include minor structural flood control projects, retrofits to address critical infrastructure and facilities, mapping to determine detailed flood hazards, and stormwater management system improvements.	
BACKGROUND INFORMATION	
Site and Location:	Throughout the Town, particularly in flood-prone areas that have flooded recently along Route 460 near the Virginia Diner.
Benefit Cost:	Structures and infrastructure can often be retrofitted to provide additional protection from hazards such as flood, thereby reducing average annual losses.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Severe Wind Events, Wildfires, Severe Winter Weather, Thunderstorms, Earthquakes, Landslides, Radon Exposure
Goal(s) Addressed:	Goal 1: Objective 1.4; Goal 3; Goal 4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	TBD
Potential Funding Sources:	DHS: BRIC, HMGP, FMA, RFC; ARPA; USACE: SFCP, FPMS; HUD: CDBG; Virginia CFPF
Lead Agency/Department Responsible:	Emergency Services/Safety, Utilities
Implementation Schedule:	Immediately upon adoption
ADDITIONAL COMMENTS	

TOWN OF WAKEFIELD MITIGATION ACTION 2	
Use available statewide, regional, or county advanced warning systems, weather gauging systems, evacuation planning tools, and public information resources to prepare community officials and residents in case of a hazard event.	
BACKGROUND INFORMATION	
Site and Location:	Throughout the Town, particularly in flood-prone areas that have flooded recently along Route 460 near the Virginia Diner.
Benefit Cost:	When people have adequate time to prepare for a hazard event and know what actions to take ahead of time, damages are reduced.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Tornadoes, Severe Wind Events, Thunderstorms, Earthquakes, Severe Winter Weather
Goal(s) Addressed:	Goal 1; Goal 2; Goal 4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	Existing budgets
Potential Funding Sources:	DHS: HMGP, BRIC; USACE
Lead Agency/Department Responsible:	Emergency Services/Safety, Utilities
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	
Examples include the *Virginia Hurricane Evacuation Guide* and data from VDEM's Crisis Track collected post-disaster.	

TOWN OF WAVERLY MITIGATION ACTION 1	
Protect public and private structures from natural hazard damage, including acquiring, relocating, retrofitting or elevating floodprone property. This action may include minor structural flood control projects, retrofits to address critical infrastructure and facilities and stormwater management system improvements.	
BACKGROUND INFORMATION	
Site and Location:	Throughout the town, with particular emphasis on: Pleasant Spring Avenue, Jackson Lane, Robert Wilkins Avenue, Main Street, Graydon Circle, New Street, and Locust/Railroad Avenue
Benefit Cost:	Structures and infrastructure can often be retrofitted to provide additional protection from hazards such as flood, thereby reducing average annual losses.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Severe Wind Events, Wildfires, Severe Winter Weather, Thunderstorms, Earthquakes, Landslides, Radon Exposure
Goal(s) Addressed:	Goal 1: Objective 1.4; Goal 3; Goal 4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	TBD
Potential Funding Sources:	DHS: BRIC, HMGP, FMA, RFC; ARPA; USACE: SFCP, FPMS; HUD: CDBG; Virginia CFPF
Lead Agency/Department Responsible:	Mayor and Town Administration
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

TOWN OF WAVERLY MITIGATION ACTION 2	
Use available statewide, regional, or county advanced warning systems, weather gauging systems, evacuation planning tools, and public information resources to prepare community officials and residents in case of a hazard event. Acquire additional resources to supplement these systems, as required.	
BACKGROUND INFORMATION	
Site and Location:	Throughout the town
Benefit Cost:	When people have adequate time to prepare for a hazard event and know what actions to take ahead of time, damages are reduced.
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Flooding due to Impoundment Failure, Tornadoes, Severe Wind Events, Thunderstorms, Earthquakes, Severe Winter Weather
Goal(s) Addressed:	Goal 1; Goal 2; Goal 4
Priority (High, Moderate, Low):	High
Impact on Socially Vulnerable Populations:	High
Estimated Cost:	TBD
Potential Funding Sources:	DHS: HMGP, BRIC; Virginia CFPF; USACE
Lead Agency/Department Responsible:	Mayor and Town Administration
Implementation Schedule:	Ongoing
ADDITIONAL COMMENTS	

8.0 Plan Maintenance Procedures

8.1 Updates for 2022

Section 8 was updated to modify the wording and scope, clarify the planning and updating requirements, and to amend the communities participating in this planning process.

8.2 Introduction

This section discusses how the Mitigation Strategy will be implemented by the communities and how the overall Hazard Mitigation Plan will be evaluated and enhanced over time. This section also discusses how the public and participating stakeholders will continue to be involved in the hazard mitigation planning process in the future.

8.3 Implementation

44 CFR Requirement

Part 201.6(c)(4)(i): The plan will include a plan maintenance process that includes a section describing the method and schedule of monitoring, evaluating and updating the mitigation plan within a five-year cycle.

In addition to the assignment of a lead department or agency, an implementation time period has been established for each mitigation action in order to assess whether actions are being implemented in a timely fashion. Each community will seek funding sources to implement mitigation projects in both the pre-disaster and post-disaster environments. When applicable, potential funding sources have been identified for proposed actions listed in each MAP.

44 CFR Requirement

Part 201.6(c)(4)(ii): The plan maintenance process will include a process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.

Emergency Management officials in each community will be responsible for determining additional implementation procedures beyond those listed within the Mitigation Action Plan. This includes further integrating the Hazard Mitigation Plan into other local planning documents such as comprehensive or capital improvement plans, when appropriate. The members of the planning committees for each community remain charged with ensuring that the goals and strategies of new and updated local planning documents

(such as Comprehensive Plans and Zoning Ordinances) are consistent with the goals and actions of the Hazard Mitigation Plan, and that those planning documents will not contribute to an increased level of hazard vulnerability in the region.

Opportunities to integrate the requirements of this Plan into other local planning mechanisms will continue to be identified through future meetings of each community's mitigation planning committee and through the five-year review process described in this section.

Each community will integrate the tenets of this mitigation plan into relevant local government decision making processes or mechanisms. The primary means for integrating mitigation strategies into other local planning documents will be accomplished through the revision, update, and implementation of the Mitigation Action Plan that requires specific planning and administrative tasks (i.e., plan amendments, ordinance revisions, capital improvement projects). In addition, each community will incorporate existing planning processes and programs addressing the impacts of climate change, resiliency programs, and flooding mitigation into this document by reference.

8.4 Monitoring, Evaluation and Enhancement

Periodic revisions and updates to the Plan are required to ensure that the goals of the Plan are kept current, taking into account potential changes in hazard vulnerability and mitigation priorities. In addition, revisions may be necessary to ensure that the Plan is in full compliance with changing Federal, state and local regulations. Periodic evaluation of the Plan will also ensure that specific mitigation actions are being reviewed and carried out according to the Mitigation Action Plan.

The Hazard Mitigation Planning Working Group will continue to meet at least annually and following any disaster events warranting a re-examination of the mitigation actions, thus continuously updating the Plan to reflect changing conditions and needs within the communities. An annual report on the Plan will be developed and presented to elected officials through PlanRVA and Crater PDC in order to report progress on the actions identified in the Plan and to provide information on the latest legislative requirements. The report may also highlight proposed additions or improvements to the Plan. The report will be released to the media and made available to the public via appropriate methods, such as the PDCs' web sites.

Each community has designated a lead person and agency responsible for the monitoring, evaluation and enhancements to the plan. Those position titles and agencies are shown in Tables 3.2a and 3.2b as rows marked with an asterisk. These individuals are the primary contacts moving forward with plan implementation.

8.4.1 Annual Progress Reports

Each community's hazard mitigation planning committee will be responsible for producing an annual progress report to evaluate the Plan's overall effectiveness. As part of the contract for preparing this plan, the contractor is providing a mitigation action plan spreadsheet in Appendix G that lists all mitigation actions for each community and the

region. Updating this spreadsheet with status information will allow periodic progress checkups that can feed into the annual progress reports.

8.4.2 Five-Year Plan Review

At a minimum, the Plan will be reviewed and must be updated every five years by the hazard mitigation planning committees as required by DMA 2000. The purpose of the review and update is to determine whether there have been any significant changes that may, in turn, necessitate changes in the types of mitigation actions proposed. New development in identified hazard areas, an increased exposure to hazards, the increase or decrease in capability to address hazards, and changes to federal or state legislation are examples of factors that may affect the content of the Plan.

The plan review provides community officials with an opportunity to evaluate those actions that have been successful and to explore the possibility of documenting potential losses avoided due to the implementation of specific mitigation measures. The plan review also provides the opportunity to address mitigation actions that may not have been successfully implemented. Each community will be responsible for reconvening and conducting the five-year review, although it is expected that the PDCs will again lead the effort to update the plan in five years. During the five-year plan review process, the following questions will be considered as criteria for assessing the effectiveness and appropriateness of the Plan:

- Do the goals and actions address current and expected conditions?
- Has the nature or magnitude of hazard risk changed?
- Are current resources adequate to implement the Plan?
- Should additional local resources be committed to address identified hazard threats?
- Are there any issues that have limited the current implementation schedule?
- Has the implementation of identified mitigation actions resulted in expected outcomes?
- Has the committee measured the effectiveness of completed hazard mitigation projects in terms of specific dollar losses avoided?
- Did the community, agencies and other partners participate in the plan implementation process as proposed?

Following the five-year review, any revisions deemed necessary will be summarized and implemented according to the reporting procedures and plan amendment process outlined in this section. Upon completion of the review and update process, the Plan will be submitted to VDEM for review and approval. Upon final approval, VDEM will submit the Plan amendments to FEMA for final review as required by DMA 2000.

8.4.3 Disaster Declaration

Following a state or federal disaster declaration, the hazard mitigation planning committee will reconvene and the Plan will be revised as necessary to reflect lessons learned or to address specific circumstances arising from the event. Community committees may find it necessary to convene following localized emergencies and disasters, or when pursuing funding for a specific mitigation project, in order to determine if administrative changes to the Plan are warranted.

8.4.4. Reporting Procedures

The results of the five-year review will be summarized by the committee in a report that will include an evaluation of the effectiveness of the Plan and any required or recommended changes or amendments. The report will also include a brief progress report for each mitigation action, including the identification of delays or obstacles to their completion along with recommended strategies to overcome them. Any necessary revisions to the Plan must follow the plan amendment process outlined herein.

8.4.5 Plan Amendment Process

Upon initiation of the amendment process, the community(ies) will forward information on the proposed change(s) to interested parties, including affected municipal departments. Information will also be forwarded to the VDEM. This information will be disseminated in order to seek input on the proposed amendment(s) for not less than a 5-day review and comment period.

At the end of the 5-day review and comment period, the proposed amendment(s) and all comments will be forwarded to the PDCs for final consideration. The committee will review the proposed amendments along with the comments received from other parties, and if acceptable, the committee will submit a recommendation for the approval and adoption of changes to the Plan.

Minor revisions to the plan may be approved by each community's Chief Administrative Officer, while substantial amendments and addendums must be approved by the community's elected governing body.

In determining whether to recommend approval or denial of a Plan amendment request, the following factors will be considered by the committee:

- There are errors, inaccuracies or omissions made in the identification of issues/needs in the Plan;
- New issues/needs have been identified which are not adequately addressed in the Plan;
- There has been a change in data or assumptions from those upon which the Plan is based.

Upon receiving the recommendation from the committee and prior to adoption of the Plan, each community's governing body will hold a public hearing. The governing body will review the recommendation from the committee (including the factors listed above) and any oral or written comments received at public hearing(s). Following that review, the governing body will take one of the following actions:

- Adopt the proposed amendments as presented;
- Adopt the proposed amendments with modifications;
- Refer the amendments request back to the committee for further revision; or
- Defer the amendment request back to the committee for further consideration and/or additional hearings.

8.5 Continued Public Involvement

44 CFR Requirement

Part 201.6(c)(4)(iii): The plan maintenance process will include a discussion on how the community will continue public participation in the plan maintenance process.

Public participation is an integral component of the mitigation planning process. As described above, significant changes or amendments to the Plan will require a public hearing prior to any adoption procedures.

Other efforts to involve the public in the maintenance, evaluation and revision process will be made. These efforts differ by community based on each community's individual needs, public response and whether the community has been recently affected by a hazard event. Examples of how communities in the Richmond-Crater region already engage the public during the interim planning period, or of how they may choose to approach this task in the future, include:

- Advertise meetings of the committee in local newspapers, public bulletin boards, web sites, social media and community public buildings. Designating a diverse community mitigation committee through official resolution of the governing board, and then scheduling regular meetings of the committee and advertising those meetings aggressively has worked well for some communities.

- Designate willing residents and private sector representatives as official members of the planning committee. While real estate, financial and construction industry leaders are natural partners in mitigation planning, look beyond these to include business leaders, large employers, and representatives of local military installations and transportation hubs, such as the Port of Virginia. Cultural institutions are an important component in the regional economy and their collections may be vulnerable to many of the hazards discussed

in the plan. Neighborhood groups, civic leagues and other citizen groups are a valuable source of mitigation ideas for specific areas.

- Engage elected officials and planning commission members in the process, beyond simply providing updates or reports. Elected officials have a responsibility to protect the health, safety and welfare of their constituents and their support is critical to successful implementation of the Mitigation Action Plan in every Richmond-Crater community.

- Use local media to update the public about any maintenance or periodic review activities taking place. The media have moved beyond traditional print and televised formats and their online presence can be valuable in disseminating information about upcoming meetings or activities. Local non-profits can also be invaluable in spreading the word about mitigation planning meetings open to the public.

- Use questionnaires, open houses, fairs and other community events to obtain ongoing public comments on the Plan and its implementation. Many local emergency managers effectively use community events to inform and advise the public on preparedness and evacuation, but the venues can also be valuable for informing the citizenry about the components of effective mitigation, how their community is implementing their Mitigation Action Plan and gathering information from the public to inform the next plan revision.

- Use community web sites, social media and list-servs to advertise any maintenance or periodic review activities taking place. Periodic surveys on social media can be a fun way to raise awareness.

- Hold area-specific meetings on a regular basis to solicit feedback from neighbors. Such meetings, held in public venues, can be used to distribute literature, educate residents on mitigation actions they can implement on their own, and solicit input on how the mitigation process can be more effective for their area or neighborhood.

- Integrate mitigation action plans, goals and objectives, and other plan elements into other community planning objectives. When a community's comprehensive or resiliency planning process includes similar team members and incorporates or references pieces of the hazard mitigation plan, the public gains familiarity with the links between the plans and the ways in which the efforts complement each other.

- Maintain hard copies of the Plan in public libraries, on the web, or other appropriate venues. While many residents are engaged in community affairs through computer technology, keeping hard copies of the plan in public venues with a business card or other contact information for providing feedback or answering questions is an old-fashioned but necessary way of reaching a much larger segment of residents.

Table 8.1 provides summary feedback from individual community's committee leaders indicating how they anticipate their community will include the public in the 5-year period following adoption.

Table 8.1: Including the Public During Plan Implementation Period						
Community	**Advertise committee meetings**	**Designate residents, private sector reps as members of committee**	**Use local media to update public on maintenance activities**	**Use questionnaires, open houses to obtain public comment**	**Use web sites to advertise maintenance activities**	**Maintain copies of the plan in libraries, on the web, or other venues**
Charles City County	✓	✓	✓	✓	✓	✓
Chesterfield County	✓	✓	✓	✓	✓	✓
City of Colonial Heights	✓		✓		✓	✓
Dinwiddie County	✓	✓	✓		✓	✓
Town of McKenney	✓					
City of Emporia	✓		✓		✓	✓
Goochland County	✓	✓	✓		✓	✓
Greensville County	✓		✓		✓	✓
Town of Jarratt	✓					
Hanover County	✓	✓	✓	✓	✓	✓
Town of Ashland	✓	✓	✓	✓	✓	✓
Henrico County	✓	✓	✓	✓	✓	✓
City of Hopewell	✓		✓		✓	✓
New Kent County	✓	✓	✓	✓	✓	✓
City of Petersburg	✓		✓		✓	✓
Powhatan County	✓		✓		✓	✓
Prince George County	✓		✓		✓	✓
City of Richmond	✓	✓	✓	✓	✓	✓
Town of Surry	✓		✓			
Sussex County	✓		✓		✓	✓

Table 8.1: Including the Public During Plan Implementation Period						
Community	Advertise committee meetings	Designate residents, private sector reps as members of committee	Use local media to update public on maintenance activities	Use questionnaires, open houses to obtain public comment	Use web sites to advertise maintenance activities	Maintain copies of the plan in libraries, on the web, or other venues
Town of Stony Creek	✓					✓
Town of Wakefield	✓					✓
Town of Waverly	✓					✓

8.6 Opportunities for Improvement

Several opportunities for improving the plan and planning process are outlined below in **Table 8.2**, primarily as suggestions or strategies that may enhance the planning process effectiveness for either individual communities in the coming 5-year period of implementation, or for future updates of the entire plan.

Table 8.2: Opportunities for Improvement	
Mitigation Planning Step	**Opportunities**
Phase I: Organize Resources **Step 1. Get Organized** **Step 2. Plan for Public Involvement** **Step 3. Coordinate with Other Departments & Agencies**	• Continue to distribute Memorandum of Intent to Participate for all communities in the early stages of the planning process. • Engage public information officers, resiliency officers, equity officers, web site managers and other community communications specialists from each community throughout the process. • The regional planning authority should continue to ask and rely on communities to reach out to large businesses, military installations, educational and medical institutions, neighborhood associations, non-profits, utilities and other groups to spur their involvement in the process, but communities need to provide documentation of these "asks" that is then included in the plan. • Rural town engagement in the planning process was limited. Continue to educate town staff about importance of their input.
Phase II: Assess Risk **Step 4. Identify the Hazards** **Step 5. Assess the Risks**	• Virtual meetings limited the feedback received after presentation of HIRA to the committee. Distributing small elements of the assessment to the committee for review may increase participation and feedback. • Difficulty obtaining repetitive loss data from FEMA and assessor data from some communities delayed completion of the HIRA.
Phase III: Develop Mitigation Plan **Step 6: Review Mitigation Alternatives** **Step 7: Draft an Action Plan** **Step 8: Set Planning Goals**	• Provide a review form for each community to document their review and approval of each plan section. • "Office Hours" with consultant worked well for developing each community MAP but did not include all stakeholders. Reassess this approach once COVID-19 restrictions are lifted.

September 9, 2024

Mr. Reggie Lantz
General Manager
Street Operations Division
Department of Public Works
1340 E. Washington Street
Petersburg, VA 23803

RE: Emergency Inspection, Structure PB-12 Bank Street over Brickhouse Run
Open End Annual Contract (IDIQ)
Project 20-0012 – Safety Inspection of Highway Structures
(Clark Nexsen Comm. No. 9334)

Dear Mr. Lantz:
Pursuant to your request, Clark Nexsen performed a non-scheduled emergency inspection of the Bank Street Culvert over Brickhouse Run, Structure PB-12. The inspection was performed on August 30, 2024 in clear weather conditions. The purpose of this inspection was to investigate and document the extent of any damage due to the collapse of the culvert and building on the adjacent property located immediately upstream and assist in determining an appropriate course of action.

An initial inspection and load rating of this structure was performed by Clark Nexsen in November 2023. The inspection revealed that the Bank Street culvert is in poor condition overall due to extensive deterioration of the mortar joints within this stone masonry arch structure as well as scour of the channel with significant undermining of the abutments. For this inspection the condition of the structure was inspected to determine changes in condition from the previous inspection. The previous inspection report with full details has been attached for reference.

The following additional observed deficiencies were noted at this time:

- Significant debris from the failed structure was located withing the upstream channel, approximately 20 CY of material was observed.
- Remaining portions of the brick foundation wall upstream of the city structure were observed to have significant cracking and displacement. Up to 1” wide horizontal cracks and 6” settlement back was observed and could be directly compared with Photo 14 in the 2023 inspection report.
- The upstream channel west stone masonry wall was observed to be undermined up to 1’ high x 3’ back.
- Debris from the collapse has washed into the channel below the Bank Street structure. Approximately 10 CY of debris (concrete masonry blocks, bricks, sand and soil) was observed.
- Debris deposits are directing flow against the west abutment of the Bank Street structure.
- Scour up to 1.5’ deep was observed along the full structure, but flow restriction due to the debris was found to scour the channel up to 3’ deep at the upstream end adjacent to the west abutment.

See attached photographs of the above conditions.

Following the inspection, recommendations to address the current conditions were discussed with City staff to maintain the integrity of the existing structure below Bank Street.

The following structure recommendations were discussed:

- The debris from the adjacent structure collapse located upstream and within this structure should be removed immediately to prevent further erosion and scour.
- The ongoing performance of the structure should be monitored on a regular basis and following any large storm flows. Appropriate action should be immediately taken to address any observed changes from the current condition.

It should be emphasized that the above recommendations are made for a short-term solution and the repairs outlined in report from the November 2023 inspection of the structure should be prioritized to preserve this important city asset.

We appreciate this opportunity to support your efforts with this structure. If any further information or clarification is required, please do not hesitate to contact me.

Yours very truly,

Matthew L. Agnes, P.E.

Attachments

Photographs

Structure collapse in channel immediat upstream of structure.	
Failure of building foundation on top of undermined stone masonry channel wa immediately upstream of structure.	
Undermining of west upstream stone masonry channel wall measures up to 1' high x 3' back.	

4525 Main Street, Suite 1400
Virginia Beach, VA 23462
clarknexsen.com

CLARKNEXSEN

Photographs

Debris in channel from failed building washed into city structure below Bank Street. Debris directs flow against west abutment.	
Up to 3’ deep scour at upstream end of structure due to debris restricting channel flow.	
Scour and undermining of west abutme stone masonry wall below Bank Street structure up to 1’ high x 3’ back with u to 6” lateral displacement of stones. Note missing mortar throughout.	

4525 Main Street, Suite 1400
Virginia Beach, VA 23462
clarknexsen.com

CLARKNEXSEN

CITY OF PETERSBURG, VIRGINIA
DEPARTMENT OF PUBLIC WORKS

CITY BRIDGE NO. PB-12

TYPE OF BRIDGE REPORT: INITIAL INSPECTION NOVEMBER 2023

BRIDGE NAME: WEST BANK STREET OVER BRICKHOUSE RUN

DIRECTION: ABUTMENT A (WEST) TO ABUTMENT B (EAST)

ROUTE NO.: 00000

INSPECTION INTERVAL: 12 MONTHS

CLARKNEXSEN
4525 Main Street, Suite 1400
Virginia Beach, VA 23462
clarknexsen.com

STRUCTURE INSPECTION REPORT – COVER PHOTOS

Structure No:	PB-12	**Date of Inspection:**	11/07/2023

ROADWAY LOOKING EAST

ROADWAY LOOKING WEST

STRUCTURE INSPECTION REPORT – COVER PHOTOS

Structure No:	PB-12	**Date of Inspection:**	11/07/2023

UPSTREAM (SOUTH) SIDE

DOWNSTREAM (NORTH) SIDE

STRUCTURE INSPECTION REPORT – SUMMARY

Structure No: PB-12 **Date of Inspection:** 11/07/2023

COMPONENT RATINGS

36 TRAFFIC SAFETY FEATURES	
1. Bridge Railing	0
2. Transition	N
3. Approach Guardrail	N
4. Approach Guardrail Terminal	N
58 DECK	**5**
1. Wearing Surface	F
2. Deck Structural Condition	-
3. Curbs	F
4. Median	-
5. Sidewalks	F
6. Parapet	-
7. Railing	F
8. Drains	F
9. Lighting Standards	-
10. Utilities	F
11. Expansion Joints or Devices	-
59 SUPERSTRUCTURE	**4**
1. Bearing Devices	-
2. Stringers	-
3A. Girder or Beams General	P
3B. Diaphragms or Cross Frames	-
3C. Bracing	-
4. Floor Beams	-
5A. Trusses General	-
5B. Portals	-
5C. Bracing	-
6. Paint	-
Year Painted (-)	
7. Machinery (Movable Span)	-

60 SUBSTRUCTURE	**4**
1 Abutment	
1A. Wings	-
1B. Backwall	-
1C. Bearing Seats	-
1D. Breast Wall	P
1E. Weep Holes	-
1F. Footing	P
1G. Piles	-
1H. Erosion/Scour/Undermining	P
1I. Settlement	G
2 Piers or Bents	
2A. Caps	-
2B. Bearing Seats	-
2C. Columns, Stem or Wall	-
2D. Footing	-
2E. Piles	-
2F. Bracing	-
2G. Erosion/Scour/Undermining	-
2H. Settlement	-
3 Pile Bents	
3A. Caps	-
3B. Bearing Seats	-
3C. Piles	-
3D. Bracing	-
61 CHANNEL & CHANNEL PROTECTION	**5**
1. Channel Scour	F
2. Embankment Erosion	G
3. Drift	G
4. Vegetation	F
5. Fender System	-
6. Spur Dikes & Jetties	-
7. Rip Rap Or Slope Protection	-
8. Adequacy of Opening	F
FIELD POSTING	
Standard (Tons):	N
Single (Tons):	N
Semi (Tons):	N
SHV4/SHV5 (Tons):	N
SHV6/SHV7 (Tons):	N
1. Legibility	-
2. Visibility	-

Katie M. Green
SIGNATURE OF INSPECTOR

* Not Visible

SIGNATURE OF REVIEWER

STRUCTURE INSPECTION REPORT – COMMENTARY

Structure No:	PB-12	**Date of Inspection:**	11/07/2023

County/City:	City of Petersburg	**Feature Intersected:**	Brickhouse Run
Main Route:	00000	**Facility Carried:**	West Bank Street
Location:	0.07 Miles from N. Market St / 0.07 Miles to N. Sycamore St		
Lead Inspector:	Katie M. Green, P.E.		
Additional Inspectors:	Ethan H. Stivers		

DESCRIPTION	One Masonry Arch Span, 10' Long Total.
ORIENTATION	Looking north on the left is Abutment A (N. Market St side) on the right is Abutment B (N. Sycamore St. side). Upstream (South) to Downstream (North).
SPECIAL REQUIREMENTS	**Underwater Inspection** ☐ **Fatigue Prone Details** ☐ **Segmental Concrete** ☐ **Fracture Critical** ☐ **Scour Critical** ☐ **Pin & Hanger** ☐ **Movable Bridge** ☐
WORK DONE	None.
MISCELLANEOUS (Items which are structure specific and cannot be included in another section)	Inspection performed on 11/07/2023 (clear – 75° F).
STRUCTURAL ANALYSIS	See attached 2024 Load Rating Summary Sheet. Current condition does not warrant additional load rating analysis at this time.
OVERALL CONDITION	**Poor** Transverse and longitudinal cracking throughout asphalt pavement; asphalt breaking up adjacent to upstream storm drain. Cracking, spalling, and settlement throughout curbs and sidewalks over structure and approaches. Rust scale throughout steel utility conduits with 100% section loss to one conduit near downstream end. Efflorescence and moisture staining throughout arch and breastwalls; severe mortar joint deterioration with stones missing. Large voids due to missing stones can be probed up to 3-1/2' deep. Scour along both abutments with undermining up to 2' under; some stones displaced outward in breastwalls at locations of missing stones or undermining.
RECOMMENDATIONS	1. Install weight restriction signage as recommended in load rating. (LS) 2. Repoint masonry mortar joints throughout arch, abutments, and spandrel walls; repair areas with missing stones and stabilize displaced stones as necessary. (~1600 SF) 3. Repair areas of undermining along abutment breastwalls and install scour countermeasures as necessary. (2 CY) 4. Repair sidewalks where cracked, spalled, and breaking up. (~40 SF) 5. Remove vegetation growth on downstream spandrel wall. (LS) 6. Investigate ownership of structure extensions (masonry walls with timber flooring on upstream end and canal walls on downstream end) and develop a plan of action to further investigate and address observed deterioration. (LS)

STRUCTURE INSPECTION REPORT – COMMENTARY

Structure No: PB-12 **Date of Inspection:** 11/07/2023

36 TRAFFIC SAFETY FEATURES

36.1 **Bridge Railing**
0 – Feature does not meet currently acceptable standards
- See "DECK - Railing".

36.2 **Transitions**
N – Not Applicable.

36.3 **Approach Guardrail**
N – Not Applicable.

36.4 **Approach Guardrail Terminal**
N – Not Applicable.

58 DECK

58.1 **Wearing Surface**
- Transverse and longitudinal cracking up to 1/8" wide at asphalt pavement over bridge. See Photo #1.
- Asphalt breaking up adjacent to upstream drain, 8' long x 1' wide, exposing concrete below asphalt.

58.3 **Curbs**
- Spalling of curbs 8" long x full height x 1" deep at random locations.

58.5 **Sidewalks**
- Up to 1/16" wide random cracking throughout.
- Upstream: Up to 1/4" wide x full width crack extending from edge of drainage inlet. See Photo #2.

58.7 **Railing**
Brick parapet with metal railing on downstream side only.
- Downstream: Peeling paint with light surface rust on railing and minor weathering or brick parapet.

58.10 **Utilities**
4", 6", 8" and 12" diameter steel conduits below arch
- Rust scale throughout steel utility conduits.
- 4" diameter near downstream end: Rust scale with up to 100% section loss.

59 SUPERSTRUCTURE

59.3 **Girders, Beams, or Slab Spans**
10'-0" long x 11'-3" high stone masonry arch

59.3(A) **General**
Arch
- Isolated efflorescence and moisture staining throughout.
- Severe mortar deterioration throughout with isolated stones missing, typically 1 SF x up to 18" deep. See Photos #3 and #5.
- At upstream drainage inlet: Void due to missing stones, 1-1/2' long x 2' wide x 18" deep. See Photo #4.
- West end of arch, 20' from downstream end: Void due to missing stones, 2' long x 18" high x 3' deep.

Downstream Spandrel Wall
- Mortar deterioration throughout with voids up to 18" deep where mortar is missing.

Structure Extension (Brick and Masonry Wall with Timber Flooring for Private Property on Upstream End)
- 50' upstream of structure: Portion below parking lot has collapsed. Parking area has been fenced off. See Photo #13.
- Between 20' to 50' upstream of structure: Brick wall is rotated backwards approximately 1' west with cracking up to 1/2" wide at base of masonry; area appears unstable. See Photo #14.

STRUCTURE INSPECTION REPORT – COMMENTARY

Structure No: PB-12 **Date of Inspection:** 11/07/2023

Structure Extension (Masonry Canal Walls on Downstream End)

- 10’ downstream of structure: West canal wall undermined with stones missing, 7’ long total x 1’ high x 30” under.

60 SUBSTRUCTURE

60.1(D) **Breast Wall**

- Isolated efflorescence and moisture staining throughout. See Photo #6.
- Severe mortar deterioration throughout with isolated stones missing, typically 1 SF x 1’ deep. See Photo #6.

Abutment A

- Upstream end: One stone at base is displaced outward up to 5”.
- Below upstream drainage inlet: One stone at bottom displaced outward up to 2” with several voids in this vicinity due to missing stones, up to 2’ long x up to 6” high x 2’ deep. See Photo #9.
- At mid-length: Void due to missing stones, 1’ long x 1’ high x 3’ deep.
- 12’ from downstream end: Void due to missing stones, 18” long x 2’ high x 3-1/2’ deep, adjacent to area of undermining. Stones in this area displaced outward up to 2”. See Photos #7 and #8.

Abutment B

- At 4’ diameter storm drain outfall: Void due to missing stones, up to 2’ long x 18” high x 2” deep below pipe, with adjacent stones displaced outward 6” for 4’ long. See Photo #10. Plywood in place below pipe.
- Downstream end: Previous 2’-6” wide x 3’-6” high drain inlet has been has been bricked closed.

60.1(F) **Footing**

- Masonry abutments are undermined. See “60.1(H) – Erosion/Scour/Undermining.”

60.1(H) **Erosion/Scour/Undermining**

Abutment A

- Scour along full length of abutment with undermining 1’ high x 1’ under along upstream end for 20’ LF total. See Photo #11.
- 12’ from downstream end: 4’ diameter x 3’ deep scour hole likely due to outfall from storm drain; abutment is undermined 5-1/2’ long x up to 2’ high x 2’ under. See Photo #7.

Abutment B

- Upstream end: Undermining, 6 LF total x 8” high x 8” under.
- Near mid-length: Undermining, 8” high x 1’ under for 5 LF total.

60.1(I) **Settlement**

- No noteworthy deficiencies.

61 CHANNEL: CHANNEL/SLOPE PROTECTION

61.1 **Channel Scour**

- Channel profile has been checked. See attached Channel Profile Sheet.
- Scour of channel along abutments with undermining. See “60.1(H) – Erosion/Scour/Undermining.”

61.2 **Embankment Erosion**

- No noteworthy deficiencies.

61.3 **Drift**

- No noteworthy deficiencies.

61.4 **Vegetation**

- Light vegetation growth throughout downstream spandrel wall. See Photo #12.

61.8 **Adequacy of Opening**

- Sufficient.

STRUCTURE INSPECTION REPORT – COMMENTARY

Structure No: PB-12 **Date of Inspection:** 11/07/2023

FIELD POSTING

- Structure is not posted.

APPROACH ITEMS

- Up to 1/8” wide cracking in sidewalks with spalling 1” wide x 1/2" deep along cracks.
- Up to 4” settlement of curbs throughout.

Abutment A (West) Approach

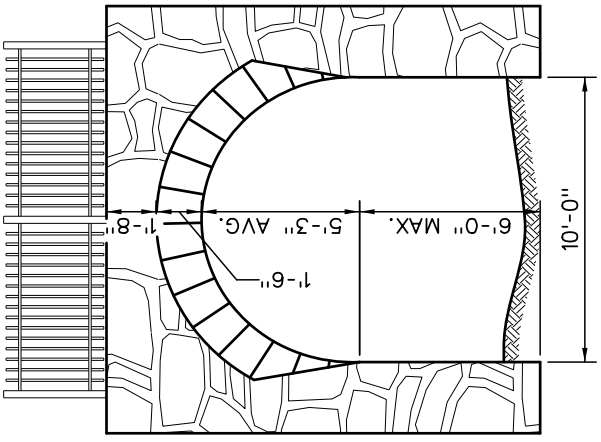
- Upstream sidewalk: Spalling, 16” diameter x 4” deep adjacent to utility pole. See Photo #15.
- Upstream sidewalk: Spalling up to 1” deep affecting 10 SF total.

Abutment B (East) Approach

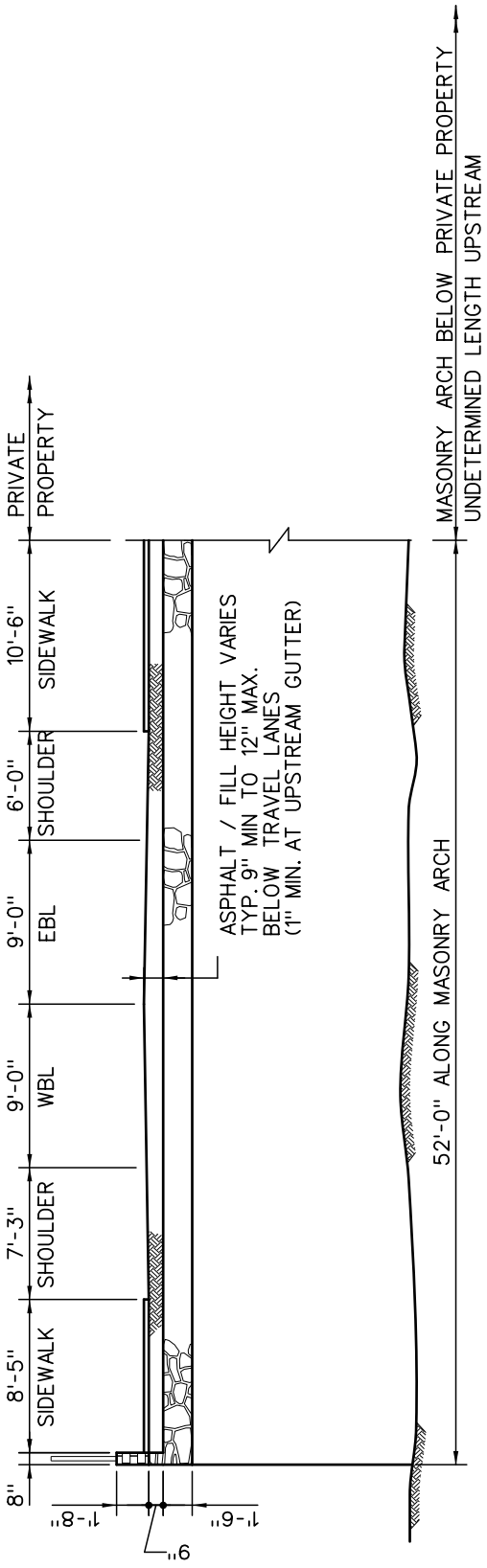
- Upstream sidewalk: One sidewalk panel settled up to 3”; area is breaking up affecting 25 SF. See Photo #16.

STRUCTURE INSPECTION REPORT – SKETCHES

Structure No: PB-12 **Date of Inspection:** 11/07/2023



NORTH (DOWNSTREAM) SIDE
NOT TO SCALE



TYPICAL SECTION LOOKING EAST
NOT TO SCALE

STRUCTURE INSPECTION REPORT – PHOTOS

Structure No: PB-12 **Date of Inspection:** 11/07/2023

Photo #1

Looking at asphalt pavement over structure.

Transverse and longitudinal cracking up to 1/8” wide at asphalt pavement over bridge.

Photo #2

Looking at upstream sidewalk over structure.

Up to 1/4" wide x full width crack extending from edge of drainage inlet.

STRUCTURE INSPECTION REPORT – PHOTOS

Structure No: PB-12 **Date of Inspection:** 11/07/2023

Photo #3

Looking at west end of arch near downstream end.

Severe mortar deterioration throughout with isolated stones missing, typically 1 SF x up to 18” deep.

Photo #4

Looking at arch near the crown at upstream drainage inlet.

Void due to missing stones, 1-1/2’ long x 2’ wide x 18” deep.

STRUCTURE INSPECTION REPORT – PHOTOS

Structure No: PB-12 **Date of Inspection:** 11/07/2023

Photo #5

Looking at east side of the arch near the downstream end.

Severe mortar deterioration throughout with isolated stones missing, typically 1 SF x up to 18” deep.

Photo #6

Looking at Abutment B breastwall at mid-length.

Isolated efflorescence and moisture staining throughout.

Severe mortar deterioration throughout with isolated stones missing, typically 1 SF x 1’ deep.

STRUCTURE INSPECTION REPORT – PHOTOS

Structure No: PB-12 **Date of Inspection:** 11/07/2023

Photo #7

Looking at Abutment A breastwall, 12’ from downstream end.

Void due to missing stones, 18” long x 2’ high x 3-1/2’ deep, adjacent to area of undermining. Stones in this area displaced outward up to 2”.

4’ diameter x 3’ deep scour hole likely due to outfall from storm drain; abutment is undermined 5-1/2’ long x up to 2’ high x 2’ under.

Photo #8

Looking at Abutment A breastwall 12’ from downstream end.

Void due to missing stones, 18” long x 2’ high x 3-1/2’ deep, adjacent to area of undermining. Stones in this area displaced outward up to 2”.

STRUCTURE INSPECTION REPORT – PHOTOS

Structure No: PB-12 **Date of Inspection:** 11/07/2023

Photo #9

Looking at Abutment A breastwall below upstream drainage inlet.

One stone at bottom displaced outward up to 2” with several voids in this vicinity due to missing stones, up to 2’ long x up to 6” high x 2’ deep.

Photo #10

Looking at Abutment B breastwall below 4’ diameter storm drain outfall.

Void due to missing stones, up to 2’ long x 18” high x 2” deep below pipe, with adjacent stones displaced outward 6” for 4’ long.

STRUCTURE INSPECTION REPORT – PHOTOS

Structure No: PB-12 **Date of Inspection:** 11/07/2023

Photo #11

Looking at Abutment A breastwall at upstream end.

Scour along full length of abutment with undermining 1’ high x 1’ under along upstream end for 20’ LF total.

Photo #12

Looking at downstream spandrel wall and brick parapet.

Light vegetation growth throughout downstream spandrel wall.

STRUCTURE INSPECTION REPORT – PHOTOS

Structure No: PB-12 **Date of Inspection:** 11/07/2023

Photo #13

Looking at structure extension on upstream side of structure, approximately 50’ from structure.

Portion below parking lot has collapsed. Parking area has been fenced off.

Photo #14

Looking at structure extension on upstream side of structure, approximately 20’ to 50’ from structure.

Brick wall is rotated backwards approximately 1’ west with cracking up to 1/2" wide at base of masonry; area appears unstable.

STRUCTURE INSPECTION REPORT – PHOTOS

Structure No: PB-12 **Date of Inspection:** 11/07/2023

Photo #15

Looking at upstream sidewalk at Abutment A approach.

Spalling, 16” diameter x 4” deep adjacent to utility pole.

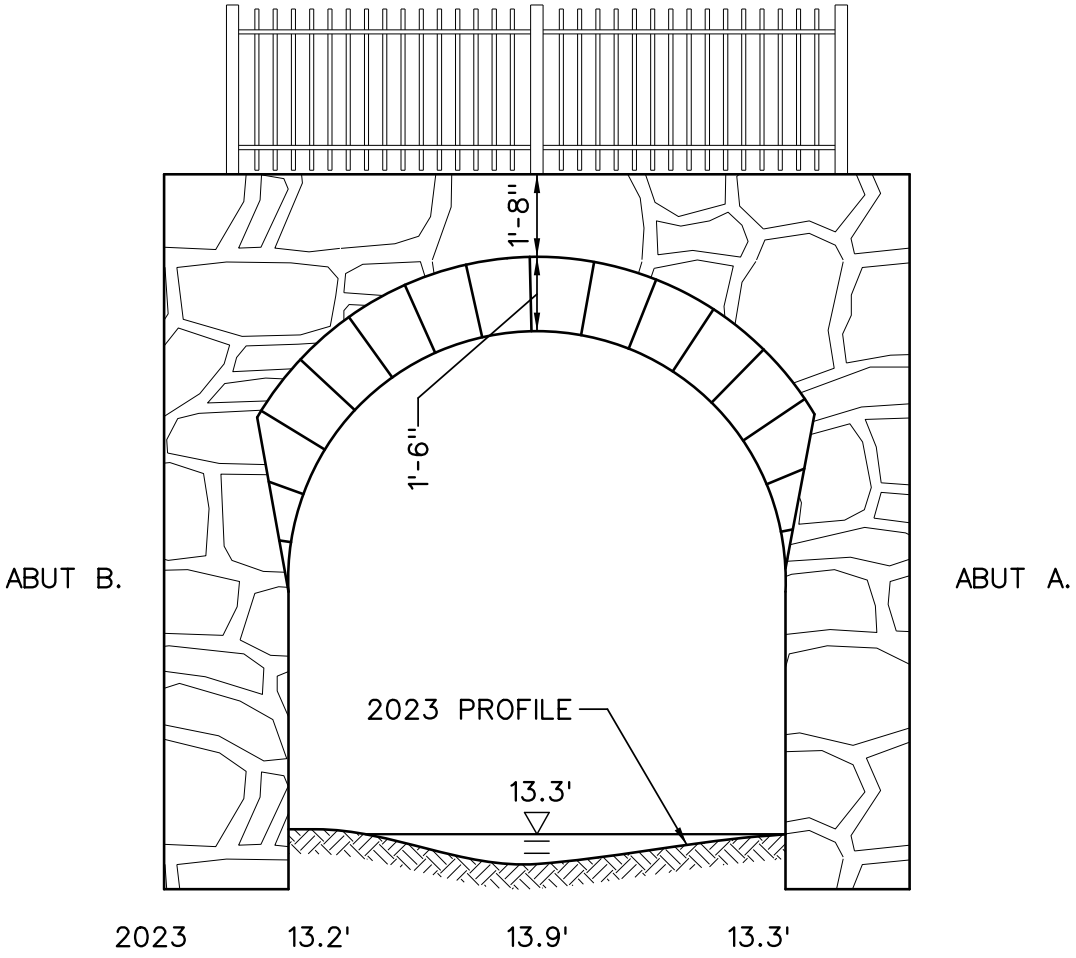
Photo #16

Looking at upstream sidewalk at Abutment B approach.

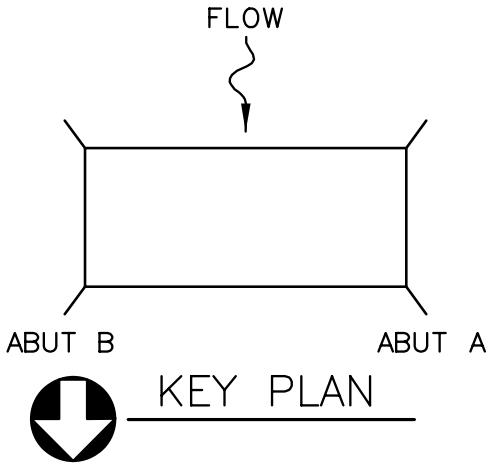
One sidewalk panel settled up to 3”; area is breaking up affecting 25 SF.

STRUCTURE INSPECTION REPORT – CHANNEL PROFILE

Structure No: PB-12 **Date of Inspection:** 11/07/2023



DOWNSTREAM (NORTH) ELEVATION
NOT TO SCALE



KEY PLAN

NOTE:
ALL SOUNDINGS TAKEN FROM TOP OF BRICK PARAPET.

STRUCTURE INSPECTION REPORT – LOAD RATING SUMMARY SHEET

Structure No: PB-12 **Date of Inspection:** 11/07/2023

VDOT Virginia Department of Transportation

LOAD RATING SUMMARY SHEET

BRIDGE LOAD RATING SUMMARY FORM (SB502)

City Bridge No	**PB-12**			**City/County**	**Petersburg**	**District**	**Richmond**
Route (Facility Carried)	**West Bank Street**			**Feature Intersected**	**Brickhouse Run**		
Load Rater	AEH	Date	4/2/2024				
Checked By	KMG	Date	4/2/2024				
VDOT's Reviewer		Date	m/dd/yyyy				
Basis of Load Rating	New Structure or Superstructure Replacement						
Load Rating Methodology	Allowable Stress (AS)						
LFR Rating Level	N/A						
Software/tool used (use comment section for the additional)	CANDE	Version	2022				
Inspection report used for load rating		11/7/2023					

COMMONWEALTH OF VIRGINIA
Katie M. Green
KATIE M. GREEN
Lic. No. 054755
04/02/2024
PROFESSIONAL ENGINEER

VA PE Sign

RATING TYPE	RATING FACTOR	GVW (TONS)	RATING (TONS)	CONTROLLING SPAN & MEMBER	CONTROLLING LOCATION	CONTROLLING MECHANISM	LRFD LIMIT STATE
DESIGN VEHICLES							
HL-93 (INV)	-	N/A		-	-	-	-
HL-93 (OPR)	-	N/A		-	-	-	-
HS-20 (INV)	0.950	36	34.2	Arch	Pipe Group 1	Crushing	-
HS-20 (OPR)	1.425	36	51.3	Arch	Pipe Group 1	Crushing	-
LEGAL VEHICLES							
VA TYPE 3	2.450	27	66.2	Arch	Pipe Group 1	Shear	-
VA TYPE 3S2	2.500	40	100.0	Arch	Pipe Group 1	Shear	-
SPECIALIZED HAULING VEHICLES							
NRL	3.560	40	142.4	Arch	Pipe Group 1	Shear	-
SU4	2.380	27	64.3	Arch	Pipe Group 1	Shear	-
SU5	2.370	31	73.5	Arch	Pipe Group 1	Shear	-
SU6	2.990	34.75	103.9	Arch	Pipe Group 1	Shear	-
SU7	3.350	38.75	129.8	Arch	Pipe Group 1	Shear	-
EMERGENCY VEHICLES							
EV2	0.820	28.75	23.6	Arch	Pipe Group 1	Crushing	-
EV3	0.620	43	26.7	Arch	Pipe Group 1	Crushing	-
VA CODE EXEMPT & PERMIT VEHICLES							
NV3	2.550	45.75	116.7	Arch	Pipe Group 1	Shear	-
NV4	2.150	57.5	123.6	Arch	Pipe Group 1	Shear	-

NOTES:

LFR/LFD ratings of legal & vehicles: Denote if the reported ratings are mid range values (steel) or operating level ratings (concrete).

(HL-93) is a LRFD design truck and shall be analysed with LRFR method only.

Petersburg Site Visit

Incident: On September 3, 2024, the DCR Floodplain Management Division Director conducted a site visit at 110 W. Bank St. in Petersburg, VA following reports of flood damages from a storm on August 30, 2024.

Flood Zones: AE and Floodway

Number of Structures Damaged: 1 building and parking lot

Substantial Damage (over 50% of market value): Yes, major/destroyed.

Property Conditions: Damage was sustained to the sole structure on the property, including a partial collapse. Large sinkhole in the parking lot, exposing underground tunnel system and tributary Brickhouse Run.

DCR Recommendations:

- Demolition of damaged building with additional mitigation measures to the parking lot.
- Bank Street stabilization and reinforcement.
- Develop strategy for mitigation of 20 Bank Street and109 Bank Street.
- Evaluate financial capacity to take immediate actions for remediation; including but not limited to amend and/or extend active grant awards through the Community Flood Preparedness Fund.
- Coordinate with DCR and FEMA on revising flood maps.

Next Steps for Locality:

- Continue emergency repair.
- Manage debris and sediment loads.
- Proceed with enforcement of floodplain ordinance.
- Coordination with DCR and FEMA as needed on above recommendations and technical assistance.

Additional Background Information: DCR has previously identified the property in questions as a potential violation of the National Flood Insurance Program through a Community Assistance Visit (9/26/22). DCR has also met with the property owner, elected officials, local staff, and stakeholders to provide technical assistance on the corrective actions needed to remedy the violations.

Locality Points of Contact: Joann Williams, Director of Communications, Tourism, Marketing & Government Relations (jwilliams@petersburg-va.org) and March Altman, City Manager (maltman@petersburg-va.org)

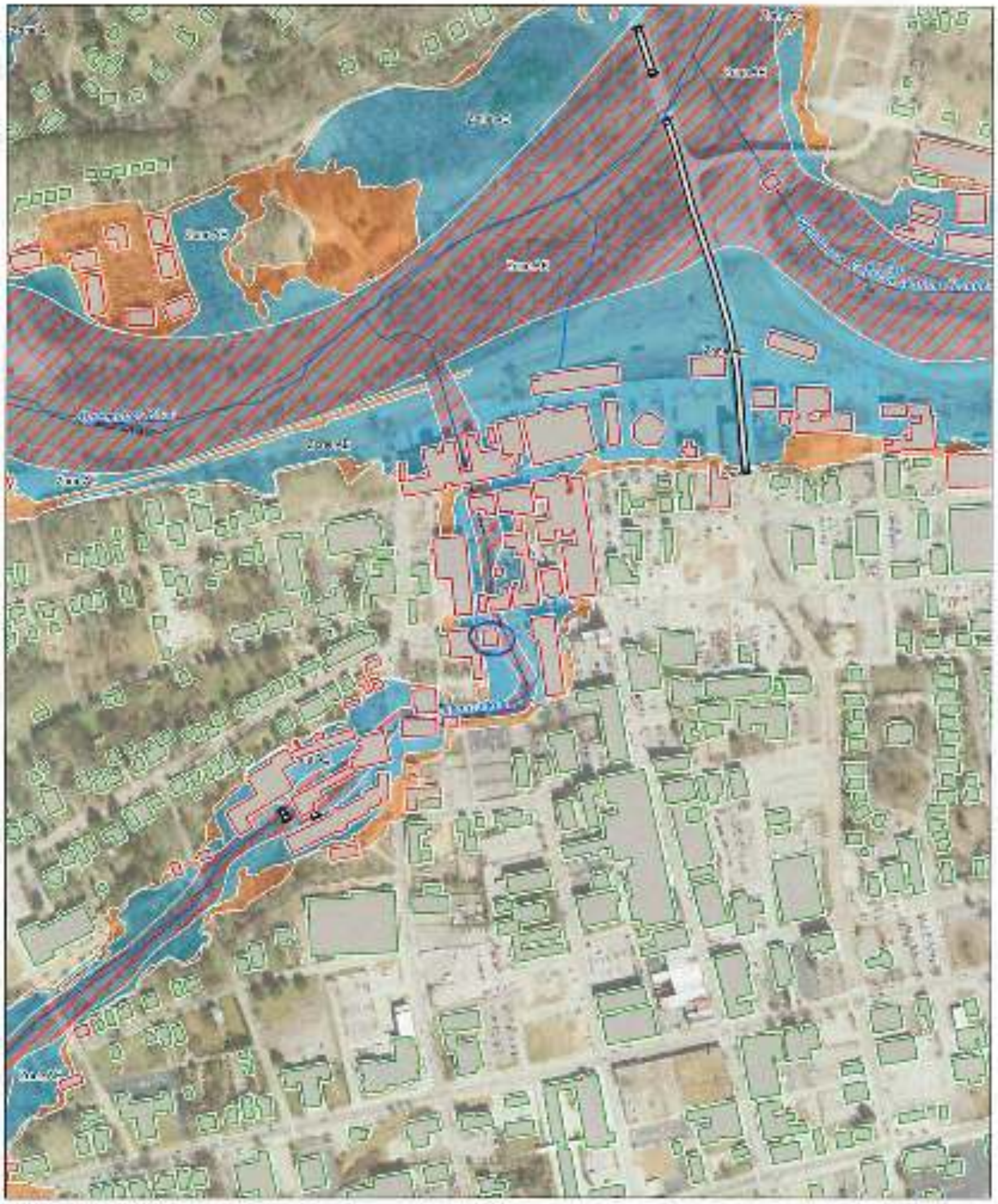
Media Coverage:

Petersburg Progress-Index

WTVR

Award Round	PoP End	Award Total	Category	Project
Round 2	2025	2,238,542	Study	Citywide Drain Study & FP Ordinance
Round 2	2025	385,016	C & P	Resilience Plan, Staff-FPA
Round 3	2026	2,800,878	Project	Lakemont Stormwater
Round 4	2027	135,000	C & P	3rd Party FPA
Round 4	2027	96,300	C & P	Property Inventory and Floodplain Assessment
Round 4	2027	2,041,200	Project	Property Acquisition
		7,696,936		

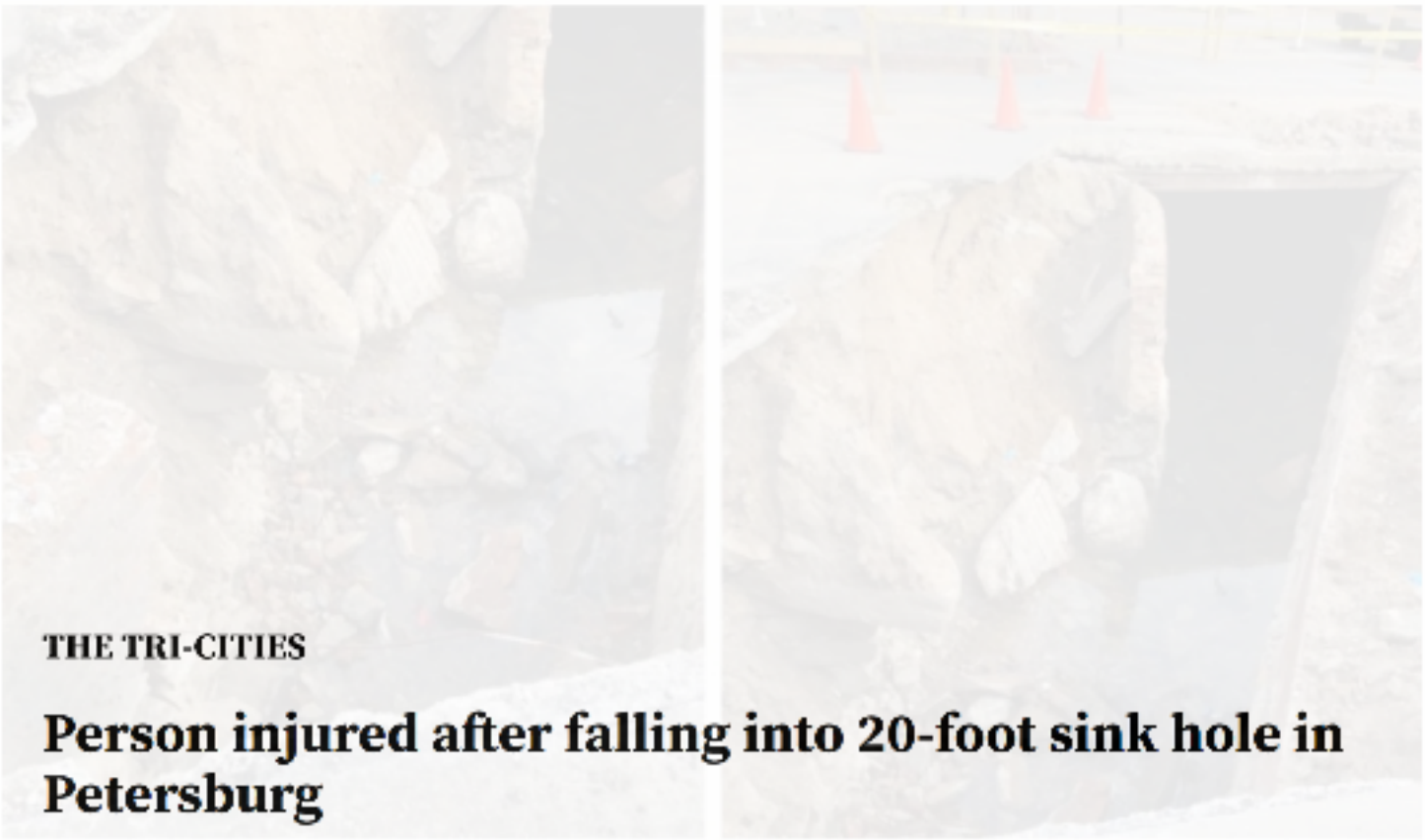
VFRIS Exporter



9/6/2024, 12:50:53 PM

1:4,726

https://www.wric.com/news/local-news/the-tri-cities/person-injured-after-falling-into-20-foot-sink-hole-in-petersburg/



THE TRI-CITIES

Person injured after falling into 20-foot sink hole in Petersburg

by: Emma North
Posted: Nov 1, 2021 / 04:32 PM EDT
Updated: Nov 1, 2021 / 04:33 PM EDT

SHARE

PETERSBURG, Va. (WRIC) — The Petersburg Fire Department rescued someone from a 20-foot sink hole on East Bank Street Monday afternoon.

The fire department shared information about the rescue on Facebook.

Two shootings, hours apart on same street in Petersburg ›

Fire firefighters and medics were called to the scene. The person who fell in the hole was in need of treatment and was successfully removed from the hole.

Photos of the sink hole show that the area was rocky and partially underwater.

https://www.wtvr.com/news/local-news/old-dmv-building-collapse-old-towne-petersburg-aug-30-2024

Deluge in centuries-old stormwater tunnel causes building to partially collapse in Old Towne Petersburg

Deluge in centuries-old stormwater tunnel causes Old Towne Petersburg building to partially collapse

By: Wayne Covil

Posted 4:22 PM, Aug 30, 2024 and last updated 4:42 PM, Aug 30, 2024

PETERSBURG, Va. — Part of a building collapsed in Old Towne Petersburg after storms brought a deluge of water to the historic city Thursday night.

All of the water coming downstream had to pass through a portion of Brickhouse Run, a centuries-old stormwater tunnel that is partially exposed.

"The first layer of the tunnel is from the late 1700s," Dean McCray, the building's former owner, said. "Then 4 foot was built higher in the 1800s as stormwater increased. In the 1900s they built 4 foot higher."

WTVR

Flooding from the storm exposed a section of the tunnel and eroded the structural integrity of what is known as the old DMV building, which dates back to the 1970s.

The exposed section of tunnel has been out in the open since the fall of 2021.

WATCH: Look how much rain fell in Central Virginia Thursday

“We finally got our permit issued last Friday,” McCray said. “Our construction team [was] set up to start Tuesday, the day after Labor Day.”

City leaders and firefighters surveyed the damage Friday morning.

The delay in fixing the problem comes after multiple federal, state and city agencies were involved in the planning process.

WTVR

Now McCray said there is a good chance this building will have to come down due to the damage.

For property and business owners on Bank Street, the ongoing issue with the exposed section of the storm water tunnel is a concern.

“I don’t know how bad the erosion will affect everything, especially the street and all that because it doesn’t go direct under my building but it’s not too far from it,” Spiro Georgogianis said.

WTVR

Susan Steward, who owns the Apothic Company, said this has been going on for years and not just a few months.

“So why aren’t things already fixed?” Steward asked.

Petersburg City Manager March Altman acknowledged there are "few hoops that had to be jumped through from a regulatory perspective with DCR, FEMA, DEQ, EPA.”

WTVR

Now the goal is to remove the debris from the exposed section of the tunnel because of more rain in the forecast Sunday.

“We want to make sure there’s nothing that creates a damming effect, so if that water comes we can handle it,” Altman said.

The sidewalk on Bank Street is closed to the public as a safety precaution. Part of the street may also be closed Sunday because of the potential for more heavy rain.

CBS 6 is committed to sharing community voices on this important topic. Email your thoughts to the CBS 6 Newsroom**.**

Every day CBS 6 is giving a voice to the stories happening in your community. If you have a story idea, email our team at NewsTips@wtvr.com or click here to submit a tip.

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The Progress-Index

NEWS

Storms likely caused part of old downtown Petersburg DMV building to collapse, officials say

Bill Atkinson
Petersburg Progress-Index

Published 2:05 p.m. ET Aug. 30, 2024 | **Updated 6:37 p.m. ET Aug. 30, 2024**

PETERSBURG – City officials say weather is likely to blame for the partial collapse of the former Department of Motor Vehicles building in downtown Petersburg.

City spokesperson Joanne Williams told The Progress-Index that the debris fell into Brickhouse Run, one of the many streams that meander through and below Petersburg. The stream had been exposed to the elements ever since a portion of the building's former parking lot caved in three years ago.

"The structural engineer determined that the building was unsafe and that debris needed to be removed immediately," Williams said. A contractor will remain onsite throughout the evening to clear out Brickhouse Run.

An aqueduct that carries Brickhouse Run below Bank Street was inspected and found to have no damage as a result of either the weather or the building collapse.

The old DMV building has been vacant for many years. A private owner bought it a few years ago and was in the process of doing some excavation work around the front of it when part of the parking lot collapsed. The site has been closed off to pedestrians since 2021 when a woman fell into the sinkhole.

No one was injured in the most recent collapse.

Bank Street between North Sycamore and North Market streets was closed to vehicular traffic while crews worked to clear the collapsed debris.

Deluge in centuries-old stormwater tunnel causes building to partially collapse in Old Towne Petersburg

Wayne Covil

Deluge in centuries-old stormwater tunnel causes Old Towne Petersburg building to partially collapse

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WATCH: Look how much rain fell in Central Virginia Thursday

Look how much rain fell in Central Virginia Thursday

“We finally got our permit issued last Friday,” McCray said. “Our construction team [was] set up to start Tuesday, the day after Labor Day.”

City leaders and firefighters surveyed the damage Friday morning.

The delay in fixing the problem comes after multiple federal, state and city agencies were involved in the planning process.

WTVR

Now McCray said there is a good chance this building will have to come down due to the damage.

For property and business owners on Bank Street, the ongoing issue with the exposed section of the storm water tunnel is a concern.

“I don’t know how bad the erosion will affect everything, especially the street and all that because it doesn’t go direct under my building but it’s not too far from it,” Spiro Georgogianis said.

WTVR

Susan Steward, who owns the Apothic Company, said this has been going on for years and not just a few months.

“So why aren’t things already fixed?” Steward asked.

Petersburg City Manager March Altman acknowledged there are "few hoops that had to be jumped through from a regulatory perspective with DCR, FEMA, DEQ, EPA.”

WTVR

Now the goal is to remove the debris from the exposed section of the tunnel because of more rain in the forecast Sunday.

“We want to make sure there’s nothing that creates a damming effect, so if that water comes we can handle it,” Altman said.

The sidewalk on Bank Street is closed to the public as a safety precaution. Part of the street may also be closed Sunday because of the potential for more heavy rain.

CBS 6 is committed to sharing community voices on this important topic. Email your thoughts to the CBS 6 Newsroom**.**

Every day CBS 6 is giving a voice to the stories happening in your community. If you have a story idea, email our team at NewsTips@wtvr.com or click here to submit a tip.

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https://www.wtvr.com/news/local-news/bank-street-update-old-towne-petersburg-sept-5-2024

LOCAL NEWS

Petersburg street reopens after old stormwater tunnel caused sinkhole, building collapse: 'It's roped off now'

Petersburg street reopens after old stormwater tunnel caused sinkhole, building collapse

By: Wayne Covil

Posted 3:33 PM, Sep 05, 2024 and last updated 5:13 PM, Sep 05, 2024

PETERSBURG, Va. — One week after floodwaters caused part of a tunnel and building to partially collapse in Petersburg, Bank Street has reopened.

At Salon Bliss, business continued while the street in front of the shop had remained blocked.

“The last week has been pretty crazy,” Megan Weaver with Salon Bliss said.

Flood waters from a storm on Aug. 29 had to pass through a section of a centuries-old tunnel that became exposed. That led to a partial collapse of the former DMV building.

“It is very close to here, yes, it’s right across the street,” Weaver said.

WTVR

The city spent much of the past week working to make sure Bank Street did not collapse and cause damage to other buildings.

“[We] put in standard riprap, which is maybe volleyball size,” Petersburg Public Works Director Jerry Byerly explained. “Then came back in yesterday and put in large pieces of riprap that will hopefully withstand the rush of water if there is another large storm. So we have essentially stabilized this bank and got the water back into the channel where it ought to be.”

City officials said they have the problem stabilized, but the street closure is another issue for neighbors.

“A lot of people come through here to get to the other side of Petersburg or get to downtown Petersburg, so there’s a lot of traffic through here,” Gloria Hill, who lives and works on Bank Street, said.

WTVR

The old DMV building, which partially collapsed during the storm, has been condemned by Petersburg building officials.

And there is another sinkhole near the initial site of the collapse.

“It’s roped off now,” Byerly said. “We’ve had the engineers look at it and waiting for a report from them.”

Officials are also waiting on a final report to determine if the tunnel gets closed back up or will remain open.

“There’s discussion about leaving the channel, once it’s dug out and repaired,” Byerly said. “By leaving it open, making a park. There’s all kinds of discussions.”

While there have been no decisions about how Brickhouse Run Creek will look in the future, the report from engineers is expected to be back in 60 to 90 days.

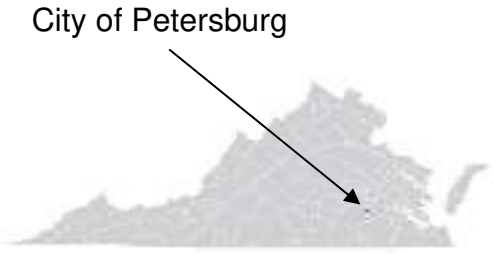
WATCH: Deluge in centuries-old stormwater tunnel causes Old Towne Petersburg building to partially collapse

CBS 6 is committed to sharing community voices on this important topic. Email your thoughts to the CBS 6 Newsroom**.**

FLOOD INSURANCE STUDY

FEDERAL EMERGENCY MANAGEMENT AGENCY

VOLUME 1 OF 1



CITY OF PETERSBURG, VIRGINIA

INDEPENDENT CITY

COMMUNITY NAME	COMMUNITY NUMBER
PETERSBURG, CITY OF	510112

FEMA

Reprinted with corrections on June 8, 2023

REVISED:

December 15, 2022

FLOOD INSURANCE STUDY NUMBER
510112V000B
Version Number 2.6.4.6

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FLOOD INSURANCE STUDY REPORT
CITY OF PETERSBURG, VIRGINIA

SECTION 1.0 – INTRODUCTION

1.1 The National Flood Insurance Program

The National Flood Insurance Program (NFIP) is a voluntary Federal program that enables property owners in participating communities to purchase insurance protection against losses from flooding. This insurance is designed to provide an alternative to disaster assistance to meet the escalating costs of repairing damage to buildings and their contents caused by floods.

For decades, the national response to flood disasters was generally limited to constructing flood-control works such as dams, levees, sea-walls, and the like, and providing disaster relief to flood victims. This approach did not reduce losses nor did it discourage unwise development. In some instances, it may have actually encouraged additional development. To compound the problem, the public generally could not buy flood coverage from insurance companies, and building techniques to reduce flood damage were often overlooked.

In the face of mounting flood losses and escalating costs of disaster relief to the general taxpayers, the U.S. Congress created the NFIP. The intent was to reduce future flood damage through community floodplain management ordinances, and provide protection for property owners against potential losses through an insurance mechanism that requires a premium to be paid for the protection.

The U.S. Congress established the NFIP on August 1, 1968, with the passage of the National Flood Insurance Act of 1968. The NFIP was broadened and modified with the passage of the Flood Disaster Protection Act of 1973 and other legislative measures. It was further modified by the National Flood Insurance Reform Act of 1994 and the Flood Insurance Reform Act of 2004. The NFIP is administered by the Federal Emergency Management Agency (FEMA), which is a component of the Department of Homeland Security (DHS).

Participation in the NFIP is based on an agreement between local communities and the Federal Government. If a community adopts and enforces floodplain management regulations to reduce future flood risks to new construction and substantially improved structures in Special Flood Hazard Areas (SFHAs), the Federal Government will make flood insurance available within the community as a financial protection against flood losses. The community's floodplain management regulations must meet or exceed criteria established in accordance with Title 44 Code of Federal Regulations (CFR) Part 60, *Criteria for Land Management and Use*.

SFHAs are delineated on the community's Flood Insurance Rate Maps (FIRMs). Under the NFIP, buildings that were built before the flood hazard was identified on the community's FIRMs are generally referred to as "Pre-FIRM" buildings. When the NFIP was created, the U.S. Congress recognized that insurance for Pre-FIRM buildings would be prohibitively expensive if the premiums were not subsidized by the Federal Government. Congress also recognized that most of these floodprone buildings were built

by individuals who did not have sufficient knowledge of the flood hazard to make informed decisions. The NFIP requires that full actuarial rates reflecting the complete flood risk be charged on all buildings constructed or substantially improved on or after the effective date of the initial FIRM for the community or after December 31, 1974, whichever is later. These buildings are generally referred to as “Post-FIRM” buildings.

1.2 Purpose of this Flood Insurance Study Report

This Flood Insurance Study (FIS) Report revises and updates information on the existence and severity of flood hazards for the study area. The studies described in this report developed flood hazard data that will be used to establish actuarial flood insurance rates and to assist communities in efforts to implement sound floodplain management.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive than the minimum Federal requirements. Contact your State NFIP Coordinator to ensure that any higher State standards are included in the community’s regulations.

1.3 Jurisdictions Included in the Flood Insurance Study Project

This FIS Report covers the entire geographic area of the City of Petersburg, Virginia.

The jurisdictions that are included in this project area, along with the Community Identification Number (CID) for each community and the United States Geological Survey (USGS) 8-digit Hydrologic Unit Code (HUC-8) sub-basins affecting each, are shown in Table 1. The FIRM panel numbers that affect each community are listed. If the flood hazard data for the community is not included in this FIS Report, the location of that data is identified.

Table 1: Listing of NFIP Jurisdictions

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s)	If Not Included, Location of Flood Hazard Data
Petersburg, City of	510112	02080207, 03010201, 03010202	5101120002D, 5101120004D, 5101120006D, 5101120007D, 5101120008D, 5101120009D, 5101120015D[1], 5101120020D, 5101120026D, 5101120028D, 5101120029D, 5101120036D, 5101120037D	

[1] Panel Not Printed

1.4 Considerations for using this Flood Insurance Study Report

The NFIP encourages State and local governments to implement sound floodplain management programs. To assist in this endeavor, each FIS Report provides floodplain data, which may include a combination of the following: 10-, 4-, 2-, 1-, and 0.2-percent annual chance flood elevations (the 1-percent-annual-chance flood elevation is also referred to as the Base Flood Elevation (BFE)); delineations of the 1-percent-annual-chance and 0.2-percent-annual-chance floodplains; and 1-percent-annual-chance floodway. This information is presented on the FIRM and/or in many components of the FIS Report, including Flood Profiles, Floodway Data tables, Summary of Non-Coastal Stillwater Elevations tables, and Coastal Transect Parameters tables (not all components may be provided for a specific FIS).

This section presents important considerations for using the information contained in this FIS Report and the FIRM, including changes in format and content. Figures 1, 2, and 3 present information that applies to using the FIRM with the FIS Report.

- Part or all of this FIS Report may be revised and republished at any time. In addition, part of this FIS Report may be revised by a Letter of Map Revision (LOMR), which does not involve republication or redistribution of the FIS Report. Refer to Section 6.5 of this FIS Report for information about the process to revise the FIS Report and/or FIRM.

  It is, therefore, the responsibility of the user to consult with community officials by contacting the community repository to obtain the most current FIS Report components. Communities participating in the NFIP have established repositories of flood hazard data for floodplain management and flood insurance purposes. Community map repository addresses are provided in Table 30, "Map Repositories," within this FIS Report.

- This FIS report was reissued on June 8, 2023 to make a correction. See the Notice-to User letter that accompanied this correction for details. This version replaces any previous versions.

- New FIS Reports are frequently developed for multiple communities, such as entire counties. A countywide FIS Report incorporates previous FIS Reports for individual communities and the unincorporated area of the county (if not jurisdictional) into a single document and supersedes those documents for the purposes of the NFIP.

  The initial FIS Report for the City of Petersburg became effective on September 16, 1980. The initial FIRM for the City of Petersburg is dated March 16, 1981. Refer to Table 27 for information about subsequent revisions to the FIRMs.

- FEMA has developed a *Guide to Flood Maps* (FEMA 258) and online tutorials to assist users in accessing the information contained on the FIRM. These include how to read panels and step-by-step instructions to obtain specific information. To obtain this guide and other assistance in using the FIRM, visit the FEMA Web site at www.fema.gov/online-tutorials.

The FIRM Index in Figure 1 shows the overall FIRM panel layout within the City of Petersburg, and also displays the panel number and effective date for each FIRM panel in the county. Other information shown on the FIRM Index includes community boundaries, flooding sources, watershed boundaries, and USGS HUC-8 codes.

Figure 1:FIRM Index

CITY OF
COLONIAL
HEIGHTS

CHESTERFIELD COUNTY

*0001D | 0002D 12/15/2022 | 0006D 12/15/2022 | 0026D 12/15/2022 | *0027D | *0035D

HUC8 02080207
Appomattox Watershed

CITY OF
PETERSBURG
510112

*0003D | 0004D 12/15/2022 | 0008D 12/15/2022 | 0009D 12/15/2022 | 0028D 12/15/2022 | 0029D 12/15/2022

**0015D | 0020D 12/15/2022 | 0036D 12/15/2022 | 0037D 12/15/2022 | *0045D

HUC8 03010201
Nottoway Watershed

DINWIDDIE COUNTY

PRINCE GEORGE COUNTY

HUC8 03010202
Blackwater Watershed

*0038D | *0039D

Appomattox River
Navigation Channel
Appomattox River
RAILROAD
RAILROAD
RAILROAD
RAILROAD
RAILROAD
Lieutenant Run
Harrison Creek
Rohoic Creek
Brickhouse Run
Wilcox Lake
Blackwater Swamp
Unnamed Tributary 1
to Blackwater Swamp
Second Swamp
1
36
460B
301
460
301A
604
613
95
106
629

1 inch = 7,083 feet 1:85,000
feet
0 4,000 8,000 16,000

Map Projection:
State Plane Virginia South 4502 Feet
North American Datum of 1983

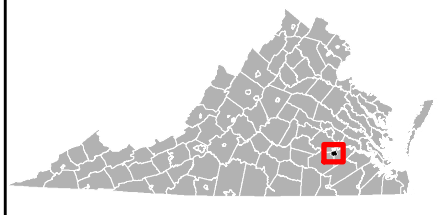
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT

HTTPS://MSC.FEMA.GOV

SEE FIS REPORT FOR ADDITIONAL INFORMATION

*PANEL NOT PRINTED -- AREA OUTSIDE COMMUNITY BOUNDARY
**PANEL NOT PRINTED -- NO SPECIAL FLOOD HAZARD AREAS

CITY LOCATOR



NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP INDEX

CITY OF PETERSBURG, VIRGINIA Independent City

PANELS PRINTED:
0002, 0004, 0006, 0007, 0008, 0009, 0020, 0026, 0028, 0029, 0036, 0037

FEMA

MAP NUMBER
510112IND0B

MAP REVISED
DECEMBER 15, 2022

Each FIRM panel may contain specific notes to the user that provide additional information regarding the flood hazard data shown on that map. However, the FIRM panel does not contain enough space to show all the notes that may be relevant in helping to better understand the information on the panel. Figure 2 contains the full list of these notes.

Figure 2: FIRM Notes to Users

NOTES TO USERS

For information and questions about this map, available products associated with this FIRM including historic versions of this FIRM, how to order products, or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Flood Map Service Center website at https://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Flood Map Service Center website or by calling the FEMA Map Information eXchange.

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Flood Map Service Center at the number listed above.

For community map dates, refer to Table 27 in this FIS Report.

To determine if flood insurance is available in the community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

The map is for use in administering the NFIP. It may not identify all areas subject to flooding, particularly from local drainage sources of small size. Consult the community map repository to find updated or additional flood hazard information.

BASE FLOOD ELEVATIONS: For more detailed information in areas where Base Flood Elevations (BFEs) and/or floodways have been determined, consult the Flood Profiles and Floodway Data and/or Summary of Non-Coastal Stillwater Elevations tables within this FIS Report. Use the flood elevation data within the FIS Report in conjunction with the FIRM for construction and/or floodplain management.

FLOODWAY INFORMATION: Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the FIS Report for this jurisdiction.

FLOOD CONTROL STRUCTURE INFORMATION: Certain areas not in Special Flood Hazard Areas may be protected by flood control structures. Refer to Section 4.3 "Non-Levee Flood Protection Measures" of this FIS Report for information on flood control structures for this jurisdiction.

PROJECTION INFORMATION: The projection used in the preparation of the map was State Plane Lambert Conformal Conic, Virginia South Zone 4502. The horizontal datum was the North American Datum of 1983 NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These

Figure 2. FIRM Notes to Users (continued)

differences do not affect the accuracy of the FIRM.

ELEVATION DATUM: Flood elevations on the FIRM are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at www.ngs.noaa.gov.

Local vertical monuments may have been used to create the map. To obtain current monument information, please contact the appropriate local community listed in Table 30 of this FIS Report.

BASE MAP INFORMATION: Base map information shown on the FIRM was provided by the United States Geological Survey (USGS). The following panels used base map information provided by the USGS that was derived from digital orthophotography at a 2-foot resolution, dated 2010. For information about base maps, refer to Section 6.2 “Base Map” in this FIS Report.

The map reflects more detailed and up-to-date stream channel configurations than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables may reflect stream channel distances that differ from what is shown on the map.

Corporate limits shown on the map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after the map was published, map users should contact appropriate community officials to verify current corporate limit locations.

NOTES FOR FIRM INDEX

REVISIONS TO INDEX: As new studies are performed and FIRM panels are updated within the City of Petersburg, Virginia, corresponding revisions to the FIRM Index will be incorporated within the FIS Report to reflect the effective dates of those panels. Please refer to Table 27 of this FIS Report to determine the most recent FIRM revision date for each community. The most recent FIRM panel effective date will correspond to the most recent index date.

Figure 2. FIRM Notes to Users (continued)

SPECIAL NOTES FOR SPECIFIC FIRM PANELS

This Notes to Users section was created specifically for the City of Petersburg, Virginia, effective December 15, 2022.

FLOOD RISK REPORT: A Flood Risk Report (FRR) may be available for many of the flooding sources and communities referenced in this FIS Report. The FRR is provided to increase public awareness of flood risk by helping communities identify the areas within their jurisdictions that have the greatest risks. Although non-regulatory, the information provided within the FRR can assist communities in assessing and evaluating mitigation opportunities to reduce these risks. It can also be used by communities developing or updating flood risk mitigation plans. These plans allow communities to identify and evaluate opportunities to reduce potential loss of life and property. However, the FRR is not intended to be the final authoritative source of all flood risk data for a project area; rather, it should be used with other data sources to paint a comprehensive picture of flood risk.

Each FIRM panel contains an abbreviated legend for the features shown on the maps. However, the FIRM panel does not contain enough space to show the legend for all map features. Figure 3 shows the full legend of all map features. Note that not all of these features may appear on the FIRM panels in the City of Petersburg.

Figure 3: Map Legend for FIRM

SPECIAL FLOOD HAZARD AREAS: The 1% annual chance flood, also known as the base flood or 100-year flood, has a 1% chance of happening or being exceeded each year. Special Flood Hazard Areas are subject to flooding by the 1% annual chance flood. The Base Flood Elevation is the water surface elevation of the 1% annual chance flood. The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights. See note for specific types. If the floodway is too narrow to be shown, a note is shown.

	Special Flood Hazard Areas subject to inundation by the 1% annual chance flood (Zones A, AE, AH, AO, AR, A99, V and VE)
Zone A	The flood insurance rate zone that corresponds to the 1% annual chance floodplains. No base (1% annual chance) flood elevations (BFEs) or depths are shown within this zone.
Zone AE	The flood insurance rate zone that corresponds to the 1% annual chance floodplains. Base flood elevations derived from the hydraulic analyses are shown within this zone.
Zone AH	The flood insurance rate zone that corresponds to the areas of 1% annual chance shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot BFEs derived from the hydraulic analyses are shown at selected intervals within this zone.
Zone AO	The flood insurance rate zone that corresponds to the areas of 1% annual chance shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average whole-foot depths derived from the hydraulic analyses are shown within this zone.
Zone AR	The flood insurance rate zone that corresponds to areas that were formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
Zone A99	The flood insurance rate zone that corresponds to areas of the 1% annual chance floodplain that will be protected by a Federal flood protection system where construction has reached specified statutory milestones. No base flood elevations or flood depths are shown within this zone.
Zone V	The flood insurance rate zone that corresponds to the 1% annual chance coastal floodplains that have additional hazards associated with storm waves. Base flood elevations are not shown within this zone.
Zone VE	Zone VE is the flood insurance rate zone that corresponds to the 1% annual chance coastal floodplains that have additional hazards associated with storm waves. Base flood elevations derived from the coastal analyses are shown within this zone as static whole-foot elevations that apply throughout the zone.
	Regulatory Floodway determined in Zone AE.

Figure 3: Map Legend for FIRM (continued)

OTHER AREAS OF FLOOD HAZARD

Shaded Zone X: Areas of 0.2% annual chance flood hazards and areas of 1% annual chance flood hazards with average depths of less than 1 foot or with drainage areas less than 1 square mile.

Future Conditions 1% Annual Chance Flood Hazard – Zone X: The flood insurance rate zone that corresponds to the 1% annual chance floodplains that are determined based on future-conditions hydrology. No base flood elevations or flood depths are shown within this zone.

Area with Reduced Flood Risk due to Levee: Areas where an accredited levee, dike, or other flood control structure has reduced the flood risk from the 1% annual chance flood.

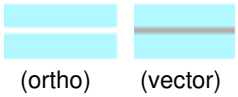
Area with Flood Risk due to Levee: Areas where a non-accredited levee, dike, or other flood control structure is shown as providing protection to less than the 1% annual chance flood.

OTHER AREAS

Zone D (Areas of Undetermined Flood Hazard): The flood insurance rate zone that corresponds to unstudied areas where flood hazards are undetermined, but possible.

Unshaded Zone X: Areas of minimal flood hazard.

FLOOD HAZARD AND OTHER BOUNDARY LINES



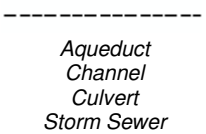
Flood Zone Boundary (white line on ortho-photography-based mapping; gray line on vector-based mapping)

Limit of Study

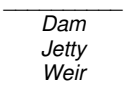
Jurisdiction Boundary

Limit of Moderate Wave Action (LiMWA): Indicates the inland limit of the area affected by waves greater than 1.5 feet

GENERAL STRUCTURES

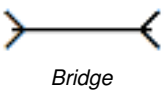


Channel, Culvert, Aqueduct, or Storm Sewer



Dam, Jetty, Weir

Levee, Dike, or Floodwall



Bridge

Figure 3: Map Legend for FIRM (continued)

REFERENCE MARKERS	
22.0	River mile Markers
CROSS SECTION & TRANSECT INFORMATION	
B 20.2	Lettered Cross Section with Regulatory Water Surface Elevation (BFE)
5280 21.1	Numbered Cross Section with Regulatory Water Surface Elevation (BFE)
17.5	Unlettered Cross Section with Regulatory Water Surface Elevation (BFE)
8	Coastal Transect
	Profile Baseline: Indicates the modeled flow path of a stream and is shown on FIRM panels for all valid studies with profiles or otherwise established base flood elevation.
	Coastal Transect Baseline: Used in the coastal flood hazard model to represent the 0.0-foot elevation contour and the starting point for the transect and the measuring point for the coastal mapping.
513	Base Flood Elevation Line
ZONE AE (EL 16)	Static Base Flood Elevation value (shown under zone label)
ZONE AO (DEPTH 2)	Zone designation with Depth
ZONE AO (DEPTH 2) (VEL 15 FPS)	Zone designation with Depth and Velocity
BASE MAP FEATURES	
Missouri Creek	River, Stream or Other Hydrographic Feature
234	Interstate Highway
234	U.S. Highway
234	State Highway
234	County Highway
MAPLE LANE	Street, Road, Avenue Name, or Private Drive if shown on Flood Profile
RAILROAD	Railroad

Figure 3: Map Legend for FIRM (continued)

_____	Horizontal Reference Grid Line
___	Horizontal Reference Grid Ticks
+	Secondary Grid Crosshairs
Land Grant	Name of Land Grant
7	Section Number
R. 43 W. T. 22 N.	Range, Township Number
^{42}**76**^{000m}**E**	Horizontal Reference Grid Coordinates (UTM)
365000 FT	Horizontal Reference Grid Coordinates (State Plane)
80° 16' 52.5"	Corner Coordinates (Latitude, Longitude)

SECTION 2.0 – FLOODPLAIN MANAGEMENT APPLICATIONS

2.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1-percent-annual-chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent-annual-chance (500-year) flood is employed to indicate additional areas of flood hazard in the community.

Each flooding source included in the project scope has been studied and mapped using professional engineering and mapping methodologies that were agreed upon by FEMA and the City of Petersburg as appropriate to the risk level. Flood risk is evaluated based on factors such as known flood hazards and projected impact on the built environment. Engineering analyses were performed for each studied flooding source to calculate its 1-percent-annual-chance flood elevations; elevations corresponding to other floods (e.g. 10-, 4-, 2-, 0.2-percent annual chance, etc.) may have also been computed for certain flooding sources. Engineering models and methods are described in detail in Section 5.0 of this FIS Report. The modeled elevations at cross sections were used to delineate the floodplain boundaries on the FIRM; between cross sections, the boundaries were interpolated using elevation data from various sources. More information on specific mapping methods is provided in Section 6.0 of this FIS Report.

Depending on the accuracy of available topographic data (Table 22), study methodologies employed (Section 5.0), and flood risk, certain flooding sources may be mapped to show both the 1-percent and 0.2-percent-annual-chance floodplain boundaries, regulatory water surface elevations (BFEs), and/or a regulatory floodway. Similarly, other flooding sources may be mapped to show only the 1-percent-annual-chance floodplain boundary on the FIRM, without published water surface elevations. In cases where the 1-percent and 0.2-percent-annual-chance floodplain boundaries are close together, only the 1-percent-annual-chance floodplain boundary is shown on the FIRM. Figure 3, “Map Legend for FIRM”, describes the flood zones that are used on the FIRMs to account for the varying levels of flood risk that exist along flooding sources within the project area. Table 2 and Table 3 indicate the flood zone designations for each flooding source and each community within the City of Petersburg, respectively.

Table 2, “Flooding Sources Included in this FIS Report,” lists each flooding source, including its study limits, affected communities, mapped zone on the FIRM, and the completion date of its engineering analysis from which the flood elevations on the FIRM and in the FIS Report were derived. Descriptions and dates for the latest hydrologic and hydraulic analyses of the flooding sources are shown in Table 12. Floodplain boundaries for these flooding sources are shown on the FIRM (published separately) using the symbology described in Figure 3. On the map, the 1-percent-annual-chance floodplain corresponds to the SFHAs. The 0.2-percent-annual-chance floodplain shows areas that, although out of the regulatory floodplain, are still subject to flood hazards.

Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data. The procedures to remove these areas from the SFHA are described in Section 6.5 of this FIS Report.

Table 2: Flooding Sources Included in this FIS Report

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
All Zone A Streams and Tributaries in HUC 02080207	Petersburg, City of	Various	Various	02080207	10.3	N	A	07/31/2019
All Zone A Streams and Tributaries in HUC 03010202	Petersburg, City of	Various	Various	03010202	4.0	N	A	07/31/2019
Appomattox River	Petersburg, City of	Approximately 3,000 feet downstream of Interstate 95	Approximately 0.5 miles upstream of confluence with Rohoic Creek	02080207	4.5	Y	AE	03/25/2020
Appomattox River Navigation Channel	Petersburg, City of	Convergence with the Appomattox River approximately 0.7 miles downstream of Interstate 95	Divergence from the Appomattox River approximately 200 feet downstream of U.S. Route 1	02080207	1.2	Y	AE	03/25/2020
Blackwater Swamp	Petersburg, City of	Approximately 500 feet downstream of U.S. Highway 460	Approximately 250 feet downstream of Retnag Road	03010202	3.5	Y	AE	03/25/2020
Brickhouse Run	Petersburg, City of	At confluence with Appomattox River	Approximately 370 feet downstream of Darby Drive	02080207	3.2	Y	AE	03/25/2020
Brickhouse Run Overland	Petersburg, City of	At Brown Street	Approximately 150 feet upstream of S South Street	02080207	0.2	Y	AE	03/25/2020
Harrison Creek	Petersburg, City of	At confluence with Appomattox River	Approximately 1,640 feet upstream of East Washington Street	02080207	1.4	Y	AE	03/25/2020

Table 2: Flooding Sources Included in this FIS Report (continued)

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Lieutenant Run	Petersburg, City of	At confluence with Appomattox River Navigation Channel	Approximately 1,300 feet upstream of Baylors Lane	02080207	3.1	Y	AE	03/25/2020
Poor Creek	Petersburg, City of	At confluence with Appomattox River Navigation Channel	Approximately 320 feet upstream of Pine Oak Drive	02080207	1.2	Y	AE	03/25/2020
Rohoic Creek	Petersburg, City of	At confluence with Appomattox River	Approximately 60 feet upstream of Boydton Plank Road	02080207	2.5	Y	AE	03/25/2020
Unnamed Tributary 1 to Blackwater Swamp	Petersburg, City of	At confluence with Blackwater Swamp	Approximately 500 feet upstream of U.S. Highway 301	03010202	0.8	Y	AE	03/25/2020
Unnamed Tributary 2 to Blackwater Swamp	Petersburg, City of	At Norfolk Southern Railroad	Approximately 1,200 feet upstream of Norfolk Southern Railroad	03010202	0.3	N	AE	03/25/2020

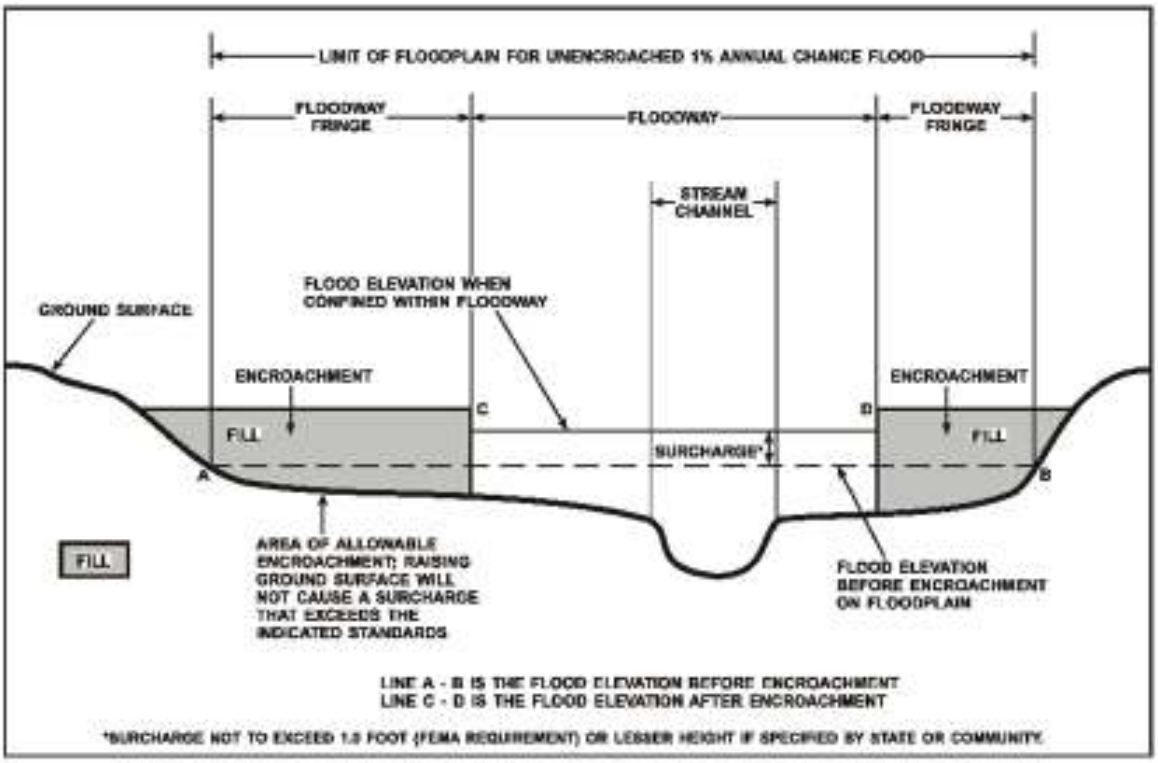
2.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard.

For purposes of the NFIP, a floodway is used as a tool to assist local communities in balancing floodplain development against increasing flood hazard. With this approach, the area of the 1-percent-annual-chance floodplain on a river is divided into a floodway and a floodway fringe based on hydraulic modeling. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment in order to carry the 1-percent-annual-chance flood. The floodway fringe is the area between the floodway and the 1-percent-annual-chance floodplain boundaries where encroachment is permitted. The floodway must be wide enough so that the floodway fringe could be completely obstructed without increasing the water surface elevation of the 1-percent-annual-chance flood more than 1 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 4.

To participate in the NFIP, Federal regulations require communities to limit increases caused by encroachment to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this project are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway projects.

Figure 4: Floodway Schematic



Floodway widths presented in this FIS Report and on the FIRM were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. For certain stream segments, floodways were adjusted so that the amount of floodwaters conveyed on each side of the floodplain would be reduced equally. The results of the floodway computations have been tabulated for selected cross sections and are shown in Table 23, "Floodway Data."

All floodways that were developed for this Flood Risk Project are shown on the FIRM using the symbology described in Figure 3. In cases where the floodway and 1-percent-annual-chance floodplain boundaries are either close together or collinear, only the floodway boundary has been shown on the FIRM. For information about the delineation of floodways on the FIRM, refer to Section 6.3.

2.3 Base Flood Elevations

The hydraulic characteristics of flooding sources were analyzed to provide estimates of the elevations of floods of the selected recurrence intervals. The BFE is the elevation of the 1-percent-annual-chance flood. These BFEs are most commonly rounded to the whole foot, as shown on the FIRM, but in certain circumstances or locations they may be rounded to 0.1 foot. Cross section lines shown on the FIRM may also be labeled with the BFE rounded to 0.1 foot. Whole-foot BFEs derived from engineering analyses that apply to coastal areas, areas of ponding, or other static areas with little elevation change may also be shown at selected intervals on the FIRM.

BFEs are primarily intended for flood insurance rating purposes. Cross sections with BFEs shown on the FIRM correspond to the cross sections shown in the Floodway Data table and Flood Profiles in this FIS Report. For construction and/or floodplain management purposes, users are cautioned to use the flood elevation data presented in this FIS Report in conjunction with the data shown on the FIRM. For example, the user may use the FIRM to determine the stream station of a location of interest and then use the profile to determine the 1-percent annual chance elevation at that location. Because only selected cross sections may be shown on the FIRM for riverine areas, the profile should be used to obtain the flood elevation between mapped cross sections. Additionally, for riverine areas, whole-foot elevations shown on the FIRM may not exactly reflect the elevations derived from the hydraulic analyses; therefore, elevations obtained from the profile may more accurately reflect the results of the hydraulic analysis.

2.4 Non-Encroachment Zones

This section is not applicable to this Flood Risk Project.

2.5 Coastal Flood Hazard Areas

This section is not applicable to this Flood Risk Project.

2.5.1 Water Elevations and the Effects of Waves

This section is not applicable to this Flood Risk Project.

Figure 5: Wave Runup Transect Schematic

[Not applicable to this Flood Risk Project.]

2.5.2 Floodplain Boundaries and BFEs for Coastal Areas

This section is not applicable to this Flood Risk Project.

2.5.3 Coastal High Hazard Areas

This section is not applicable to this Flood Risk Project.

Figure 6: Coastal Transect Schematic

[Not applicable to this Flood Risk Project.]

2.5.4 Limit of Moderate Wave Action

This section is not applicable to this Flood Risk Project.

SECTION 3.0 – INSURANCE APPLICATIONS

3.1 National Flood Insurance Program Insurance Zones

For flood insurance applications, the FIRM designates flood insurance rate zones as described in Figure 3, “Map Legend for FIRM.” Flood insurance zone designations are assigned to flooding sources based on the results of the hydraulic or coastal analyses. Insurance agents use the zones shown on the FIRM and depths and base flood elevations in this FIS Report in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

The 1-percent-annual-chance floodplain boundary corresponds to the boundary of the areas of special flood hazards (e.g. Zones A, AE, V, VE, etc.), and the 0.2-percent-annual-chance floodplain boundary corresponds to the boundary of areas of additional flood hazards.

Table 3 lists the flood insurance zones in the City of Petersburg.

Table 3: Flood Zone Designations by Community

Community	Flood Zone(s)
Petersburg, City of	A, AE, X

SECTION 4.0 – AREA STUDIED

4.1 Basin Description

Table 4 contains a description of the characteristics of the HUC-8 sub-basins within which each community falls. The table includes the main flooding sources within each basin, a

brief description of the basin, and its drainage area.

Table 4: Basin Characteristics

HUC-8 Sub-Basin Name	HUC-8 Sub-Basin Number	Primary Flooding Source	Description of Affected Area	Drainage Area (square miles)
Appomattox	02080207	Appomattox River	Drains the northwestern two-thirds of the City of Petersburg.	1,610
Blackwater	03010202	Blackwater River	Drains the southeastern third of the City of Petersburg.	740
Nottoway	03010201	Nottoway River	Drains a small southwestern portion of the City of Petersburg.	1,723

4.2 Principal Flood Problems

Table 5 contains a description of the principal flood problems that have been noted for the City of Petersburg by flooding source.

Table 5: Principal Flood Problems

Flooding Source	Description of Flood Problems
Appomattox River	The Appomattox River is the source of most major flood problems in the City of Petersburg. The Appomattox River can flood any time of the year, typically from prolonged winter and spring storms or tropical storms that pass overthe area in late summer and fall. Due to the hydrologic nature of the Appomattox River drainage basin, flood events typically last for several days. Three of the five largest floods in Petersburg were recorded between October 1971- 1972. Petersburg recorded highest peaks (cfs) of 40,800,28,000,22,800,21,100,18,800 in 1972,1940,1971,1970,1937 with recurrence intervals of 110,40,25,20 and 15 years respectively (FIS 2011)
Blackwater Swamp	Major flooding along Blackwater Swamp has been the result of summer thunderstorms, hurricanes, and snowmelt. (FIS 2011)
Brickhouse Run, Harrison Creek, Lieutenant Run, Poor Creek, and Rohoic Creek	Downstream sections of these reaches are impacted by the backwater from Appomattox river and susceptible to flooding. Brickhouse and Lieutenant Run flow through highly urban areas, while Harrison Poor and Rohoic Creek flow through commercial/industrial development and many of their structures are inadequate and creating ponding. (FIS 2011)

Table 6 contains information about historic flood elevations in the communities within the City of Petersburg.

Table 6: Historic Flooding Elevations

[Not applicable to this Flood Risk Project.]

4.3 Non-Levee Flood Protection Measures

Table 7 contains information about non-levee flood protection measures within the City of Petersburg such as dams, jetties, and or dikes. Levees are addressed in Section 4.4 of this FIS Report.

Table 7: Non-Levee Flood Protection Measures

[Not applicable to this Flood Risk Project.]

4.4 Levees

This section is not applicable to this Flood Risk Project.

Table 8: Levees

[Not applicable to this Flood Risk Project.]

SECTION 5.0 – ENGINEERING METHODS

For the flooding sources in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that are expected to be equaled or exceeded at least once on the average during any 10-, 25-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 25-, 50-, 100-, and 500-year floods, have a 10-, 4-, 2-, 1-, and 0.2-percent-annual-chance, respectively, of being equaled or exceeded during any year.

Although the recurrence interval represents the long-term, average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood that equals or exceeds the 100-year flood (1-percent chance of annual exceedance) during the term of a 30-year mortgage is approximately 26 percent (about 3 in 10); for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

In addition to these flood events, the “1-percent-plus”, or “1%+”, annual chance flood elevation has been modeled and included on the flood profile for certain flooding sources in this FIS Report. While not used for regulatory or insurance purposes, this flood event has been calculated to help illustrate the variability range that exists between the regulatory 1-percent-annual-chance flood elevation and a 1-percent-annual-chance elevation that has taken into account an additional amount of uncertainty in the flood discharges (thus, the 1% “plus”). For flooding sources whose discharges were estimated using regression equations, the 1%+ flood elevations are derived by taking the 1-percent-annual-chance flood discharges and increasing the modeled discharges by a percentage equal to the average predictive error for the regression equation. For flooding sources with

gage- or rainfall-runoff-based discharge estimates, the upper 84-percent confidence limit of the discharges is used to compute the 1%+ flood elevations.

5.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak elevation-frequency relationships for floods of the selected recurrence intervals for each flooding source studied. Hydrologic analyses are typically performed at the watershed level. Depending on factors such as watershed size and shape, land use and urbanization, and natural or man-made storage, various models or methodologies may be applied. A summary of the hydrologic methods applied to develop the discharges used in the hydraulic analyses for each stream is provided in Table 12. Greater detail (including assumptions, analysis, and results) is available in the archived project documentation.

A summary of the discharges is provided in Table 9. Note: Discharges for flooding sources designated as Zone A on the FIRM are not shown in Table 9 of this FIS report, however, discharge values are included in the FIRM database in the S_NODES and L_SUMMARY_DISCHARGES feature classes. Stream gage information is provided in Table 11.

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Appomattox River	Upstream of the confluence with Brickhouse Run	1,357	19,707	26,101	31,503	37,462	53,881
Appomattox River	Upstream of the confluence with Fleets Branch	1,356	19,690	26,078	31,475	37,429	53,834
Appomattox River	Upstream of the confluence with Rohoic Creek	1,345	19,525	25,859	31,212	37,115	53,382
Blackwater Swamp	Approximately 1,000 feet upstream of County Road	4.8	590	809	831	1,172	1,616
Blackwater Swamp	Approximately 1,800 feet downstream of Country Drive	2.9	850	1,231	1,246	1,880	2,723
Blackwater Swamp	Upstream of Wagner Road	1.8	492	717	722	1,094	1,580
Brickhouse Run	At the confluence with Appomattox River	2.3	1,711	2,328	2,910	3,536	5,186
Brickhouse Run	Approximately 700 feet upstream of S West St	1.2	638	847	1,035	1,242	1,804
Brickhouse Run	Approximately 550 feet upstream of Elm Street	0.4	336	477	567	709	1,092
Harrison Creek	At the confluence with Appomattox River	2.9	782	1,119	1,368	1,634	2,228
Harrison Creek	Upstream of Norfolk Southern Railroad	1.8	332	562	770	1,004	1,504
Harrison Creek	Downstream of Hickory Hill Road	0.6	226	354	464	586	898

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Lieutenant Run	At the confluence with Appomattox River Navigation Channel	5.6	2,525	3,197	3,637	4,079	5,091
Lieutenant Run	Upstream of Johnson Road	3.3	1,046	1,495	1,919	2,407	3,711
Lieutenant Run	Downstream of East Washington Street	5.3	2,252	2,874	3,281	3,662	4,367
Poor Creek	At the confluence with Appomattox River Navigation Channel	2.6	1,075	1,189	1,276	1,449	1,863
Poor Creek	At East Washington Street	2.4	1,572	2,266	2,912	3,635	5,194
Poor Creek	Approximately 5,000 feet upstream of East Washington Street	1.9	1,643	2,378	3,040	3,750	4,907
Rohoic Creek	At the confluence with Appomattox River	9.6	1,792	2,636	3,383	4,267	8,571
Rohoic Creek	Upstream of Cattail Creek	4.9	990	1,475	1,929	2,405	4,550
Rohoic Creek	Upstream of Route 142	3.9	805	1,208	1,591	1,974	3,688

Figure 7: Frequency Discharge-Drainage Area Curves

[Not applicable to this Flood Risk Project.]

Table 10: Summary of Non-Coastal Stillwater Elevations

Flooding Source	Location	Elevations (feet NAVD 88)				
		10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Unnamed tributary 2 to Blackwater Swamp	Upstream of Norfolk Southern Railroad	140.1	140.5	140.5	141.2	142

Table 11: Stream Gage Information used to Determine Discharges

Flooding Source	Gage Identifier	Agency that Maintains Gage	Site Name	Drainage Area (Square Miles)	Period of Record	
					From	To
Appomattox River	02041650	USGS	Appomattox River at Matoaca	1,342	04/04/1970	12/26/2015

5.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals. Base flood elevations on the FIRM represent the elevations shown on the Flood Profiles and in the Floodway Data tables in the FIS Report. Rounded whole-foot elevations may be shown on the FIRM in coastal areas, areas of ponding, and other areas with static base flood elevations. These whole-foot elevations may not exactly reflect the elevations derived from the hydraulic analyses. Flood elevations shown on the FIRM are primarily intended for flood insurance rating purposes. For construction and/or floodplain management purposes, users are cautioned to use the flood elevation data presented in this FIS Report in conjunction with the data shown on the FIRM. The hydraulic analyses for this FIS were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

For streams for which hydraulic analyses were based on cross sections, locations of selected cross sections are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 6.3), selected cross sections are also listed in Table 23, “Floodway Data.”

A summary of the methods used in hydraulic analyses performed for this project is provided in Table 12. Roughness coefficients are provided in Table 13. Roughness coefficients are values representing the frictional resistance water experiences when passing overland or through a channel. They are used in the calculations to determine water surface elevations. Greater detail (including assumptions, analysis, and results) is available in the archived project documentation.

Table 12: Summary of Hydrologic and Hydraulic Analyses

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
All Zone A Streams and Tributaries in HUC 02080207	Various	Various	Regression Equations	HEC-RAS 5.0.5	07/31/2019	A	Effects of hydraulic structures were not considered in the model.
All Zone A Streams and Tributaries in HUC 03010202	Various	Various	Regression Equations	HEC-RAS 5.0.5	07/31/2019	A	Effects of hydraulic structures were not considered in the model.
Appomattox River	Approximately 3,000 feet downstream of Interstate 95	Approximately 0.5 miles upstream of confluence with Rohoic Creek	Regression Equations	HEC-RAS 5.0.5	03/25/2020	AE w/ Floodway	Gage No. 02041650 was used in hydrologic analysis. Hydraulic models incorporated field measured bridge and culvert data. Modeling incorporates split flow through Interstate 95.
Appomattox River Navigation Channel	Convergence with the Appomattox River approximately 0.7 miles downstream of Interstate 95	Divergence from the Appomattox River approximately 200 feet downstream of U.S. Route 1	Regression Equations	HEC-RAS 5.0.5	03/25/2020	AE w/ Floodway	Gage No. 02041650 was used in hydrologic analysis. Hydraulic models incorporated field measured bridge and culvert data. Modeling incorporates split flow through Interstate 95.
Blackwater Swamp	Approximately 500 feet downstream of U.S. Highway 460	Approximately 250 feet downstream of Retnag Road	HEC-HMS 4.3	HEC-RAS 5.0.5	03/25/2020	AE w/ Floodway	Hydraulic model incorporated field measured bridge and culvert data.
Brickhouse Run	At confluence with Appomattox River	Approximately 370 feet downstream of Darby Drive	HEC-HMS 4.3	HEC-RAS 5.0.5	03/25/2020	AE w/ Floodway	Hydraulics models incorporated field measured bridge and culvert data. A culvert extends from S. South Street to Brown Street. The overland flow for this reach has been modeled separately.
Brickhouse Run Overland	At Brown Street	Approximately 150 feet upstream of S. South Street	HEC-HMS 4.3	HEC-RAS 5.0.5	03/25/2020	AE w/ Floodway	A culvert extends from S. South Street to Brown Street. The overland flow for this reach has been modeled separately.
Harrison Creek	At confluence with Appomattox River	Approximately 1,640 feet upstream of East Washington Street	HEC-HMS 4.3	HEC-RAS 5.0.5	03/25/2020	AE w/ Floodway	Hydraulic model incorporated field measured bridge and culvert data.

Table 12: Summary of Hydrologic and Hydraulic Analyses (continued)

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Lieutenant Run	At confluence with Appomattox River Navigation Channel	Approximately 1,300 feet upstream of Baylors Lane	HEC-HMS 4.3	HEC-RAS 5.0.5	03/25/2020	AE w/ Floodway	Hydraulic model incorporated field measured bridge and culvert data.
Poor Creek	At confluence with Appomattox River Navigation Channel	Approximately 320 feet upstream of Pine Oak Drive	HEC-HMS 4.3	HEC-RAS 5.0.5	03/25/2020	AE w/ Floodway	Hydraulic model incorporated field measured bridge and culvert data.
Rohoic Creek	At confluence with Appomattox River	Approximately 60 feet upstream of Boydton Plank Road	Regression Equations	HEC-RAS 5.0.5	03/25/2020	AE w/ Floodway	Hydraulic model incorporated field measured bridge and culvert data.
Unnamed Tributary 1 to Blackwater Swamp	At confluence with Blackwater Swamp	Approximately 500 feet upstream of U.S. Highway 301	HEC-HMS 4.3	HEC-RAS 5.0.5	03/25/2020	AE w/ Floodway	Hydraulic model incorporated field measured bridge and culvert data.
Unnamed Tributary 2 to Blackwater Swamp	At Norfolk Southern Railroad	Approximately 1,200 feet upstream of Norfolk Southern Railroad	HEC-HMS 4.3	N/A	03/25/2020	AE	Static elevation mapped based on the hydrologic analysis of the storage area.

Table 13: Roughness Coefficients

Flooding Source	Channel “n”	Overbank “n”
Appomattox River	0.045 - 0.055	0.045 - 0.120
Appomattox River Navigation Channel	0.045 - 0.055	0.045 - 0.120
Blackwater Swamp	0.045 - 0.050	0.040 - 0.082
Brickhouse Run	0.035 - 0.045	0.035 - 0.120
Brickhouse Run Overland Flow	0.048 - 0.100	0.048 - 0.100
Harrison Creek	0.040	0.060 - 0.100
Lieutenant Run	0.040 - 0.045	0.060 - 0.120
Poor Creek	0.040	0.055 - 0.080
Rohoic Creek	0.045 - 0.050	0.040 - 0.120

5.3 Coastal Analyses

This section is not applicable to this Flood Risk Project.

Table 14: Summary of Coastal Analyses
[Not applicable to this Flood Risk Project.]

5.3.1 Total Stillwater Elevations

This section is not applicable to this Flood Risk Project.

Figure 8: 1% Annual Chance Total Stillwater Elevations for Coastal Areas
[Not applicable to this Flood Risk Project.]

Table 15: Tide Gage Analysis Specifics
[Not applicable to this Flood Risk Project.]

5.3.2 Waves

This section is not applicable to this Flood Risk Project.

5.3.3 Coastal Erosion

This section is not applicable to this Flood Risk Project.

5.3.4 Wave Hazard Analyses

This section is not applicable to this Flood Risk Project.

Table 16: Coastal Transect Parameters

[Not applicable to this Flood Risk Project.]

Figure 9: Transect Location Map

[Not applicable to this Flood Risk Project.]

5.4 Alluvial Fan Analyses

This section is not applicable to this Flood Risk Project.

Table 17: Summary of Alluvial Fan Analyses

[Not applicable to this Flood Risk Project.]

Table 18: Results of Alluvial Fan Analyses

[Not applicable to this Flood Risk Project.]

SECTION 6.0 – MAPPING METHODS

6.1 Vertical and Horizontal Control

All FIS Reports and FIRMs are referenced to a specific vertical datum. The vertical datum provides a starting point against which flood, ground, and structure elevations can be referenced and compared. Until recently, the standard vertical datum used for newly created or revised FIS Reports and FIRMs was the National Geodetic Vertical Datum of 1929 (NGVD29). With the completion of the North American Vertical Datum of 1988 (NAVD88), many FIS Reports and FIRMs are now prepared using NAVD88 as the referenced vertical datum.

Flood elevations shown in this FIS Report and on the FIRMs are referenced to NAVD88. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between NGVD29 and NAVD88 or other datum conversion, visit the National Geodetic Survey website at www.ngs.noaa.gov.

Temporary vertical monuments are often established during the preparation of a flood hazard analysis for the purpose of establishing local vertical control. Although these monuments are not shown on the FIRM, they may be found in the archived project documentation associated with the FIS Report and the FIRMs for this community. Interested individuals may contact FEMA to access these data.

To obtain current elevation, description, and/or location information for benchmarks in the area, please visit the NGS website at www.ngs.noaa.gov.

The datum conversion locations and values that were calculated for the City of Petersburg are provided in Table 19.

Table 19: Vertical Datum Conversion

Quadrangle Name	Quadrangle Corner	Latitude	Longitude	Conversion
Carson	NE	37.125	-77.375	-1.122
Charles City	SE	37.250	-77.000	-0.990
Charles City	VA	37.250	-77.000	-0.990
Disputanta North	NE	37.250	-77.125	-1.132
Petersburg	NE	37.250	-77.375	-1.168
Petersburg	NE	37.250	-77.375	-1.168
Petersburg	NE	37.250	-77.375	-1.168
Prince George	NE	37.250	-77.250	-1.158
Prince George	NE	37.250	-77.250	-1.158
Savedge	NE	37.250	-77.000	-0.991
Templeton	NE	37.125	-77.250	-1.099
Average Conversion from NGVD29 to NAVD88 = -1.104 Feet				

Table 20: Stream-Based Vertical Datum Conversion

[Not applicable to this Flood Risk Project.]

6.2 Base Map

The FIRMs and FIS Report for this project have been produced in a digital format. The flood hazard information was converted to a Geographic Information System (GIS) format that meets FEMA's FIRM Database specifications and geographic information standards. This information is provided in a digital format so that it can be incorporated into a local GIS and be accessed more easily by the community. The FIRM Database includes most of the tabular information contained in the FIS Report in such a way that the data can be associated with pertinent spatial features. For example, the information contained in the Floodway Data table and Flood Profiles can be linked to the cross sections that are shown on the FIRMs. Additional information about the FIRM Database and its contents can be found in FEMA's *Guidelines and Standards for Flood Risk Analysis and Mapping*, www.fema.gov/media-library/resources-documents/collections/361.

Base map information shown on the FIRM was derived from the sources described in Table 21.

Table 21: Base Map Sources

Data Type	Data Provider	Data Date	Data Scale	Data Description
City of Petersburg Ortho Imagery	USDA FSA Aerial Photography Field Office	2016	N/A	NAIP Ortho Imagery for City of Petersburg, VA (USDA 2016)

Data Type	Data Provider	Data Date	Data Scale	Data Description
NHD Data	United States Geological Survey	2017	N/A	NHD data for City of Petersburg, VA (USGS 2017)
TIGER Roads and Rail Data	U.S. Census Bureau	2016	N/A	Road and Rail data for City of Petersburg, VA (U.S. Census 2016)
Virginia Administrative Boundaries	Virginia Geographic Information Network	2018	N/A	VGIN City of Petersburg, VA boundary (VGIN 2018)

6.3 Floodplain and Floodway Delineation

The FIRM shows tints, screens, and symbols to indicate floodplains and floodways as well as the locations of selected cross sections used in the hydraulic analyses and floodway computations.

For riverine flooding sources, the mapped floodplain boundaries shown on the FIRM have been delineated using the flood elevations determined at each cross section; between cross sections, the boundaries were interpolated using the topographic elevation data described in Table 22.

In cases where the 1-percent and 0.2-percent-annual-chance floodplain boundaries are close together, only the 1-percent-annual-chance floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

The floodway widths presented in this FIS Report and on the FIRM were computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. Table 2 indicates the flooding sources for which floodways have been determined. The results of the floodway computations for those flooding sources have been tabulated for selected cross sections and are shown in Table 23, “Floodway Data.”

Table 22: Summary of Topographic Elevation Data used in Mapping

Community	Flooding Source	Source for Topographic Elevation Data			
		Description	Vertical Accuracy	Horizontal Accuracy	Citation
Petersburg, City of	All flooding sources in City of Petersburg	USGS VA NRCS SANDY 2014 United States Geological Survey	18.7 cm CVA	N/A	USGS 2014

BFEs shown at cross sections on the FIRM represent the 1-percent-annual-chance water surface elevations shown on the Flood Profiles and in the Floodway Data tables in the FIS Report.

Table 23: Floodway Data

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH[3] (Feet)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET / SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	54,787	1,080/116	14,824	2.5	14.6	14.6	14.8	0.2
B[2]	58,550	247/0	4,989	4.9	15.3	15.3	15.3	0.0
C	60,934	238/0	4,368	5.6	16.3	16.3	16.6	0.3
D	63,227	527/375	7,559	5.0	17.3	17.3	17.8	0.5
E	65,531	538/489	8,640	4.3	19.5	19.5	19.9	0.4
F	66,773	248/238	2,630	14.2	26.4	26.4	27.4	1.0
G	67,046	376/229	6,696	5.6	35.2	35.2	36.1	0.9
H	69,078	570/426	6,105	6.1	38.1	38.1	38.4	0.3
I	72,340	706/307	6,650	5.6	44.5	44.5	44.6	0.1
J	74,804	655/362	6,189	6.0	50.6	50.6	50.8	0.2

[1] Feet Above Confluence With James River

[2] Cross section is outside of this community and is located in the City of Colonial Heights

[3] Total floodway width/width within jurisdiction

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, VIRGINIA

INDEPENDENT CITY

FLOODWAY DATA

FLOODING SOURCE: APPOMATTOX RIVER

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (Feet)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET / SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	1,943	361	6,040	2.2	15.3	15.3	15.4	0.1
B	4,684	272	4,029	3.4	15.8	15.8	15.8	0.0

[1] Stream Distance in Feet Above Confluence with Appomattox River

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY
CITY OF PETERSBURG, VIRGINIA
INDEPENDENT CITY

FLOODWAY DATA

FLOODING SOURCE: APPOMATTOX RIVER NAVIGATION CHANNEL

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (Feet)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET / SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	93,449	670	1,825	1.3	121.1	121.1	121.5	0.4
B	94,411	792	4,423	0.6	125.1	125.1	125.4	0.3
C	97,430	519	1,545	0.8	125.6	125.6	125.9	0.3
D	99,198	261	737	1.5	127.8	127.8	128.0	0.2
E	99,385	1,260	7,015	0.8	133.1	133.1	133.3	0.2
F	100,045	976	6,874	0.2	135.2	135.2	135.2	0.0
G	101,169	765	5,610	0.2	135.2	135.2	135.2	0.0
H	101,718	641	1,713	0.7	135.2	135.2	135.2	0.0
I	101,889	903	2,401	0.5	135.2	135.2	135.3	0.1
J	103,219	923	2,480	0.6	135.3	135.3	135.4	0.1
K	103,757	860	3,618	0.4	137.7	137.7	137.7	0.0
L	106,861	440	1,422	0.5	138.0	138.0	138.1	0.1
M	108,140	265	637	1.2	138.7	138.7	138.9	0.2
N	109,113	95	377	2.0	142.8	142.8	142.8	0.0
O	109,921	193	732	0.7	143.0	143.0	143.0	0.0
P	110,426	89	283	1.9	143.3	143.3	143.3	0.0
Q	111,247	30	103	5.1	145.8	145.8	146.0	0.2

[1] Feet Above Confluence With Blackwater River

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, VIRGINIA

INDEPENDENT CITY

FLOODWAY DATA

FLOODING SOURCE: BLACKWATER SWAMP

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (Feet)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET / SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	994	94	414	8.6	23.6	23.6	23.6	0.0
B	1,522	65	400	8.8	28.7	28.7	29.7	1.0
C	1,958	30	397	8.9	37.7	37.7	38.1	0.4
D	2,280	84	813	4.3	40.5	40.5	41.4	0.9
E	2,544	99	810	4.4	41.0	41.0	41.9	0.9
F	2,785	57	379	9.3	41.1	41.1	42.1	1.0
G	3,242	81	598	5.9	45.6	45.6	46.1	0.5
H	3,782	115	665	5.3	50.6	50.6	51.1	0.5
I	4,270	133	774	4.6	51.7	51.7	52.1	0.4
J	4,932	78	676	5.2	58.7	58.7	59.7	1.0
K	5,356	75	575	6.1	59.6	59.6	60.5	0.9
L	6,925	95	454	4.6	65.8	65.8	66.1	0.3
M	7,421	94	484	2.9	68.5	68.5	69.0	0.5
N	7,857	59	275	5.1	69.4	69.4	70.2	0.8
O	8,791	124	982	1.4	78.8	78.8	79.2	0.4
P	9,761	308	2,578	0.3	86.0	86.0	86.4	0.4
Q	10,895	185	1,079	0.8	89.0	89.0	89.4	0.4
R	11,760	45	172	1.8	89.6	89.6	89.8	0.2
S	12,573	478	1,564	0.3	94.7	94.7	94.7	0.0
T	13,291	50	159	4.4	96.5	96.5	96.6	0.1
U	13,576	65	233	3.0	98.4	98.4	99.1	0.7
V	14,259	76	214	3.3	102.6	102.6	103.5	0.9
W	14,833	65	119	6.0	107.2	107.2	107.4	0.2
X	16,226	25	122	5.8	120.5	120.5	120.8	0.3
Y	16,852	44	115	6.2	124.8	124.8	124.8	0.0

[1] Feet Above Confluence With Appomattox River

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, VIRGINIA

INDEPENDENT CITY

FLOODWAY DATA

FLOODING SOURCE: BRICKHOUSE RUN

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (Feet)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET / SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	263	190	900	1.6	61.2	61.2	61.7	0.5
B	680	145	231	6.3	63.3	63.3	63.4	0.1
C	1,060	135	562	2.6	65.1	65.1	65.6	0.5

[1] Feet Above Convergence With Brickhouse Run

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, VIRGINIA

INDEPENDENT CITY

FLOODWAY DATA

FLOODING SOURCE: BRICKHOUSE RUN OVERLAND

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH[2] (Feet)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET / SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	659	157/146	645	2.5	14.4	6.1[3]	6.3	0.2
B	1,914	55/16	214	7.6	14.7	14.7	15.5	0.8
C	2,494	31/15	221	5.5	21.0	21.0	21.2	0.2
D	2,978	250/62	2,300	0.5	25.7	25.7	26.0	0.3
E	3,694	305/133	2,032	0.6	25.7	25.7	26.1	0.4
F	4,240	245/209	1,131	0.9	25.9	25.9	26.2	0.3
G	4,711	218/32	1,205	0.8	31.2	31.2	31.2	0.0
H	5,815	130/12	453	2.2	32.7	32.7	32.8	0.1
I	6,536	80/13	285	3.5	36.1	36.1	36.9	0.8
J	7,200	151/0	447	2.2	38.6	38.6	39.2	0.6

[1] Feet Above Confluence with Appomattox River

[2] Total floodway width/width within jurisdiction

[3] Elevation Computed Without Consideration of Backwater Effects from Appomattox River

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, VIRGINIA

INDEPENDENT CITY

FLOODWAY DATA

FLOODING SOURCE: HARRISON CREEK

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (Feet)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET / SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	484	180	1,416	2.9	17.9	17.9	17.9	0.0
B	654	192	1,389	2.9	18.1	18.1	18.2	0.1
C	1,171	114	919	4.4	18.6	18.6	18.7	0.1
D	2,580	103	1,122	3.3	27.3	27.3	27.5	0.2
E	2,933	145	1,625	2.3	27.8	27.8	28.1	0.3
F	4,620	160	493	6.5	30.1	30.1	30.2	0.1
G	5,073	105	682	4.7	33.3	33.3	34.1	0.8
H	5,443	28	225	14.3	35.2	35.2	35.3	0.1
I	6,176	64	417	7.7	44.8	44.8	45.1	0.3
J	7,222	72	478	6.7	49.2	49.2	49.4	0.2
K	7,557	111	762	4.2	51.5	51.5	52.4	0.9
L	8,963	108	428	5.1	54.4	54.4	55.0	0.6
M	9,852	441	5,207	2.0	67.8	67.8	68.3	0.5
N	10,739	944	7,962	0.3	68.4	68.4	68.6	0.2
O	11,886	322	1,389	1.5	68.8	68.8	69.1	0.3
P	12,431	276	699	3.4	70.8	70.8	70.9	0.1
Q	13,346	179	850	1.6	83.7	83.7	83.7	0.0
R	14,078	125	585	1.9	83.8	83.8	83.8	0.0
S	14,815	29	139	8.0	86.0	86.0	86.1	0.1
T	15,259	55	471	2.3	96.8	96.8	97.3	0.5
U	15,983	55	244	4.5	98.2	98.2	98.4	0.2
V	16,517	27	111	10.0	100.9	100.9	100.9	0.0

[1] Feet Above Confluence With Appomattox River Navigation Channel

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, VIRGINIA

INDEPENDENT CITY

FLOODWAY DATA

FLOODING SOURCE: LIEUTENANT RUN

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (Feet)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET / SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	546	382	172	10.2	15.3	5.6[2]	6.0	0.4
B	1,066	190	3,341	0.5	25.9	25.9	25.9	0.0
C	1,613	232	3,713	0.4	25.9	25.9	25.9	0.0
D	2,511	287	2,993	0.5	25.9	25.9	25.9	0.0
E	3,206	37	155	10.2	26.0	26.0	26.0	0.0
F	4,949	129	275	4.9	31.8	31.8	31.9	0.1
G	5,866	45	250	5.4	38.2	38.2	38.2	0.0
H	6,456	55	173	7.9	40.9	40.9	41.0	0.1

[1] Feet Above Confluence With Appomattox River Navigation Channel

[2] Computed Without Consideration of Backwater Effects From Appomattox River Navigation Channel

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, VIRGINIA

INDEPENDENT CITY

FLOODWAY DATA

FLOODING SOURCE: POOR CREEK

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (Feet)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET / SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	557	120	492	8.7	50.7	46.0[3]	46.5	0.5
B	872	81	2,283	1.9	73.2	73.2	73.2	0.0
C	1,582	128	2,193	1.9	73.3	73.3	73.3	0.0
D	2,004	137	1,186	3.6	74.0	74.0	74.0	0.0
E	2,670	110	983	4.3	74.6	74.6	74.7	0.1
F	3,371	88	817	5.2	75.8	75.8	75.8	0.0
G	3,795	79	640	6.7	78.1	78.1	78.2	0.1
H	4,248	140/0[2]	1,338	3.2	80.7	80.7	80.7	0.0
I	5,845	80/0[2]	695	6.1	82.7	82.7	82.9	0.2
J	7,728	120/0[2]	573	4.2	86.3	86.3	86.8	0.5
K	9,454	137/0[2]	717	3.4	92.7	92.7	92.8	0.1
L	10,349	97/0[2]	905	2.7	98.9	98.9	99.6	0.7
M	11,356	159	1,150	1.9	101.9	101.9	102.2	0.3
N	12,945	50	322	6.3	105.3	105.3	105.5	0.2
O	13,269	118	907	2.2	106.9	106.9	107.2	0.3

[1] Feet Above Confluence With Appomattox River

[2] Total floodway width/width within jurisdiction

[3] Elevation Computed Without Consideration of Backwater Effects From Appomattox River

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, VIRGINIA

INDEPENDENT CITY

FLOODWAY DATA

FLOODING SOURCE: ROHOIC CREEK

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (Feet)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET / SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	1,766	322	844	1.8	139.4	139.4	139.5	0.1
B	3,580	98	381	3.2	143.6	143.6	143.7	0.1
C	4,460	180	1,111	1.1	146.4	146.4	147.3	0.9

[1] Feet above Confluence With Blackwater Swamp

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY
CITY OF PETERSBURG, VIRGINIA
INDEPENDENT CITY

FLOODWAY DATA

FLOODING SOURCE: UNNAMED TRIBUTARY 1 TO BLACKWATER SWAMP

Table 24: Flood Hazard and Non-Encroachment Data for Selected Streams

[Not applicable to this Flood Risk Project.]

6.4 Coastal Flood Hazard Mapping

This section is not applicable to this Flood Risk Project.

Table 25: Summary of Coastal Transect Mapping Considerations

[Not applicable to this Flood Risk Project.]

6.5 FIRM Revisions

This FIS Report and the FIRM are based on the most up-to-date information available to FEMA at the time of its publication; however, flood hazard conditions change over time. Communities or private parties may request flood map revisions at any time. Certain types of requests require submission of supporting data. FEMA may also initiate a revision. Revisions may take several forms, including Letters of Map Amendment (LOMAs), Letters of Map Revision Based on Fill (LOMR-Fs), Letters of Map Revision (LOMRs) (referred to collectively as Letters of Map Change (LOMCs)), Physical Map Revisions (PMRs), and FEMA-contracted restudies. These types of revisions are further described below. Some of these types of revisions do not result in the republishing of the FIS Report. To assure that any user is aware of all revisions, it is advisable to contact the community repository of flood-hazard data (shown in Table 30, "Map Repositories").

6.5.1 Letters of Map Amendment

A LOMA is an official revision by letter to an effective NFIP map. A LOMA results from an administrative process that involves the review of scientific or technical data submitted by the owner or lessee of property who believes the property has incorrectly been included in a designated SFHA. A LOMA amends the currently effective FEMA map and establishes that a specific property is not located in a SFHA.

To obtain an application for a LOMA, visit www.fema.gov/letter-map-amendment-loma and download the form "MT-1 Application Forms and Instructions for Conditional and Final Letters of Map Amendment and Letters of Map Revision Based on Fill". Visit the "Flood Map-Related Fees" section to determine the cost, if any, of applying for a LOMA.

FEMA offers a tutorial on how to apply for a LOMA. The LOMA Tutorial Series can be accessed at www.fema.gov/online-tutorials.

For more information about how to apply for a LOMA, call the FEMA Map Information eXchange; toll free, at 1-877-FEMA MAP (1-877-336-2627).

6.5.2 Letters of Map Revision Based on Fill

A LOMR-F is an official revision by letter to an effective NFIP map. A LOMR-F states FEMA's determination concerning whether a structure or parcel has been elevated on fill above the base flood elevation and is, therefore, excluded from the SFHA.

Information about obtaining an application for a LOMR-F can be obtained in the same manner as that for a LOMA, by visiting www.fema.gov/letter-map-amendment-loma for the "MT-1 Application Forms and Instructions for Conditional and Final Letters of Map Amendment and Letters of Map Revision Based on Fill" or by calling the FEMA Map Information eXchange, toll free, at 1-877-FEMA MAP (1-877-336-2627). Fees for applying for a LOMR-F, if any, are listed in the "Flood Map-Related Fees" section.

A tutorial for LOMR-F is available at www.fema.gov/online-tutorials.

6.5.3 Letters of Map Revision

A LOMR is an official revision to the currently effective FEMA map. It is used to change flood zones, floodplain and floodway delineations, flood elevations and planimetric features. All requests for LOMRs should be made to FEMA through the chief executive officer of the community, since it is the community that must adopt any changes and revisions to the map. If the request for a LOMR is not submitted through the chief executive officer of the community, evidence must be submitted that the community has been notified of the request.

To obtain an application for a LOMR, visit www.fema.gov/media-library/assets/documents/1343 and download the form "MT-2 Application Forms and Instructions for Conditional Letters of Map Revision and Letters of Map Revision". Visit the "Flood Map-Related Fees" section to determine the cost of applying for a LOMR. For more information about how to apply for a LOMR, call the FEMA Map Information eXchange; toll free, at 1-877-FEMA MAP (1-877-336-2627) to speak to a Map Specialist.

Previously issued mappable LOMCs (including LOMRs) that have been incorporated into the City of Petersburg FIRM are listed in Table 26.

Table 26: Incorporated Letters of Map Change

[Not applicable to this Flood Risk Project.]

6.5.4 Physical Map Revisions

A Physical Map Revisions (PMR) is an official republication of a community's NFIP map to effect changes to base flood elevations, floodplain boundary delineations, regulatory floodways and planimetric features. These changes typically occur as a result of structural works or improvements, annexations resulting in additional flood hazard areas or correction to base flood elevations or SFHAs.

The community's chief executive officer must submit scientific and technical data to FEMA to support the request for a PMR. The data will be analyzed and the map will be revised if warranted. The community is provided with copies of the revised information and is afforded a review period. When the base flood elevations are changed, a 90-day appeal period is provided. A 6-month adoption period for formal approval of the revised map(s) is also provided.

For more information about the PMR process, please visit www.fema.gov and visit the "Flood Map Revision Processes" section.

6.5.5 Contracted Restudies

The NFIP provides for a periodic review and restudy of flood hazards within a given community. FEMA accomplishes this through a national watershed-based mapping needs assessment strategy, known as the Coordinated Needs Management Strategy (CNMS). The CNMS is used by FEMA to assign priorities and allocate funding for new flood hazard analyses used to update the FIS Report and FIRM. The goal of CNMS is to define the validity of the engineering study data within a mapped inventory. The CNMS is used to track the assessment process, document engineering gaps and their resolution, and aid in prioritization for using flood risk as a key factor for areas identified for flood map updates. Visit www.fema.gov to learn more about the CNMS or contact the FEMA Regional Office listed in Section 8 of this FIS Report.

6.5.6 Community Map History

The current FIRM presents flooding information for the entire geographic area of the City of Petersburg. Previously, separate FIRMs, Flood Hazard Boundary Maps (FHBMs) and/or Flood Boundary and Floodway Maps (FBFMs) may have been prepared for the community that had identified SFHAs. Current and historical data relating to the maps prepared for the project area are presented in Table 27, "Community Map History." A description of each of the column headings and the source of the date is also listed below.

- *Community Name* includes communities falling within the geographic area shown on the FIRM, including those that fall on the boundary line, nonparticipating communities, and communities with maps that have been rescinded. Communities with No Special Flood Hazards are indicated by a footnote. If all maps (FHBM, FBFM, and FIRM) were rescinded for a community, it is not listed in this table unless SFHAs have been identified in this community.

- *Initial Identification Date (First NFIP Map Published)* is the date of the first NFIP map that identified flood hazards in the community. If the FHBM has been converted to a FIRM, the initial FHBM date is shown. If the community has never been mapped, the upcoming effective date or "pending" (for Preliminary FIS Reports) is shown. If the community is listed in Table 27 but not identified on the map, the community is treated as if it were unmapped.

- *Initial FHBM Effective Date* is the effective date of the first FHBM. This date may be the same date as the Initial NFIP Map Date.

- *FHBM Revision Date(s)* is the date(s) that the FHBM was revised, if applicable.

- *Initial FIRM Effective Date* is the date of the first effective FIRM for the community.

- *FIRM Revision Date(s)* is the date(s) the FIRM was revised, if applicable. This is the revised date that is shown on the FIRM panel, if applicable. As single-jurisdiction studies are completed or revised, the community should have its FIRM dates updated accordingly to reflect the date of the single-jurisdiction study. Once the FIRMs exist in single-jurisdiction format, as PMRs of FIRM panels within the county are completed, the FIRM Revision Dates in the table for each community affected by the PMR are updated with the date of the PMR, even if the PMR did not revise all the panels within that community.

The initial effective date for the City of Petersburg FIRMs was 03/16/1981.

Table 27: Community Map History

Community Name	Initial Identification Date	Initial FHBM Effective Date	FHBM Revision Date(s)	Initial FIRM Effective Date	FIRM Revision Date(s)
Petersburg, City of	05/31/1974	05/31/1974	07/30/1976	03/16/1981	12/15/2022 02/04/2011

SECTION 7.0 – CONTRACTED STUDIES AND COMMUNITY COORDINATION

7.1 Contracted Studies

Table 28 provides a summary of the contracted studies, by flooding source, that are included in this FIS Report.

Table 28: Summary of Contracted Studies Included in this FIS Report

Flooding Source	FIS Report Dated	Contractor	Number	Work Completed Date	Affected Communities
All Zone A Streams and Tributaries in HUC 02080207	12/15/2022	STARR II	HSFE60-15-D-0005	07/31/2019	Petersburg, City of
All Zone A Streams and Tributaries in HUC 03010202	12/15/2022	STARR II	HSFE60-15-D-0005	07/31/2019	Petersburg, City of
Appomattox River	12/15/2022	STARR II	HSFE60-15-D-0005	03/25/2020	Petersburg, City of
Appomattox River Navigation Channel	12/15/2022	STARR II	HSFE60-15-D-0005	03/25/2020	Petersburg, City of
Blackwater Swamp	12/15/2022	STARR II	HSFE60-15-D-0005	03/25/2020	Petersburg, City of
Brickhouse Run	12/15/2022	STARR II	HSFE60-15-D-0005	03/25/2020	Petersburg, City of
Brickhouse Run Overland	12/15/2022	STARR II	HSFE60-15-D-0005	03/25/2020	Petersburg, City of
Harrison Creek	12/15/2022	STARR II	HSFE60-15-D-0005	03/25/2020	Petersburg, City of
Lieutenant Run	12/15/2022	STARR II	HSFE60-15-D-0005	03/25/2020	Petersburg, City of
Poor Creek	12/15/2022	STARR II	HSFE60-15-D-0005	03/25/2020	Petersburg, City of

Table 28: Summary of Contracted Studies Included in this FIS Report (continued)

Flooding Source	FIS Report Dated	Contractor	Number	Work Completed Date	Affected Communities
Rohoic Creek	12/15/2022	STARR II	HSFE60-15-D-0005	03/25/2020	Petersburg, City of
Unnamed Tributary 1 to Blackwater Swamp	12/15/2022	STARR II	HSFE60-15-D-0005	03/25/2020	Petersburg, City of

7.2 Community Meetings

The dates of the community meetings held for this Flood Risk Project and previous Flood Risk Projects are shown in Table 29. These meetings may have previously been referred to by a variety of names (Community Coordination Officer (CCO), Scoping, Discovery, etc.), but all meetings represent opportunities for FEMA, community officials, study contractors, and other invited guests to discuss the planning for and results of the project.

Table 29: Community Meetings

Community	FIS Report Dated	Date of Meeting	Meeting Type	Attended By
Petersburg, City of	12/15/2022	08/25/2016	Project Discovery	FEMA, Compass, City of Petersburg.
		04/28/2020	Flood Risk Review	FEMA, STARR II, City of Petersburg, Virginia Department of Conservation and Recreation, Crater Planning District Commission.
		03/25/2021	Final CCO Meeting	FEMA, STARR II, City of Petersburg, Virginia Department of Conservation and Recreation, Crater Planning District Commission.

SECTION 8.0 – ADDITIONAL INFORMATION

Information concerning the pertinent data used in the preparation of this FIS Report can be obtained by submitting an order with any required payment to the FEMA Engineering Library. For more information on this process, see www.fema.gov.

Table 30 is a list of the locations where FIRMs for the City of Petersburg can be viewed. Please note that the maps at these locations are for reference only and are not for distribution. Also, please note that only the maps for the community listed in the table are available at that particular repository. A user may need to visit another repository to view maps from an adjacent community.

Table 30: Map Repositories

Community	Address	City	State	Zip Code
Petersburg, City of	City Hall 135 North Union Street	Petersburg	VA	23803

The National Flood Hazard Layer (NFHL) dataset is a compilation of effective FIRM Databases and LOMCs. Together they create a GIS data layer for a State or Territory. The NFHL is updated as studies become effective and extracts are made available to the public monthly. NFHL data can be viewed or ordered from the website shown in Table 31.

Table 31 contains useful contact information regarding the FIS Report, the FIRM, and other relevant flood hazard and GIS data. In addition, information about the State NFIP Coordinator and GIS Coordinator is shown in this table. At the request of FEMA, each Governor has designated an agency of State or territorial government to coordinate that State's or territory's NFIP activities. These agencies often assist communities in developing and adopting necessary floodplain management measures. State GIS Coordinators are knowledgeable about the availability and location of State and local GIS data in their state.

Table 31: Additional Information

FEMA and the NFIP	
FEMA and FEMA Engineering Library website	www.fema.gov/national-flood-insurance-program-flood-hazard-mapping/engineering-library
NFIP website	www.fema.gov/national-flood-insurance-program
NFHL Dataset	msc.fema.gov
FEMA Region III	Federal Emergency Management Agency One Independence Mall 615 Chestnut Street, 6th Floor Philadelphia, PA 19106-4404 (215) 931-5500
Other Federal Agencies	
USGS website	www.usgs.gov
Hydraulic Engineering Center website	www.hec.usace.army.mil
State Agencies and Organizations	
State NFIP Coordinator	Angela Davis, Floodplain Program Planner Virginia Department of Conservation & Recreation 600 East Main Street, 24th Floor Richmond, V.A. 23219 Phone: (804) 371-6135 angela.davis@dcr.virginia.gov
State GIS Coordinator	Stuart Blankenship, Geospatial Projects Manager Integrated Services Program VITA, Virginia Geographic Information Network (VGIN) 11751 Meadowville Lane Chester, VA 23836 Phone: (804) 416-6208 stuart.blankship@vita.virginia.gov

SECTION 9.0 – BIBLIOGRAPHY AND REFERENCES

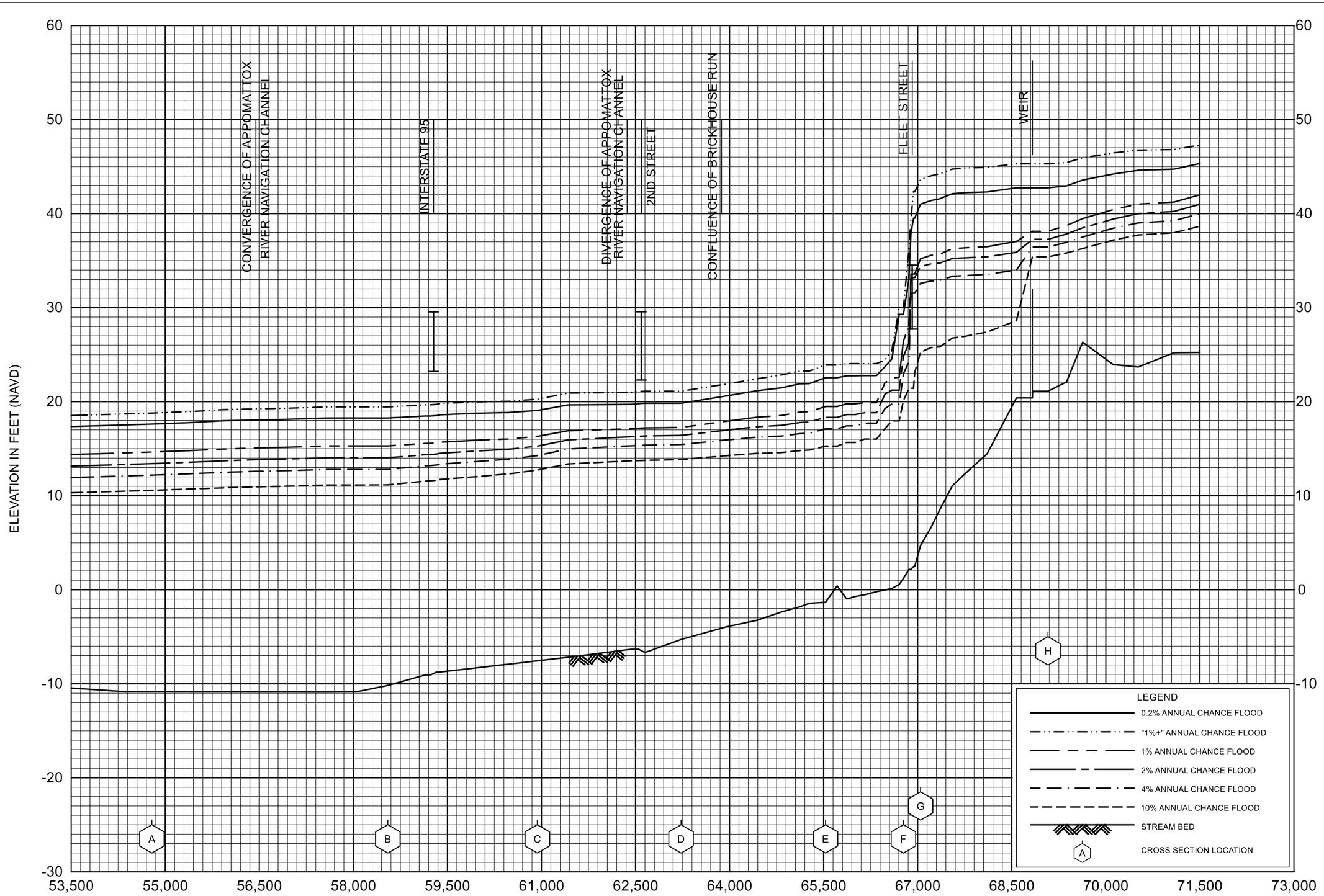
Table 32 includes sources used in the preparation of and cited in this FIS Report as well as additional studies that have been conducted in the study area.

Table 32: Bibliography and References

Citation in this FIS	Publisher/ Issuer	*Publication Title,* "Article," Volume, Number, etc.	Author/Editor	Place of Publication	Publication Date/ Date of Issuance	Link
FEMA 2011	Federal Emergency Management Agency	National Flood Hazard Layer Data	Federal Emergency Management Agency	Washington, D.C.	02/04/2011	https://msc.fema.gov/portal
FEMA 2018	Federal Emergency Management Agency	Lower James Watershed Hydrology Study	STARR II	Washington, D.C.	08/01/2018	http://hazards.fema.gov
FEMA 2019a	Federal Emergency Management Agency	Lower James: Brickhouse Run Hydrology Study	STARR II	Washington, D.C.	12/01/2019	http://hazards.fema.gov
FEMA 2019b	Federal Emergency Management Agency	Lower James: Lieutenant Hydrology Study	STARR II	Washington, D.C.	12/01/2019	http://hazards.fema.gov
FEMA 2019c	Federal Emergency Management Agency	Lower James: Poor Creek Hydrology Study	STARR II	Washington, D.C.	12/01/2019	http://hazards.fema.gov
FEMA 2019d	Federal Emergency Management Agency	Hydrology: Prince Georges County, Lower James	STARR II	Washington, D.C.	12/01/2019	http://hazards.fema.gov
FEMA 2020a	Federal Emergency Management Agency	Lower James Watershed Hydraulic Analysis	STARR II	Washington, D.C.	03/25/2020	http://hazards.fema.gov

Citation in this FIS	Publisher/ Issuer	*Publication Title,* "Article," Volume, Number, etc.	Author/Editor	Place of Publication	Publication Date/ Date of Issuance	Link
USACE 2005	United States Army Corps of Engineers	Hec-GeoRAS; GIS Tools for Support of HEC-RAS using ArcGIS	Ackerman, C.T.	Davis, C.A.	01/01/2005	
USACE 2016	US Army Corps of Engineers, Hydrologic Engineering Center	*HEC-RAS River Analysis System, Version 5.0.5*	US Army Corps of Engineers	Davis, CA	02/1/2016	
USACE 2018	United States Army Corps of Engineers	HEC-HMS 4.3	USACE, Hydrologic Engineering Center	Davis, C.A.	09/01/2018	
US Census 2016	U.S. Census Bureau	TIGER Roads and Rail Data	U.S. Census Bureau	Washington, D.C.	08/19/2016	https://www.census.gov/geo/maps-data/data/tiger-line.html
USDA 2016	USDA FSA Aerial Photography Field Office	City of Petersburg Ortho Imagery	USDA FSA Aerial Photography Field Office	Salt Lake City, U.T.	09/15/2016	https://nrcs.app.box.com/v/naip
USGS 2011	United States Geological Survey	U.S. Geological Survey Scientific Investigations Report 2011 – 5144: Peak Flow Characteristics of Virginia Streams	Samuel H. Austin, Jennifer L. Krstolic, and Ute Wiegand	Reston, V.A.	01/01/2011	https://pubs.usgs.gov/sir/2011/5144/
USGS 2014	United States Geological Survey	USGS VA NRCS SANDY 2014	United States Geological Survey	Reston, V.A.	08/27/2015	
USGS 2017	United States Geological Survey	NHD Data	United States Geological Survey	Reston, V.A.	04/26/2017	https://viewer.nationalmap.gov/basic/?basemap=b1&category=nhd&title=NHD%20View

Citation in this FIS	Publisher/ Issuer	*Publication Title,* "Article," Volume, Number, etc.	Author/Editor	Place of Publication	Publication Date/ Date of Issuance	Link
VGIN 2018	Virginia Geographic Information Network	Virginia Administrative Boundaries	Virginia Geographic Information Network	Chester, V.A.	01/01/2018	https://vgin.maps.arcgis.com/home/item.html?id=777890ecdb634d18a02eec604db522c6



FLOOD PROFILES

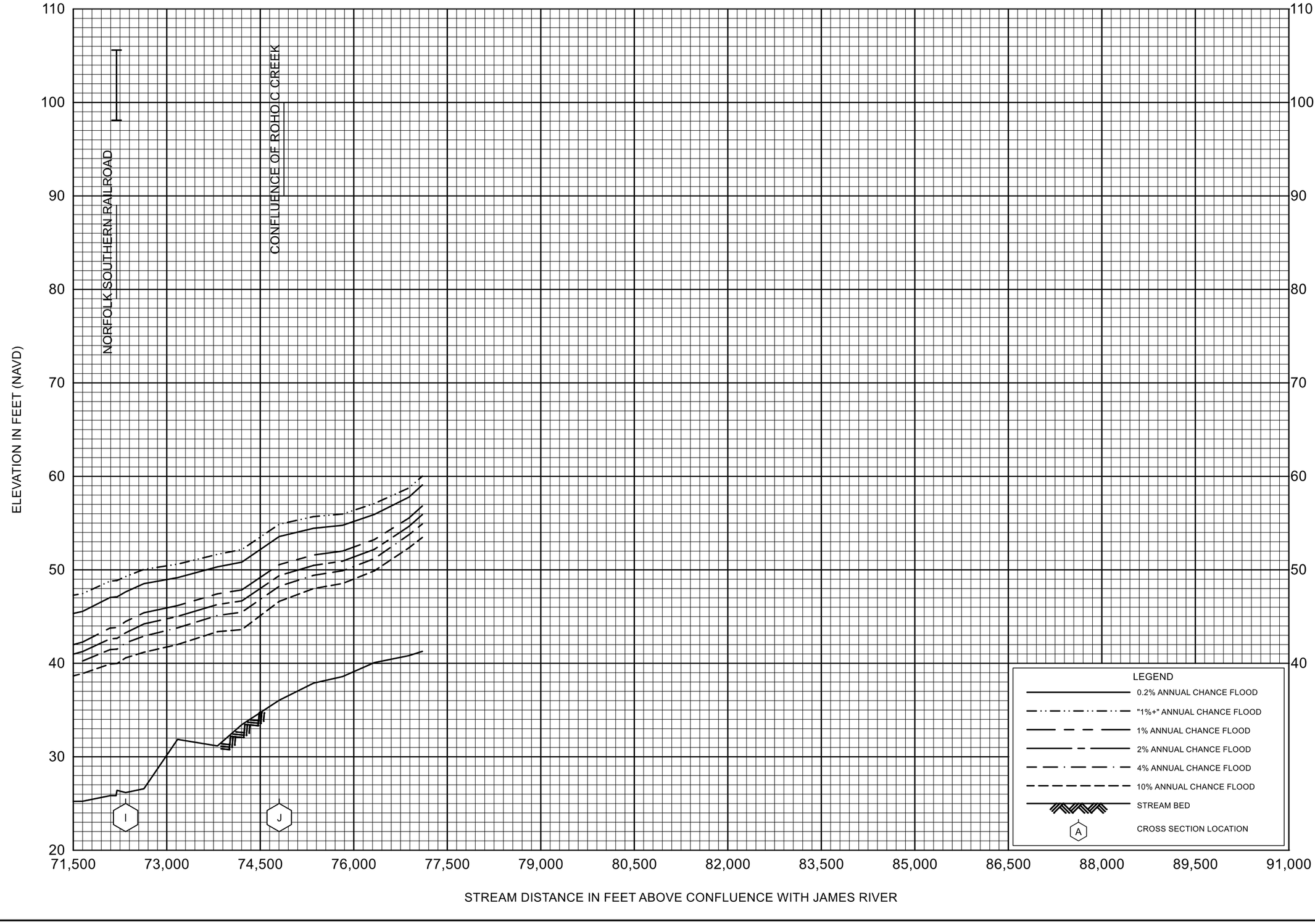
APPOMATTOX RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, VA

INDEPENDENT CITY

01P



FLOOD PROFILES

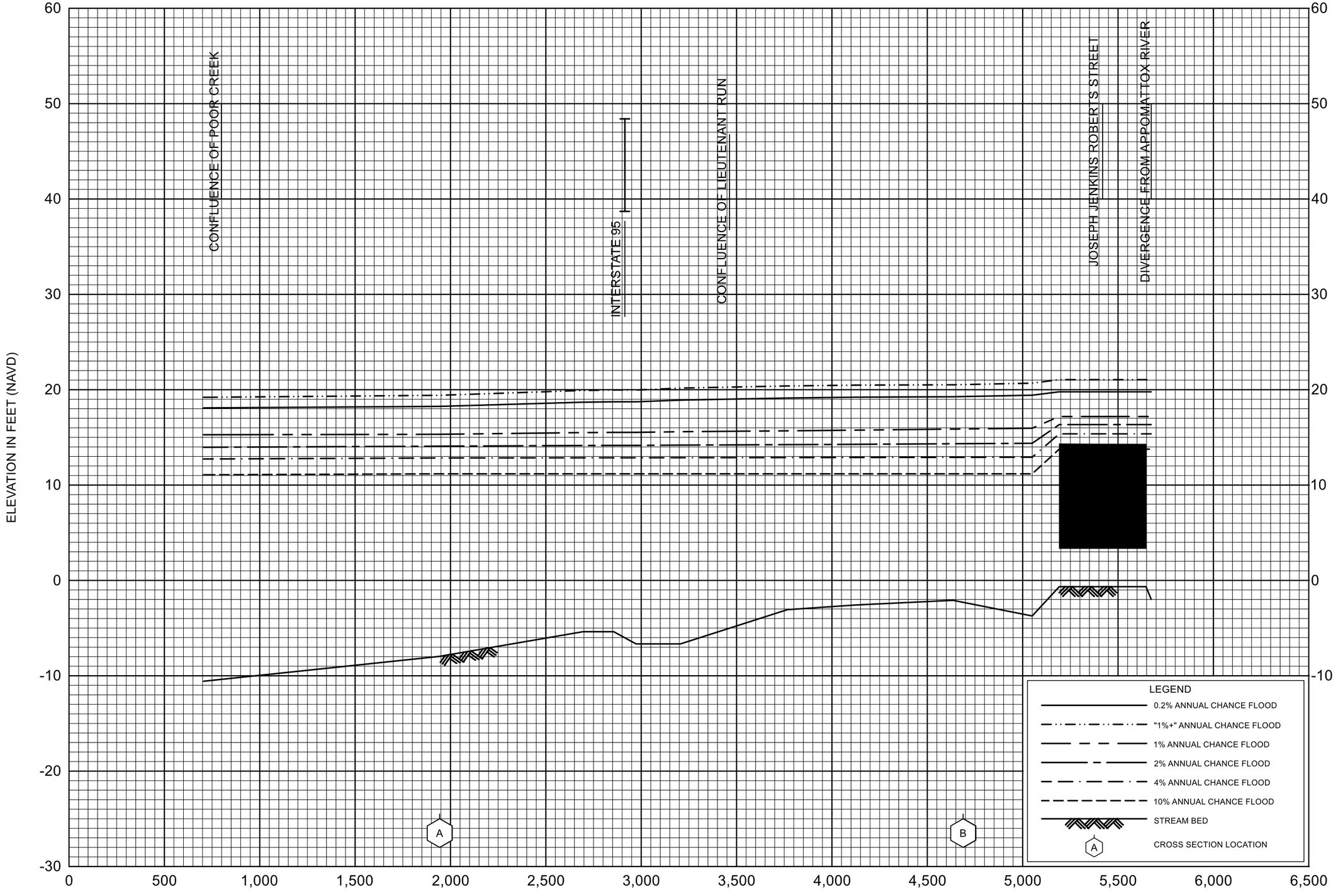
APPOMATTOX RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, VA

INDEPENDENT CITY

02P



FLOOD PROFILES

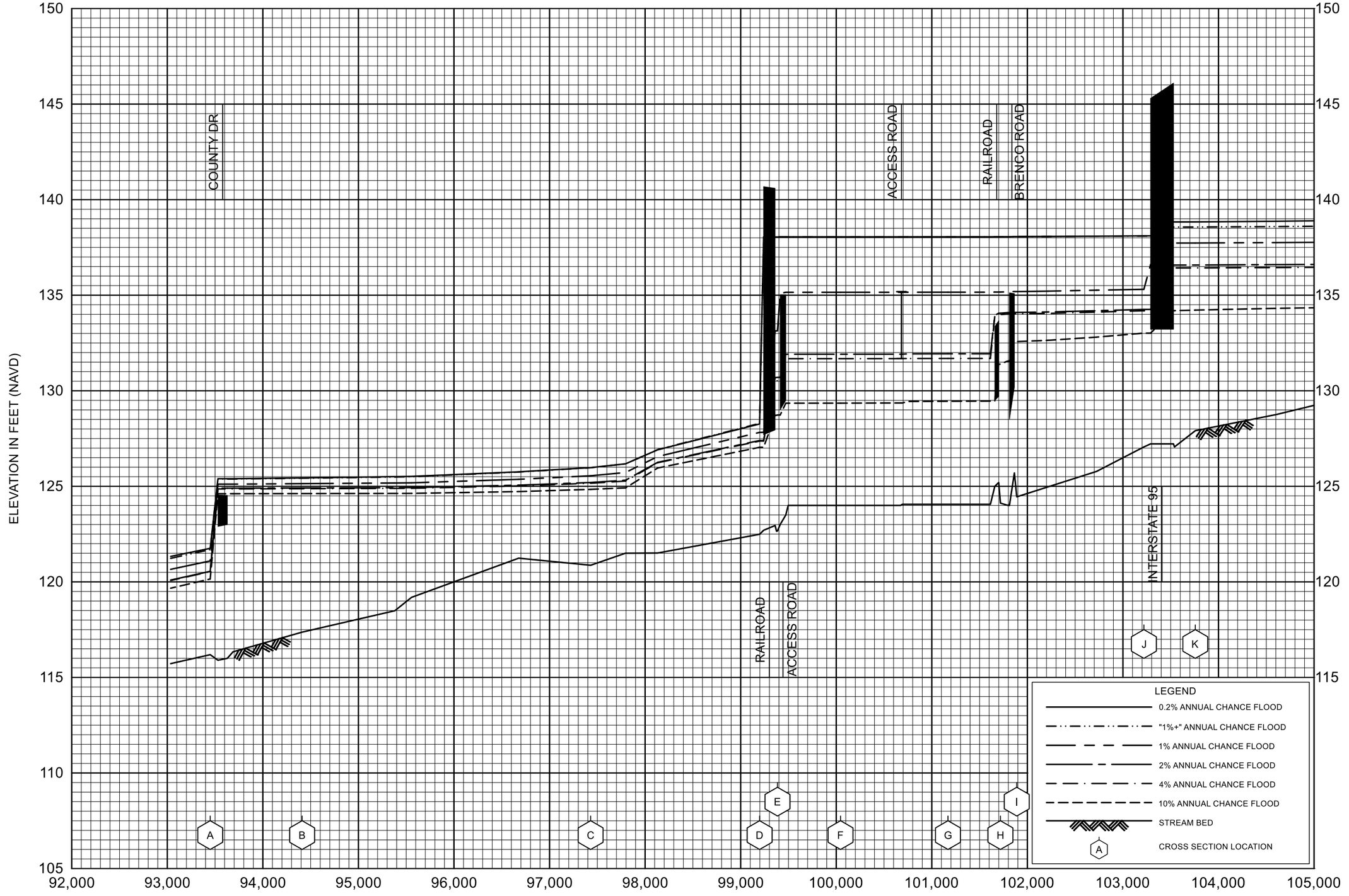
APPOMATTOX RIVER NAVIGATION CHANNEL

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, VA

INDEPENDENT CITY

03P



FLOOD PROFILES

BLACKWATER SWAMP

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, VA

INDEPENDENT CITY

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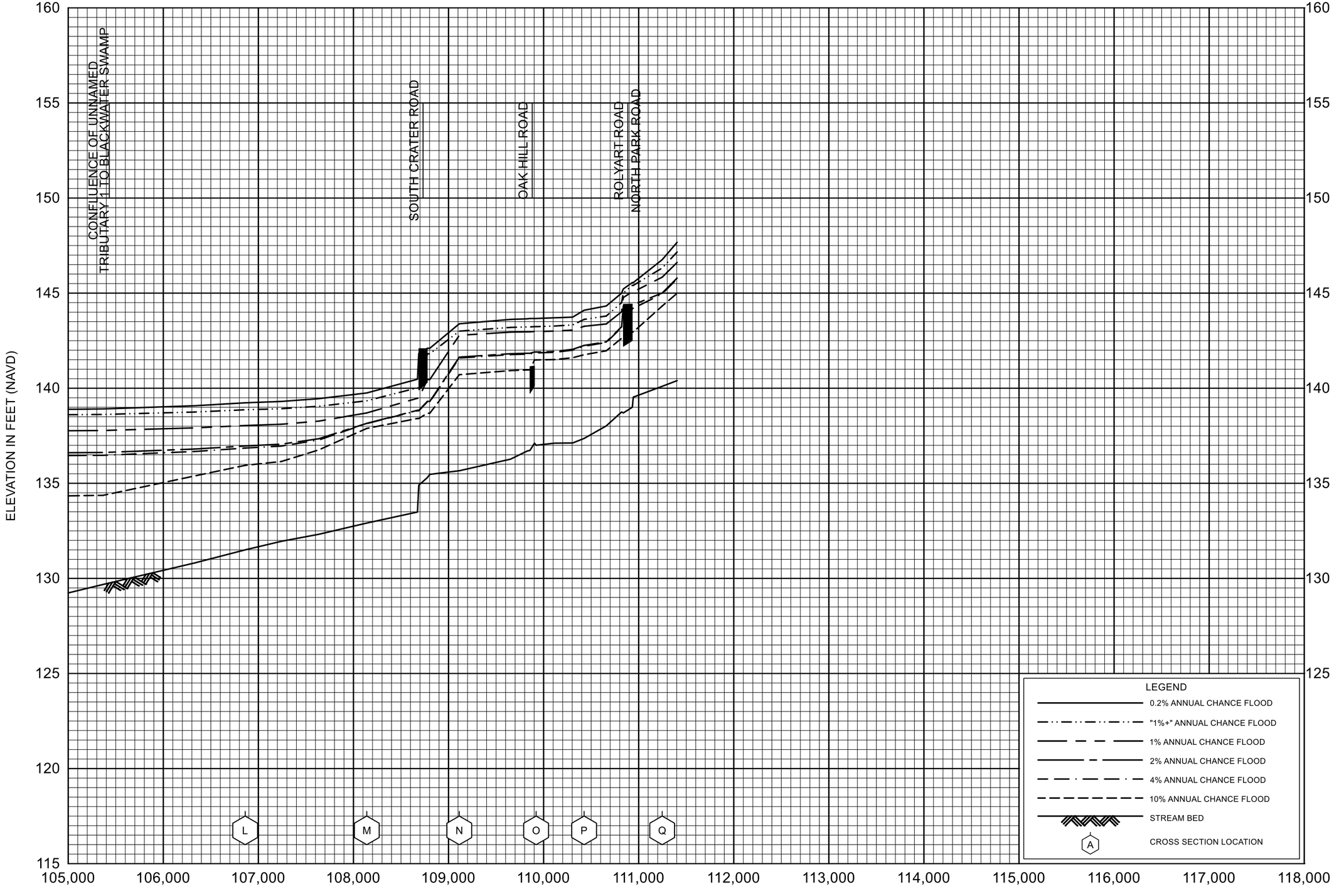


FLOOD PROFILES

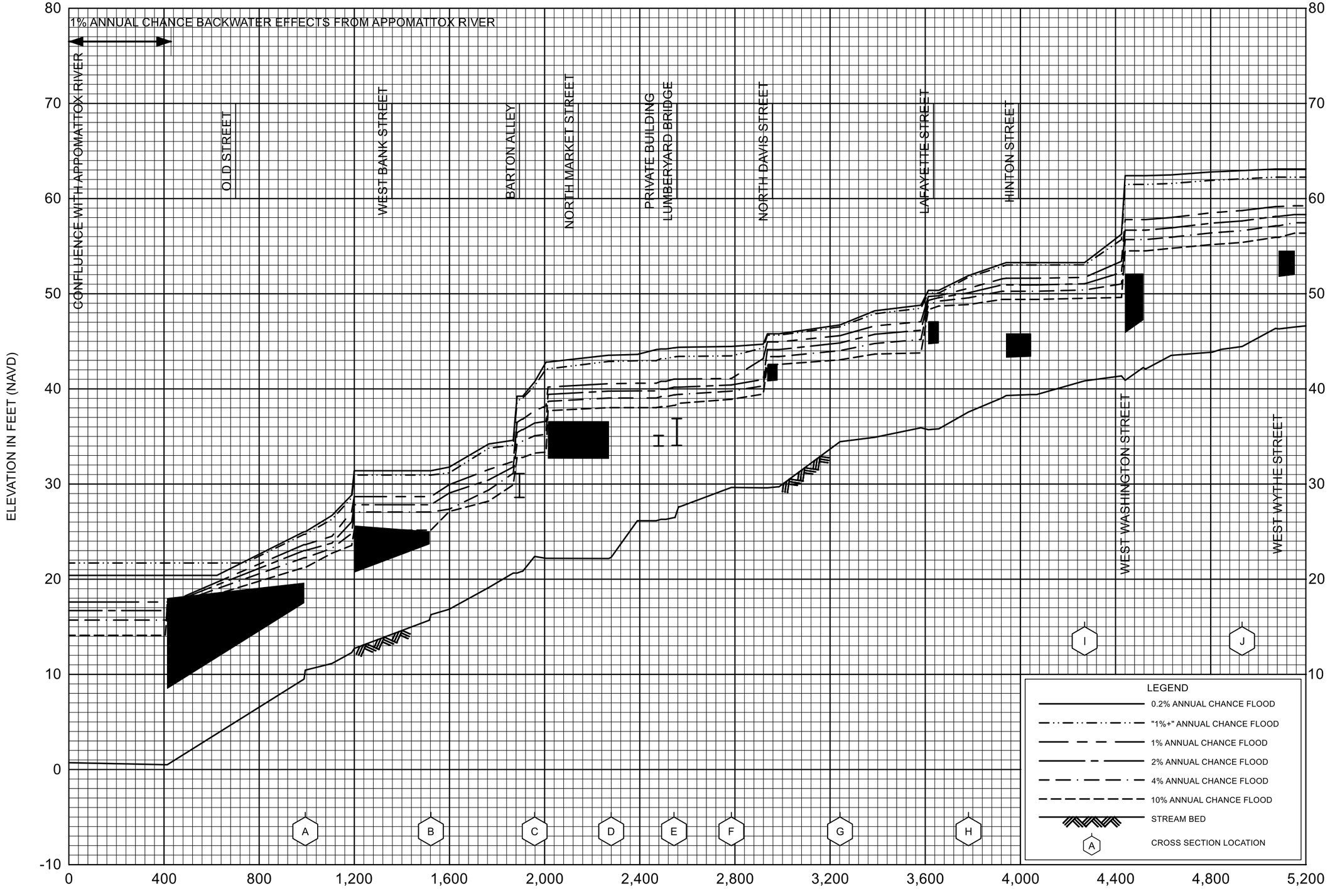
BLACKWATER SWAMP

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, VA

INDEPENDENT CITY

05P



FLOOD PROFILES

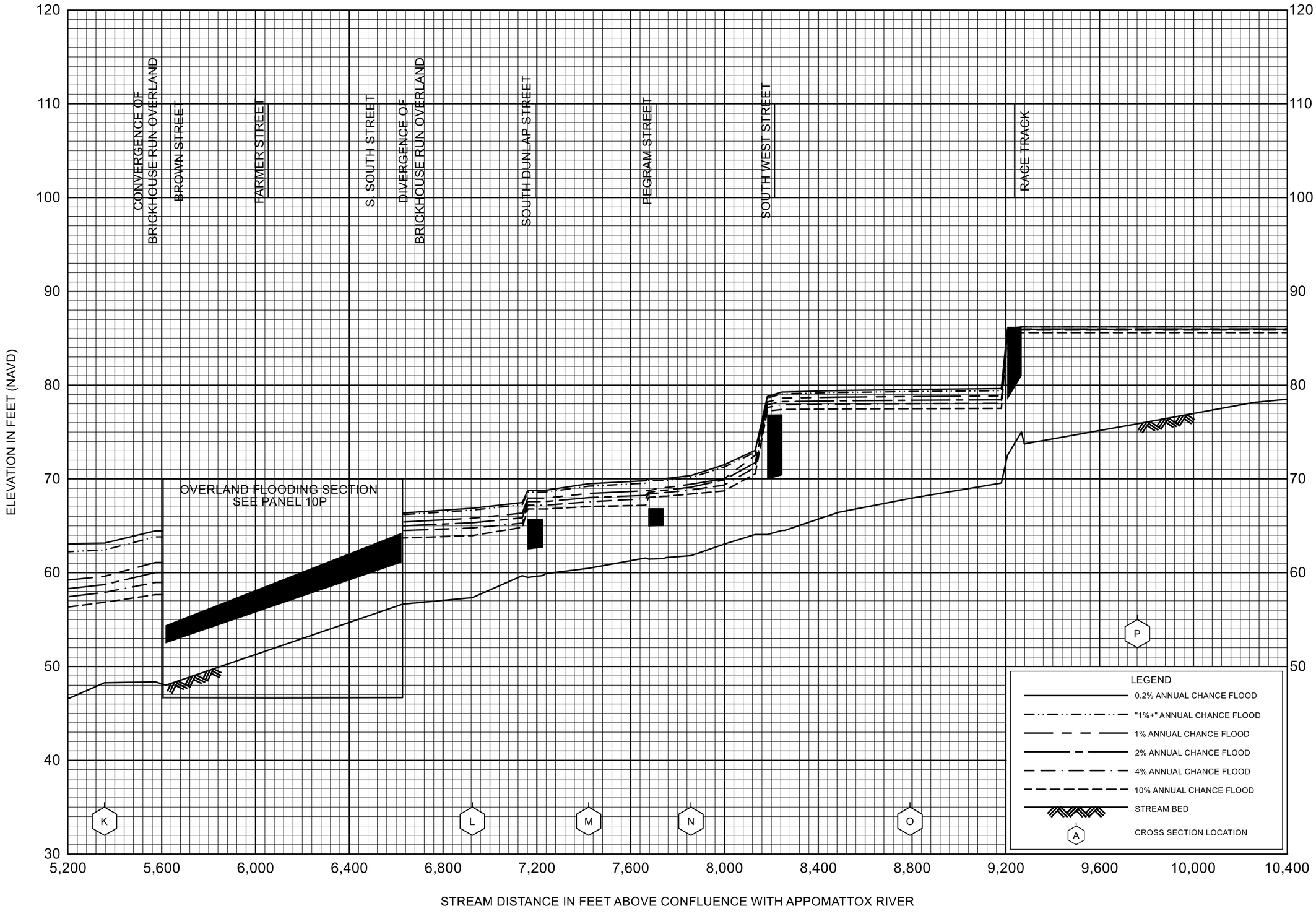
BRICKHOUSE RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, VA

INDEPENDENT CITY

06P



FLOOD PROFILES

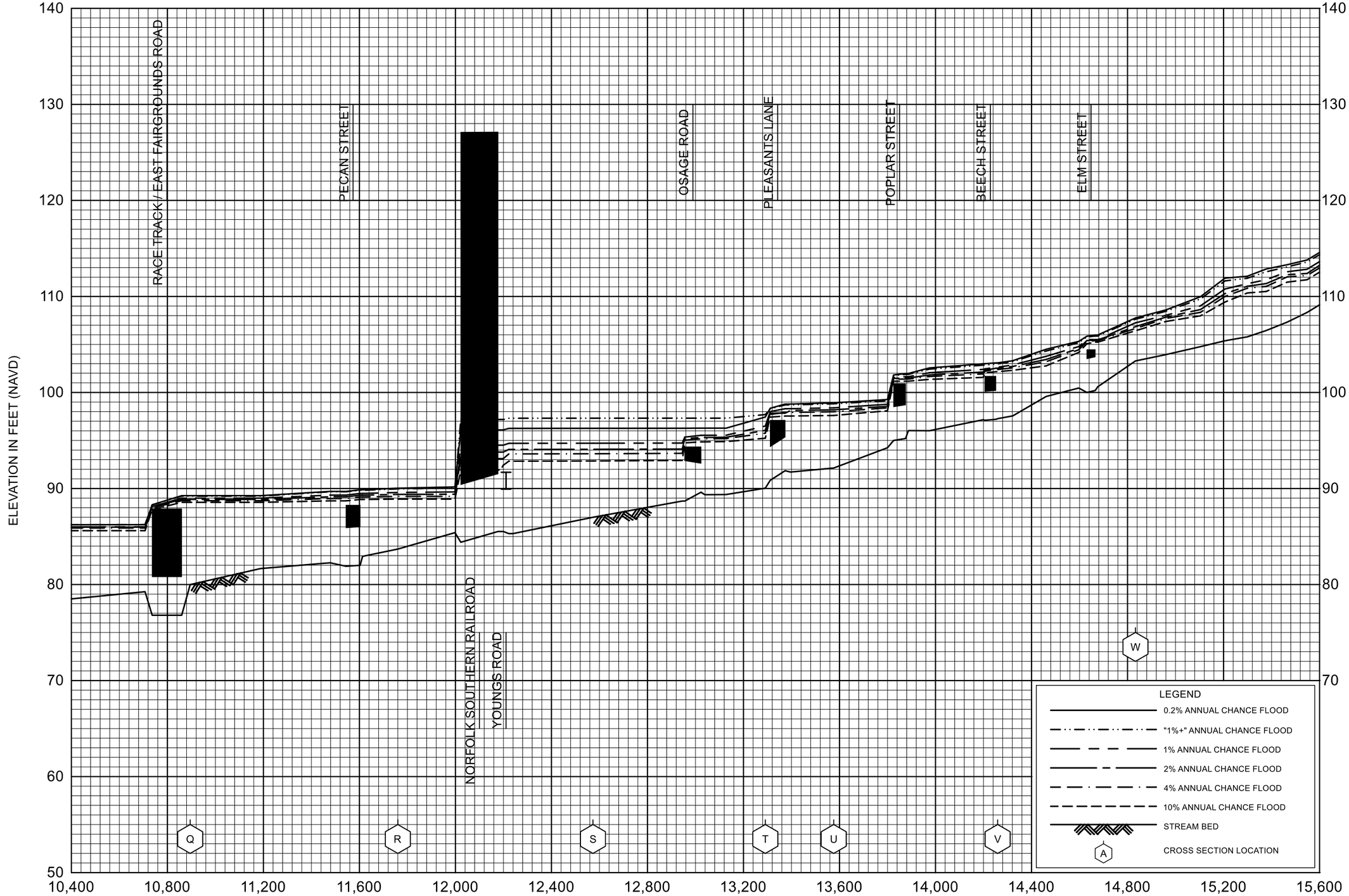
BRICKHOUSE RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, VA

INDEPENDENT CITY

07P



FLOOD PROFILES

BRICKHOUSE RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, VA

INDEPENDENT CITY

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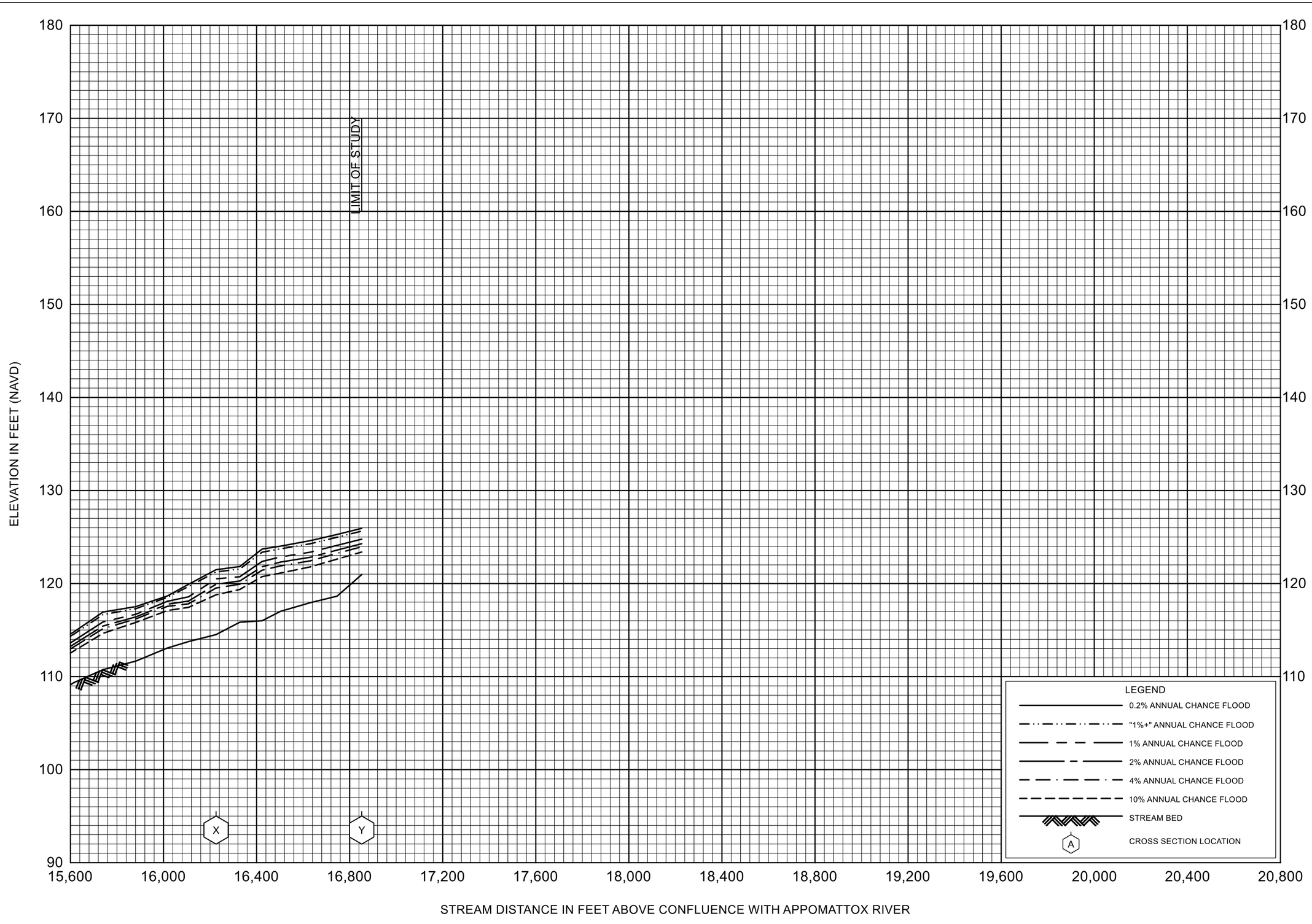


FLOOD PROFILES

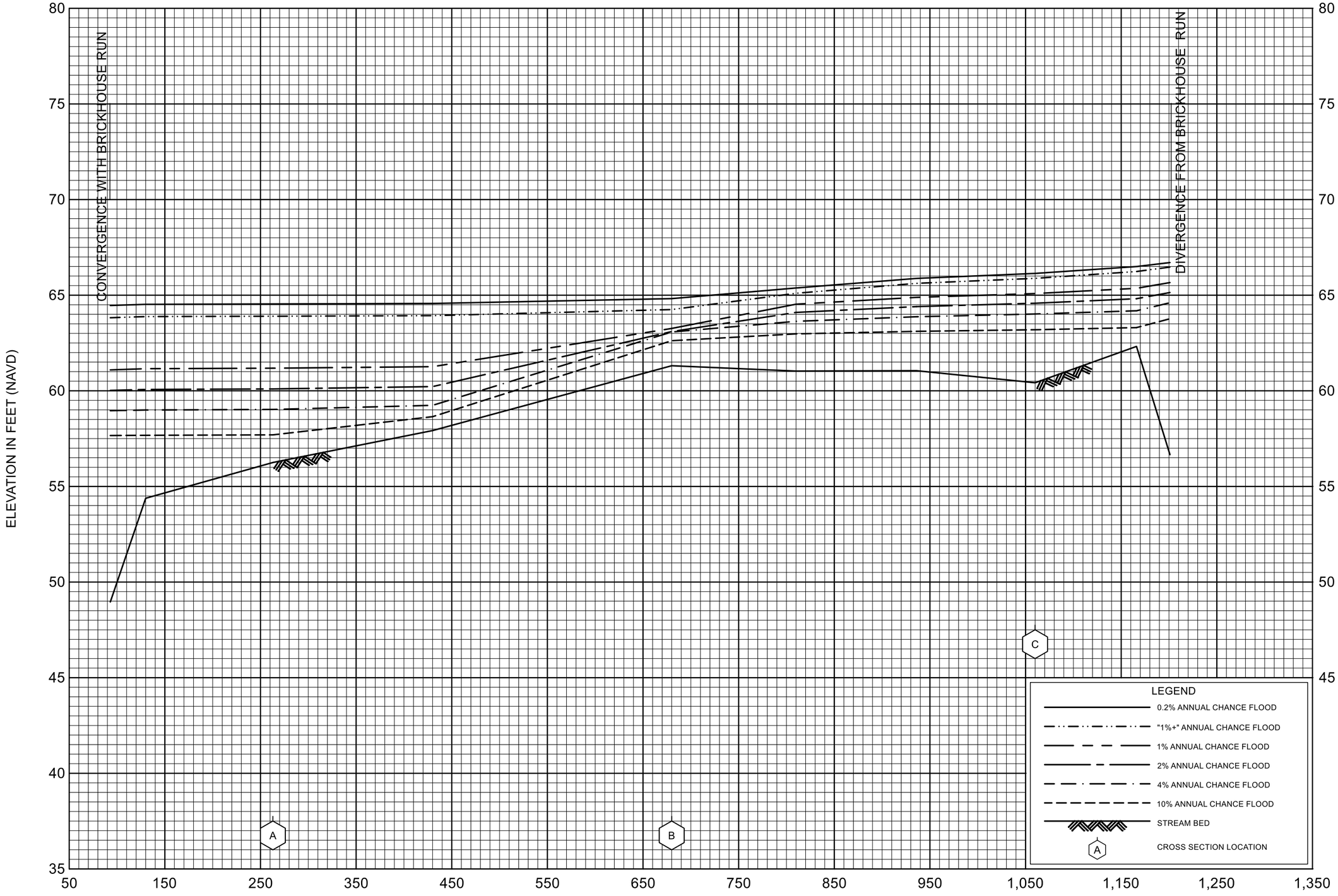
BRICKHOUSE RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, VA

INDEPENDENT CITY

09P



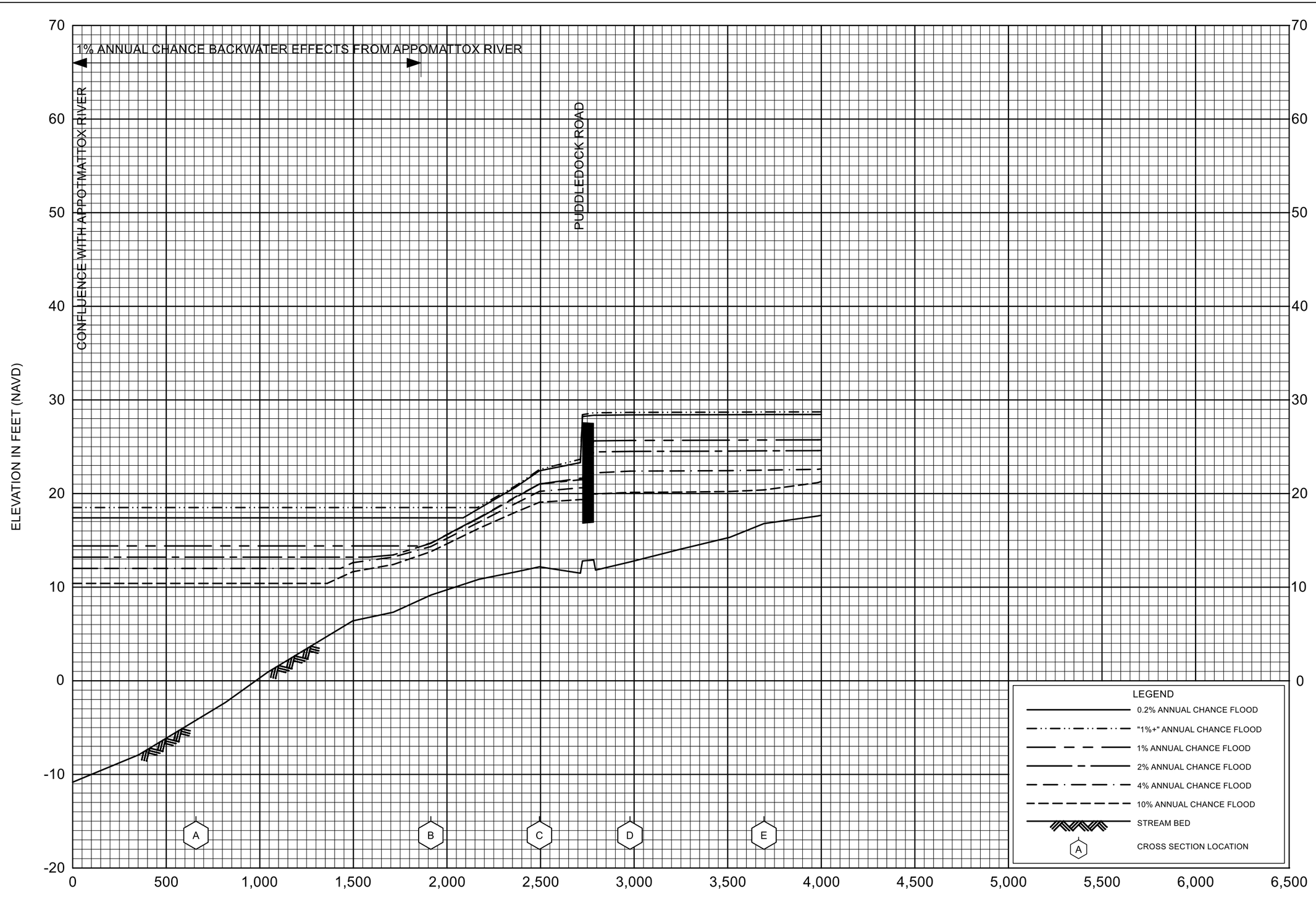
FLOOD PROFILES

BRICKHOUSE RUN OVERLAND

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, VA

INDEPENDENT CITY



FLOOD PROFILES

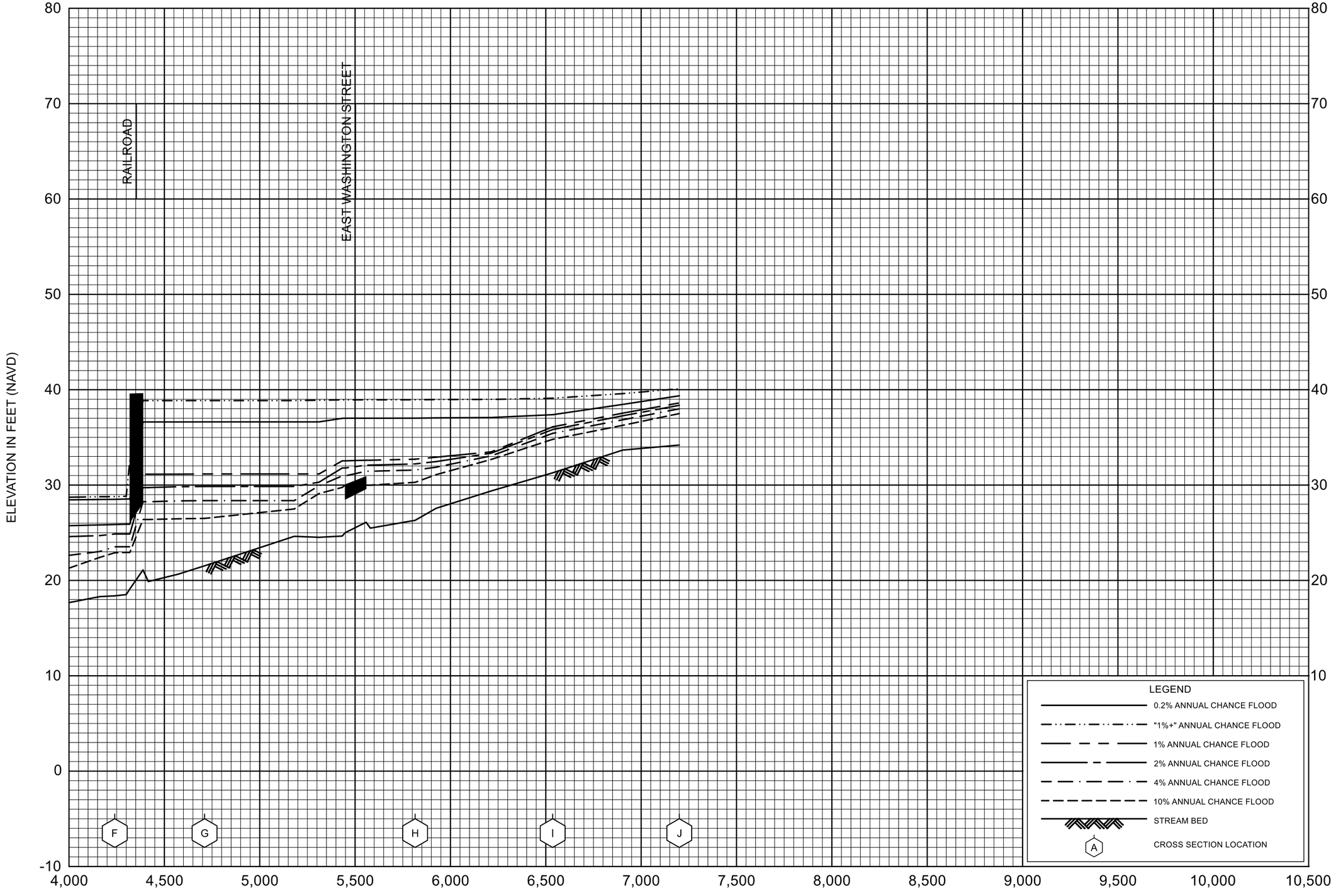
HARRISON CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, VA

INDEPENDENT CITY

11P



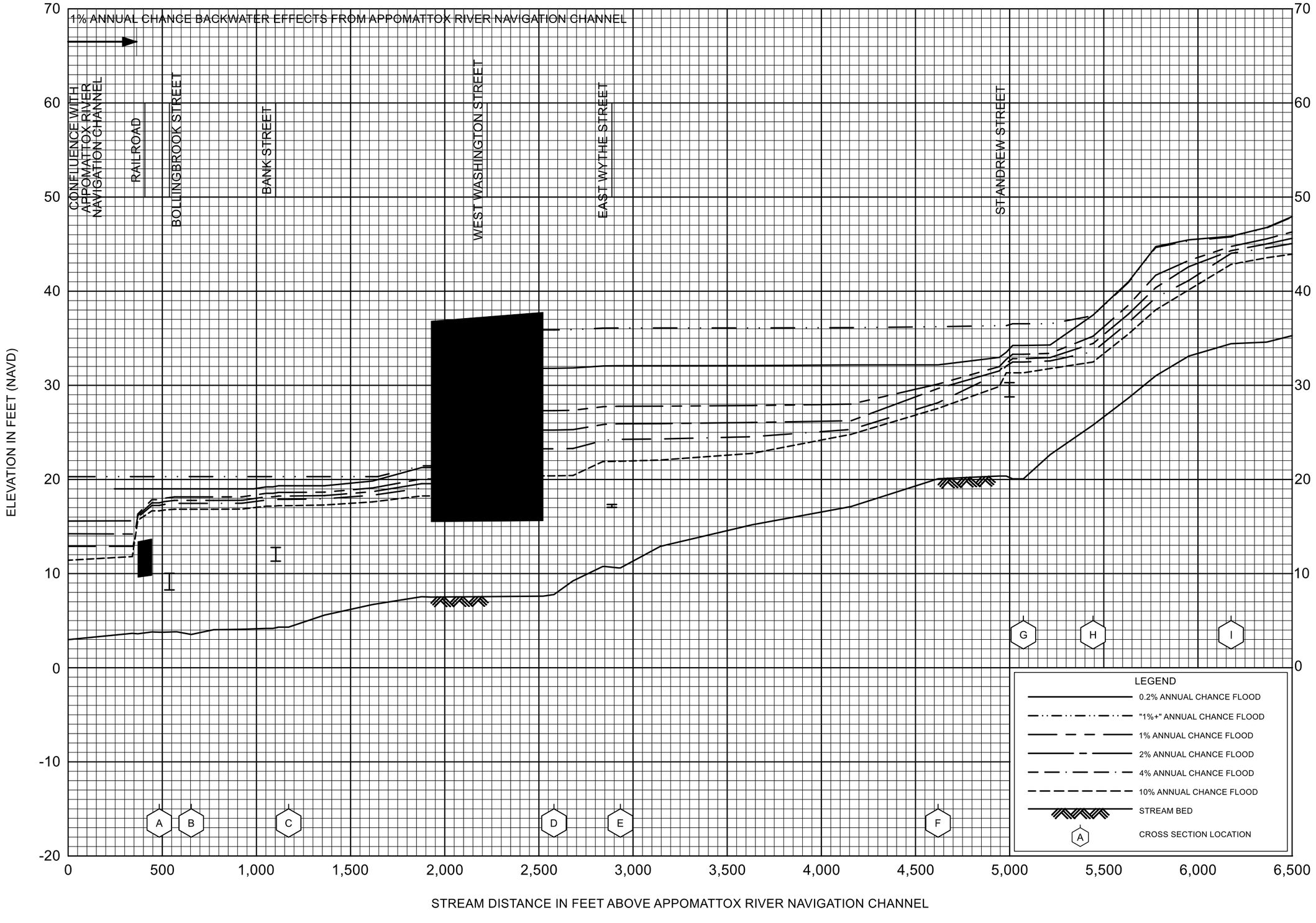
FLOOD PROFILES

HARRISON CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, VA

INDEPENDENT CITY



FLOOD PROFILES

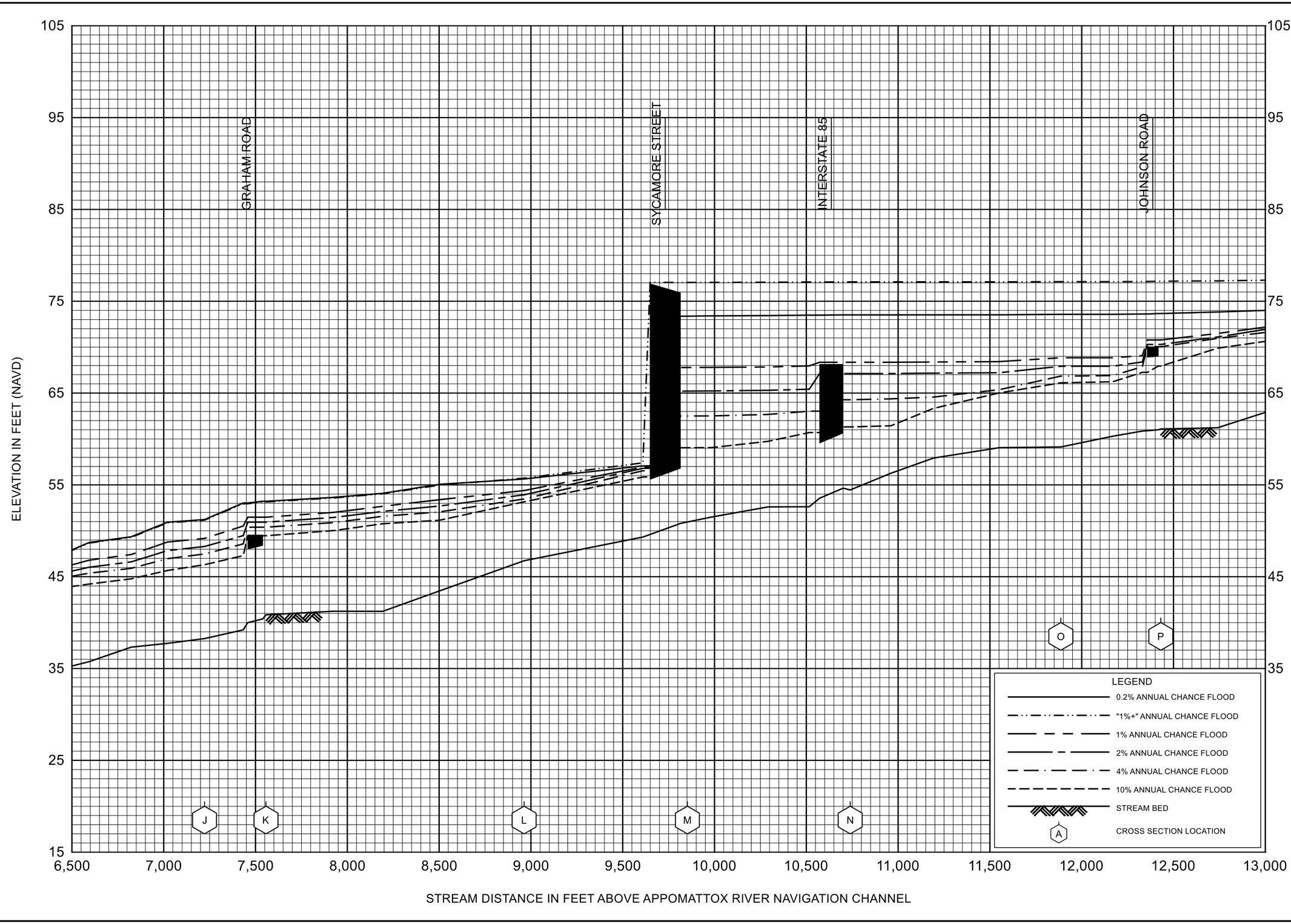
LIEUTENANT RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, VA

INDEPENDENT CITY

13P



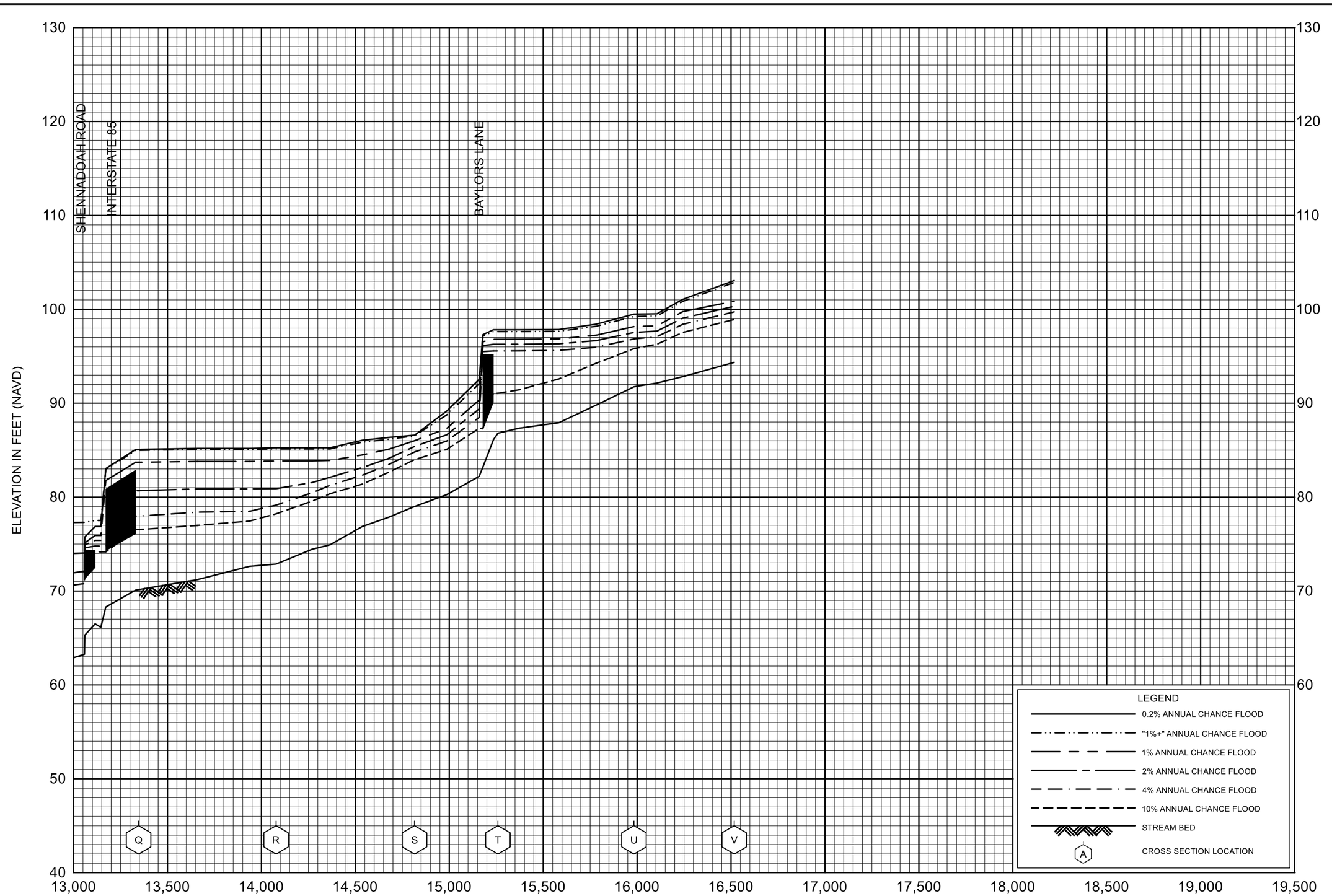
FLOOD PROFILES

LIEUTENANT RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, VA

INDEPENDENT CITY



FLOOD PROFILES

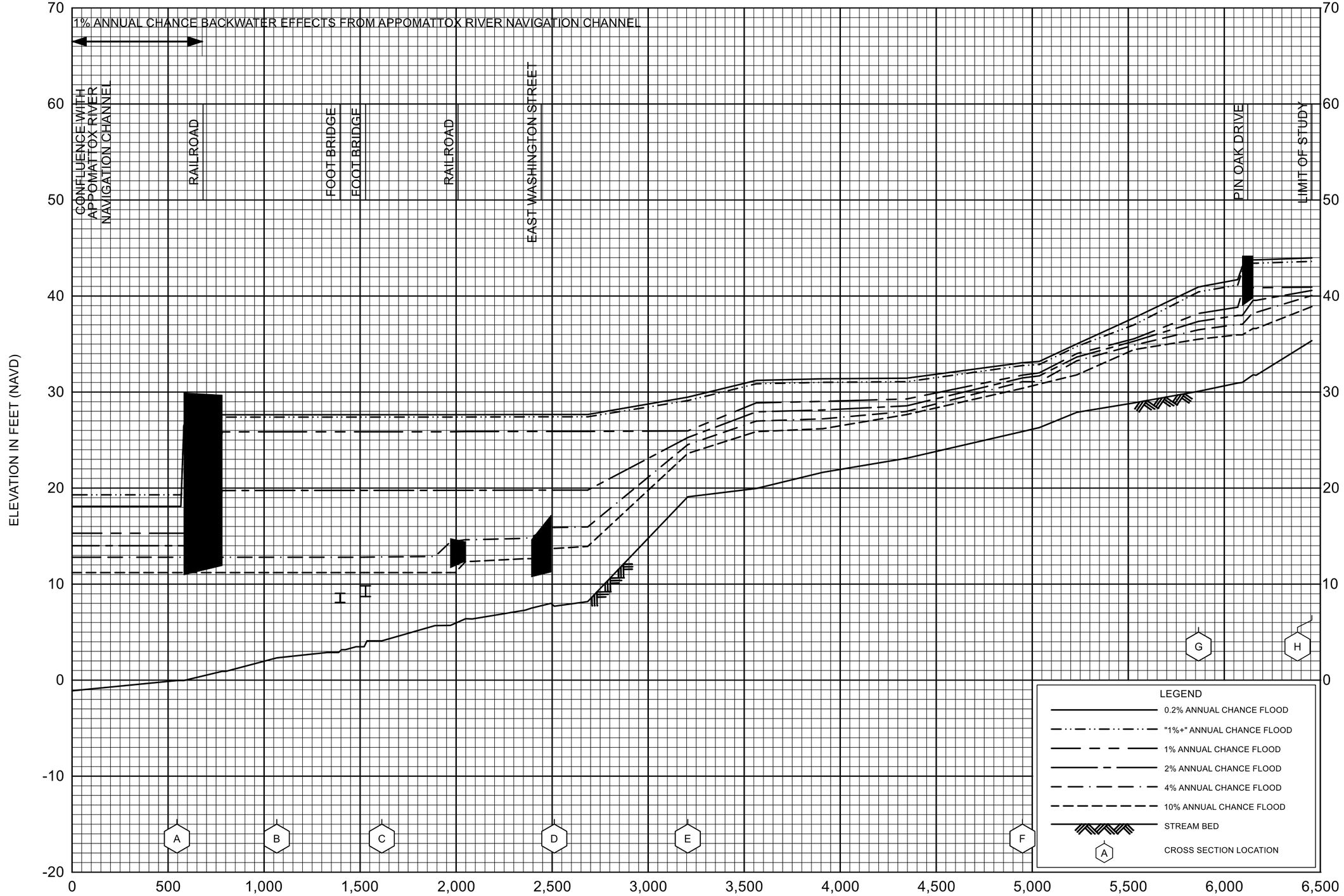
LIEUTENANT RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, VA

INDEPENDENT CITY

15P



FLOOD PROFILES

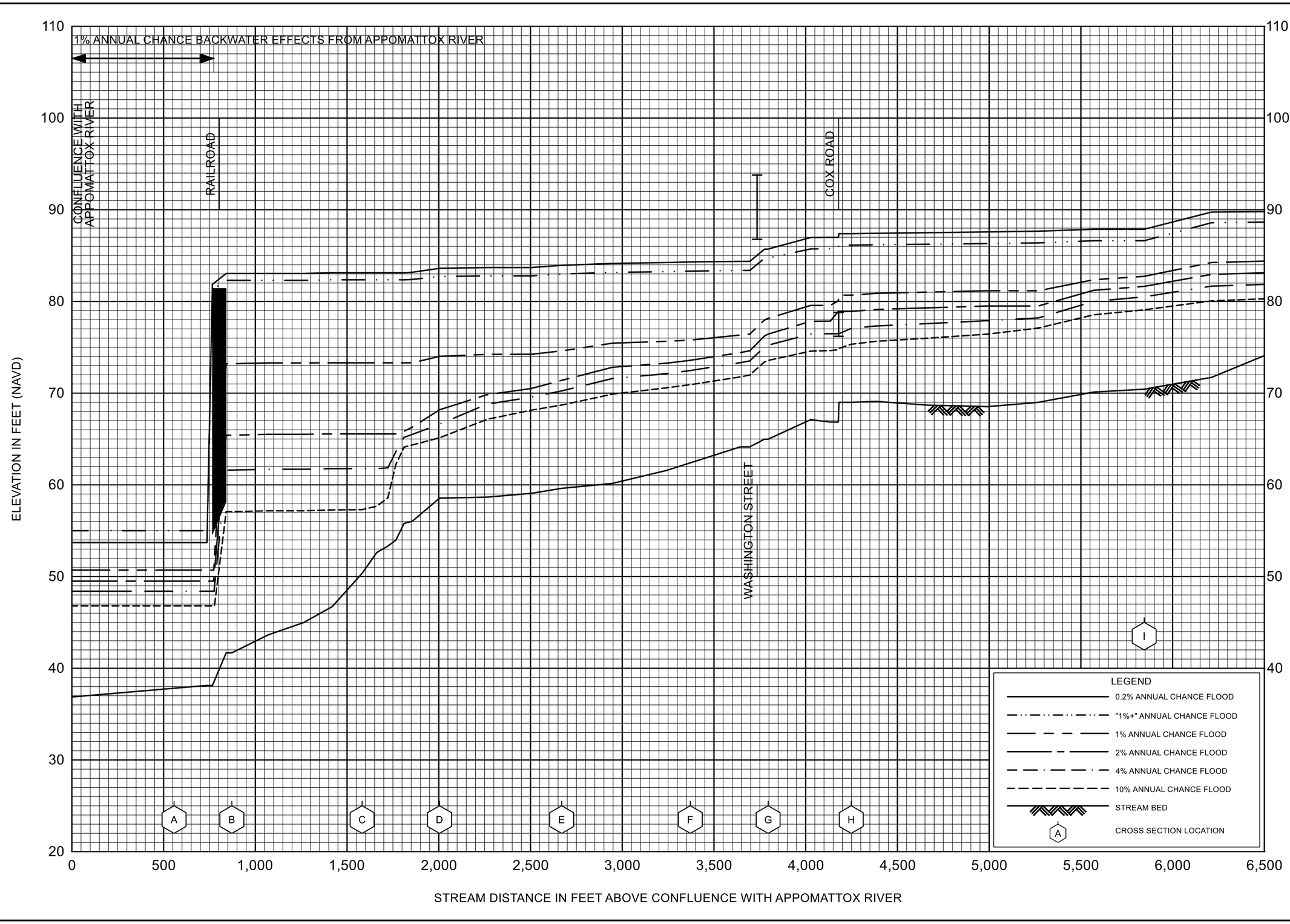
POOR CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, VA

INDEPENDENT CITY

16P



FLOOD PROFILES

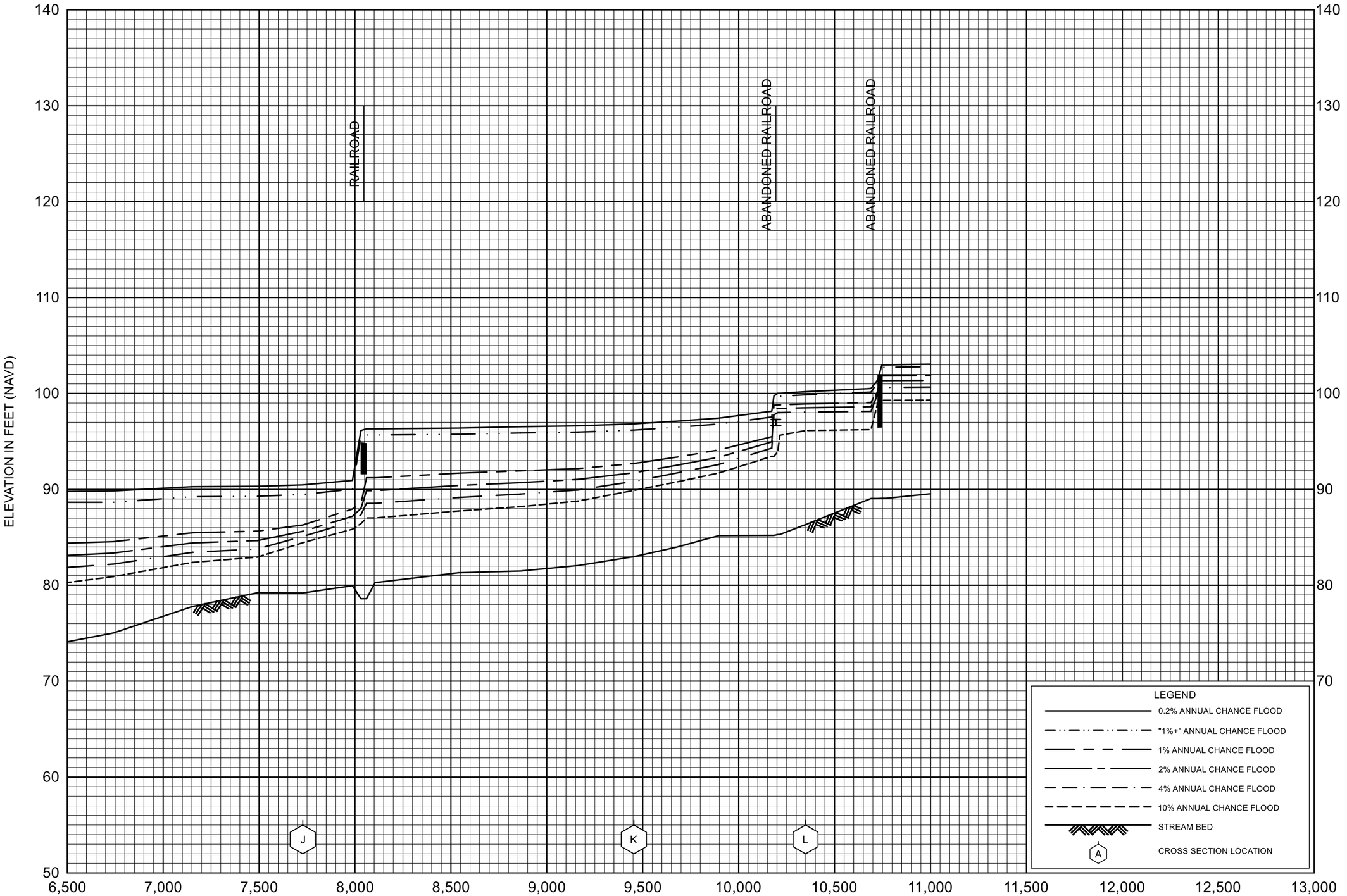
ROHOIC CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, VA

INDEPENDENT CITY

17P



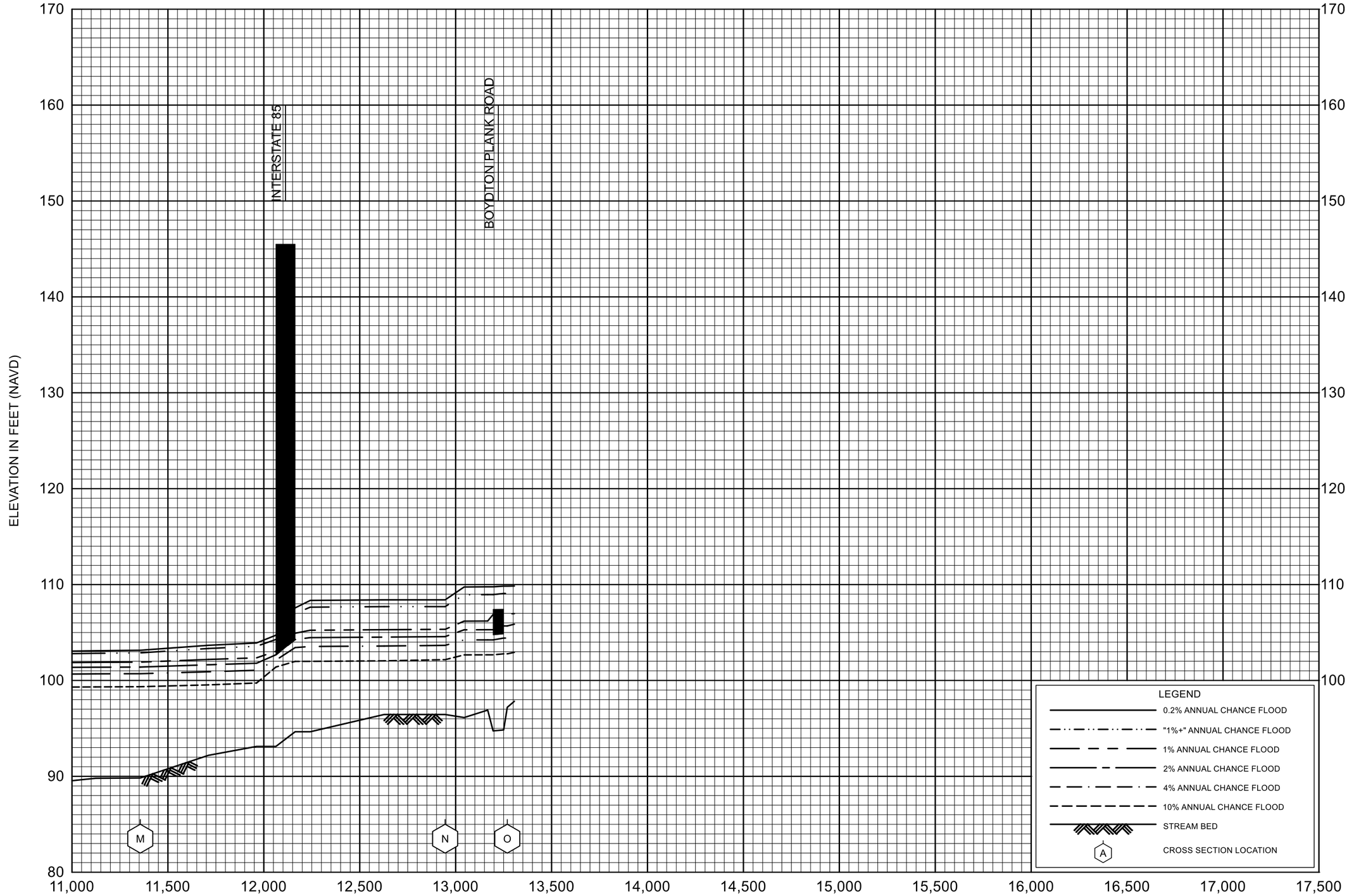
FLOOD PROFILES

ROHOIC CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, VA

INDEPENDENT CITY



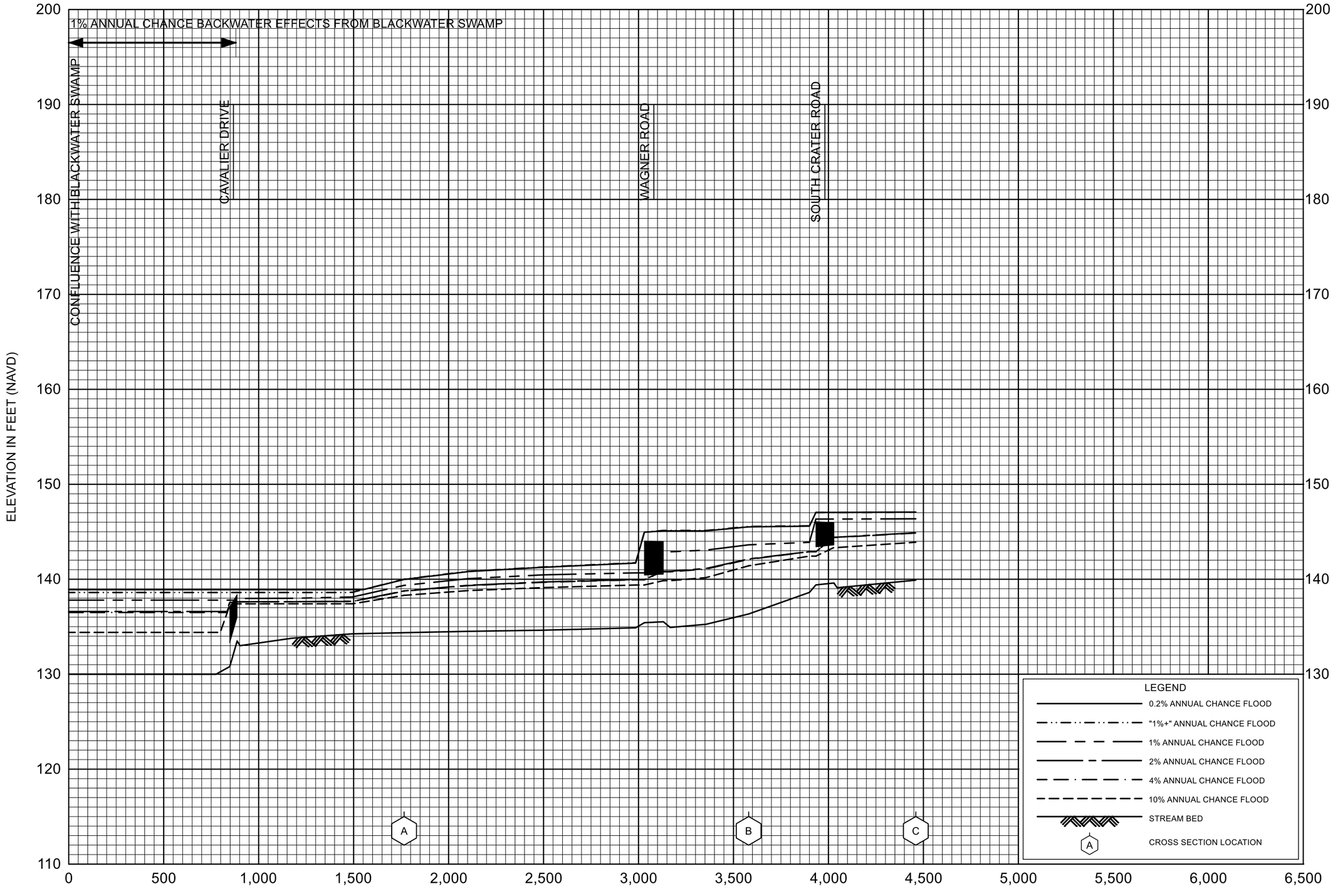
FLOOD PROFILES

ROHOIC CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, VA

INDEPENDENT CITY



FLOOD PROFILES

UNNAMED TRIBUTARY 1 TO BLACKWATER SWAMP

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, VA

INDEPENDENT CITY

Chapter 58 - FLOODS

Footnotes:

*--- (**1**) ---*

Cross reference— *Buildings and building regulations, ch. 22; environment, ch. 50; health and sanitation, ch. 62; planning, ch. 82; streets, sidewalks and other public places, ch. 98; subdivisions, app. A; utilities, ch. 114; waterways, ch. 122; zoning, app. B.*

State Law reference— *Flood Damage Reduction Act, Code of Virginia, § 10.1-600 et seq.*

ARTICLE I. - IN GENERAL

Secs. 58-1—58-30. - Reserved.

ARTICLE II. - FLOODPLAIN MANAGEMENT

Footnotes:

*--- (**2**) ---*

Editor's note— *Ord. No. 11-09, adopted January 18, 2011, amended Article II in its entirety to read as herein set out. Former Article II, §§ 58-31—58-37, 58-56—58-59, 58-76, 58-77, 58-96—58-98, 58-116, 58-136—58-138, 58-156—58-158, 58-176 pertained to similar subject matter, and derived from Code 1981, §§ 13.5-1—13.5-7, 13.5-19—13.5-22, 13.5-34, 13.5-35, 13.5-41—13.5-43, 13.5-50, 13.5-67—13.5-73.*

DIVISION 1. - GENERALLY

Sec. 58-31. - Purpose.

This article is adopted pursuant to the authority granted to localities by chapter 6 of title 10.1 of the Code of Virginia Flood Protection and Dam Safety (Va. Code § 10.1-600 et. seq.) The purpose of these provisions is to prevent the loss of life and property, the creation of health and safety hazards, the disruption of commerce and governmental services, the extraordinary and unnecessary expenditure of public funds for flood protection and relief, and the impairment of the tax base by:

(1) Regulating uses, activities and development which, acting alone or in combination with other existing or future uses, activities and development, will cause unacceptable increases in flood heights, velocities and frequencies.

(2) Restricting or prohibiting certain uses, activities and development from locating within areas subject to flooding.

(3) Requiring all those uses, activities and developments that do occur in floodprone areas to be protected and floodproofed against flooding and flood damage.

(4) Protecting individuals from buying lands and structures which are unsuited for intended purposes, because of flood hazards.

(Ord. No. 11-09, 1-18-2011)

Sec. 58-32. - Definitions.

Unless the context specifically indicates otherwise, the meaning of terms used in this article shall be as follows:

Base flood means a flood that, on the average, is likely to occur once every 100 years (i.e., that has a one percent chance of occurring each year, although such a flood may occur in any year).

Base flood elevation means the Federal Emergency Management Agency designated 100-year water surface elevation. The water surface elevation of the base flood in relation to the datum specified on the community's flood insurance rate map. For the purposes of this article, the 100-year flood or one percent annual chance flood.

Basement means any area of the building having its floor sub-grade (below ground level) on all sides.

Crater Regional Building Code Board of Appeals means the board appointed to review appeals made by individuals with regard to decisions of the building official and/or zoning administrator in the interpretation of this article.

Development means any manmade change to improved or unimproved real estate, including but not limited to, buildings or other structures, the placement of manufactured homes, streets and other paving, utilities, filling, grading, excavation, mining, dredging, drilling operations, or storage of equipment or materials.

Elevated building means a non-basement building built to have the lowest floor elevated above the ground level by means of fill, solid foundation perimeter walls, pilings, or columns (posts and piers).

Encroachment means the advance or infringement of uses, plant growth, fill, excavation, buildings, permanent structures or development into a floodplain, which may impede or alter the flow capacity of a floodplain.

Existing manufactured home park/subdivision means a manufactured home park or subdivision for which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including, at a minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads) is completed before September 18, 1990.

Expansion to an existing manufactured home park/subdivision means the preparation of additional sites by the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including, at a minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads).

Flood or *flooding* means:

(1) A general or temporary condition of partial or complete inundation of normally dry land areas from:

(a) The overflow of inland or tidal waters; or,

(b) The unusual and rapid accumulation or runoff of surface waters from any source.

(c) Mudflows which are proximately caused by flooding as defined in paragraph (1)(b) of this definition and are akin to a river of liquid and flowing mud on the surfaces of normally dry land areas, as when earth is carried by a current of water and deposited along the path of the current.

(2) The collapse or subsistence of land along the shore of a lake or other body of water as a result of erosion or undermining caused by waves or currents of water exceeding anticipated cyclical levels or suddenly caused by an unusually high water level in a natural body of water, accompanied by a severe storm, or by an unanticipated force of nature such as flash flood or an abnormal tidal surge, or by some similarly unusual and unforeseeable event which results in flooding as defined in paragraph (1)(a) of this definition.

Flood insurance rate map (FIRM) means an official map of a community, on which the Administrator has delineated both the special hazard areas and the risk premium zones applicable to the community. A FIRM that has been made available digitally is called a digital flood insurance rate map (DFIRM).

Flood insurance study (FIS) means an examination, evaluation and determination of flood hazards and, if appropriate, corresponding water surface elevations, or an examination, evaluation and determination of mudflow and/or flood-related erosion hazards.

Floodplain means:

(1) A relatively flat or low land area adjoining a river, stream or watercourse which is subject to partial or complete inundation; or

(2) An area subject to the unusual and rapid accumulation or runoff of surface water from any source.

Floodprone area means any land area susceptible to being inundated by water from any source.

Flood proofing means any combination of structural and non-structural additions, changes, or adjustments to structures which reduce or eliminate flood damage to real estate or improved real property, water and sanitary facilities, structures and their contents.

Floodway means the designated area of the floodplain required to carry and discharge floodwaters of a given magnitude. For the purposes of this article, the floodway shall be capable of accommodating a flood of the 100-year magnitude.

Freeboard means a factor of safety usually expressed in feet above a flood level for purposes of floodplain management. Freeboard tends to compensate for the many unknown factors that could contribute to flood heights greater than the height calculated for a selected size flood and floodway conditions, such as wave action, bridge openings, and the hydrological effect of urbanization in the watershed. When a freeboard is included in the height of a structure, the flood insurance premiums will be significantly cheaper.

Highest adjacent grade means the highest natural elevation of the ground surface prior to construction next to the proposed walls of a structure.

Historic structure means any structure that is:

(1) Listed individually in the national register of historic places (a listing maintained by the department of interior) or preliminarily determined by the secretary of the interior as meeting the requirements for individual listing on the national register;

(2) Certified or preliminarily determined by the secretary of the interior as contributing to the historical significance of a registered historic district or a district preliminarily determined by the secretary to qualify as a registered historic district;

(3) Individually listed on a state inventory of historic places in states with historic preservation programs which have been approved by the secretary of the interior; or

(4) Individually listed on a local inventory of historic places in communities with historic preservation programs that have been certified either:

(a) By an approved state program as determined by the secretary of the interior; or

(b) Directly by the secretary of the interior in states without approved programs.

Lowest floor means the lowest floor of the lowest enclosed area (including basement). An unfinished or flood-resistant enclosure, usable solely for parking of vehicles, building access or storage in an area other than a basement area is not considered a building's lowest floor; provided, that such enclosure is not built so as to render the structure in violation of the applicable non-elevation design requirements of Federal Code 44CFR § 60.3.

Manufactured home means, for the purposes of this article, a structure, transportable in one or more sections, which is built on a permanent chassis and is designed for use with or without a permanent foundation when attached to the required utilities. The term "manufactured home" does not include a recreational vehicle. For floodplain management purposes the term "manufactured home" also includes park trailers, travel trailers, and other similar vehicles placed on a site for greater than 180 consecutive days.

Manufactured home park/subdivision means a parcel (or contiguous parcels) of land divided into two or more lots for rent or sale for the placement of manufactured homes.

New construction means, for the purposes of determining insurance rates, structures for which the start of construction commenced on or after March 16, 1981 and includes any subsequent improvements to such structures. For floodplain management purposes, the term "new construction" means structures for which the start of construction commenced on or after September 18, 1990, and includes any subsequent improvements to such structures.

New manufactured home park/subdivision means a manufactured home park or subdivision for which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including, at a minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads) is completed on or after September 18, 1990.

Recreational vehicle means, for purposes of this article, a vehicle which is:

(1) Built on a single chassis.

(2) Four hundred square feet or less when measured at the largest horizontal projection.

(3) Designed to be self-propelled or permanently towable by a light duty truck.

(4) Designed primarily not for use as a permanent dwelling but as temporary living quarters for recreational camping, travel, or seasonal use.

Shallow flooding area means a special flood hazard area with base flood depths from one to three feet where a clearly defined channel does not exist, where the path of flooding is unpredictable and indeterminate, and where velocity flow may be evident. Such flooding is characterized by ponding or sheet flow.

Special flood hazard area means the land in the floodplain subject to a one percent or greater chance of being flooded in any given year as determined in section 58-56 of this article.

Start of construction means, for other than new construction and substantial improvement, under the Costal Barriers Resource Act (P.L. 97-384), the date the building permit was issued, provided the actual start of construction, repair, reconstruction, rehabilitation, addition, placement, or other improvement was within 180 days of the permit date. The actual start means either the first placement of permanent construction of a structure on a site, such as the pouring of slab or footings, the installation of piles, the construction of columns, or any work beyond the stage of excavation, or the placement of a manufactured home on a foundation. Permanent construction does not include land preparation, such as clearing, grading and filling; nor does it include the installation of streets or walkways; nor does it include excavation for a basement, footings, piers, or foundations or the erection of temporary forms; nor does it include the installation on the property of accessory buildings, such as garages or sheds not occupied as dwelling units or not part of the main structure. For a substantial improvement, the actual start of construction means the first alteration on any wall, ceiling, floor, or other structural part of a building, whether or not the alteration affects the external dimensions of the building.

Structure means for flood plain management purposes, a walled and roofed building, including a gas or liquid storage tank, that is principally above ground, as well as a manufactured home.

Substantial damage means damage of any origin sustained by a structure whereby the cost of restoring the structure to its before damaged condition would equal or exceed 50 percent of the market value of the structure before the damage occurred.

Substantial improvement means any reconstruction, rehabilitation, addition or other improvement of a structure, the cost of which equals or exceeds 50 percent of the market value of the structure before the start of construction of the improvement. This term includes structures which have incurred substantial damage regardless of the actual repair work performed. The term does not, however, include either:

(1) Any project for improvement of a structure to correct existing violations of state or local health, sanitary, or safety code specifications which have been identified by the local code enforcement official and which are the minimum necessary to ensure safe living conditions; or

(2) Any alteration of a historic structure, provided that the alteration will not preclude the structure's continued designation as a historic structure.

Violation means the failure of a structure or other development to be fully compliant with the community's flood plain management regulations. A structure or other development without the elevation certificate, other certifications, or other evidence of compliance as required in this article is presumed to be in violation until such time as that documentation is provided.

Watercourse means a lake, river, creek, stream, wash, channel or other topographic feature on or over which waters flow at least periodically. Watercourse includes specifically designated areas in which substantial flood damage may occur.

(Ord. No. 11-09, 1-18-2011)

Cross reference— Definitions generally, § 1-2.

Sec. 58-33. - General penalty for violation of article.

Any person who fails to comply with any of the requirements or provisions of this article or directions of the director of planning or any authorized employee of the City of Petersburg shall be guilty of a class 1 misdemeanor as provided in section 1-14 of the Code of the City of Petersburg and subject to the penalties therefore.

In addition to the above penalties, all other actions are hereby reserved, including an action in equity for the proper enforcement of this article. The imposition of a fine or penalty for any violation of, or noncompliance with, this article shall not excuse the violation or noncompliance or permit it to continue; and all such persons shall be required to correct or remedy such violations or noncompliances within a

reasonable time. Any structure constructed, reconstructed, enlarged, altered or relocated in noncompliance with this article may be declared by the City of Petersburg to be a public nuisance and abatable as such. Flood insurance may be withheld from structures constructed in violation of this article.

(Ord. No. 11-09, 1-18-2011)

Sec. 58-34. - City disclaimer of liability for flood damages.

The degree of flood protection required by this article is considered reasonable for regulatory purposes, and is based upon scientific and engineering considerations. Floods more severe than the regulatory 100-year flood can and will occur on rare occasions, as flood heights may be increased by natural or manmade causes. The provisions of this article are not intended to imply that lands outside the designated floodplain districts, or development permitted within such districts, will be free from flooding or flood damage. This article shall not create liability on the part of the city, or any officer or employee thereof, for any flood damages that may result under compliance with the provisions of this article or any administrative decision lawfully made pursuant thereto.

(Ord. No. 11-09, 1-18-2011)

Sec. 58-35. - Applicability of article; compliance; abrogations; greater restrictions.

(a) *Applicability*. The provisions of this article shall apply to all lands within the jurisdiction of the City of Petersburg and identified as being floodprone within this article.

(b) *Compliance*. No land shall hereafter be developed, and no structure shall be located, relocated, constructed, reconstructed, enlarged, or structurally altered, except in full compliance with the terms and provisions of this article and any other applicable ordinances and regulations which apply to uses within the jurisdiction of this article.

(c) *Abrogation and greater restrictions*. This article supersedes any article currently in effect in floodprone areas. However, any underlying article shall remain in full force and effect to the extent that the provisions of such article are more restrictive.

(Ord. No. 11-09, 1-18-2011)

Sec. 58-36. - Administration and enforcement; duties of zoning administrator and building inspector.

It shall be the responsibility of the zoning administrator of the city to administer and enforce the provisions of this article; provided, however, that this section shall not be construed to abrogate the authority and responsibility of the building inspector of the city to administer and enforce the provisions of the Virginia Uniform Statewide Building Code, as it applies to development within designated floodplain districts.

(Ord. No. 11-09, 1-18-2011)

Cross reference— Administration, ch. 2.

Sec. 58-37. - Building permits required; applications; required information.

(a) A building permit to erect, construct, reconstruct, enlarge, extend or structurally alter any building or structure within a floodplain district shall be required, as set forth in the Virginia Uniform Statewide Building Code. Applications for building permits shall be filed with the building inspector of the city; and no such permit shall be issued until the applicant has furnished satisfactory evidence that all necessary permits have been received from those governmental agencies from which approval is required by state and federal law and the zoning administrator has reviewed all sites to assure that they are reasonably safe from flooding. Under no circumstances shall any use, activity, and/or development adversely affect the capacity of the channels or floodways of any watercourse, drainage ditch, or any other drainage facility or system.

(b) In addition to information required by the building code to be provided in conjunction with building permit applications, the following shall be included when the property involved is located, wholly or partially, within a floodplain district:

(1) The elevation of the 100-year flood, and delineation of the 100-year floodplain.

(2) The elevation of the lowest floor, including basement.

(3) The elevation to which a nonresidential structure is to be floodproofed.

(4) Topographic information showing existing and proposed ground elevations.

(Ord. No. 11-09, 1-18-2011)

Secs. 58-38—58-55. - Reserved.

DIVISION 2. - DISTRICT BOUNDARIES

Sec. 58-56. - Established; criteria.

(a) *Areas included; basis for delineation*. The various floodplain districts shall include areas subject to inundation by waters of the 100-year flood. The basis for the delineation of these districts shall be the flood insurance study (FIS) and the flood insurance rate maps (FIRM) for the City of Petersburg prepared by the Federal Emergency Management Agency, Federal Insurance Administration, dated February 4, 2011, and any subsequent revisions or amendments thereto.

(b) *Floodway district*. The floodway district is delineated for purposes of this article, using the criterion that a certain area within the floodplain must be capable of carrying the waters of the 100-year flood without increasing the water surface elevation of that flood more than one foot, at

any point. The areas included in this district are specifically defined in table 5 of the flood insurance study referenced in subsection (a) of this section and shown on the accompanying flood boundary and floodway map.

(c) *Special floodplain district*. The special floodplain district shall be those areas identified as an AE zone on the maps accompanying the flood insurance study for which 100-year flood elevations have been provided.

(d) *Approximated floodplain district*. The approximated floodplain district shall be those areas identified as an A or A99 zone on the maps accompanying the flood insurance study. In these zones, no detailed flood profiles or elevations are provided, but the 100-year floodplain boundary has been approximated. For these areas, the 100-year flood elevations and floodway information from federal, state, and other acceptable sources shall be used when available. Where the specific 100-year flood elevation cannot be determined for this area using other sources of data, such as the U.S. Army Corps of Engineers Floodplain Information Reports, U.S. Geological Survey Floodprone Quadrangles, etc., then the applicant for the proposed use, development or activity shall determine this elevation in accordance with hydrologic and hydraulic engineering techniques. Hydrologic and hydraulic analyses shall be undertaken only by professional engineers or others of demonstrated qualifications, who shall certify that the technical methods used correctly reflect currently accepted technical concepts. Studies, analyses, computations, etc., shall be submitted in sufficient detail to allow a thorough review by the zoning administrator.

(e) *Shallow flooding district*. The shallow flooding district shall be those areas identified as zone AO or AH on the maps accompanying the flood insurance study.

(Ord. No. 11-09, 1-18-2011)

Sec. 58-57. - Official floodplain map designated.

The boundaries of the floodplain districts are established, as shown on the flood insurance rate map, which is declared to be a part of this article and which shall be kept on file at the office of the clerk of the city council.

(Ord. No. 11-09, 1-18-2011)

Sec. 58-58. - District boundary changes.

The delineation of any of the floodplain districts may be revised by the city council, where natural or manmade changes have occurred or where more detailed studies conducted or undertaken by the U.S. Army Corps of Engineers, or other qualified agency or individual, document the justification for such change. However, prior to any such change, approval must be obtained from the Federal Insurance Administration.

(Ord. No. 11-09, 1-18-2011)

Sec. 58-59. - Interpretations of boundaries; disputes.

Initial interpretations of the boundaries of the floodplain districts shall be made by the zoning administrator. Should a dispute arise concerning the boundaries of any of the districts, the crater regional building code board of appeals shall make the necessary determination. The person questioning or contesting the location of the district boundary shall be given a reasonable opportunity to present his case to the board of appeals and to submit his own technical evidence, if he so desires.

(Ord. No. 11-09, 1-18-2011)

Sec. 58-60. - Submitting technical data.

A community's base flood elevations may increase or decrease resulting from physical changes affecting flooding conditions. As soon as practicable, but not later than six months after the date such information becomes available, a community shall notify the Federal Insurance Administrator of the changes by submitting technical or scientific data. Such a submission is necessary so that upon confirmation of those physical changes affecting flooding conditions, risk premium rates and flood plain management requirements will be based upon current data.

(Ord. No. 11-09, 1-18-2011)

Secs. 58-61—58-75. - Reserved.

DIVISION 3. - DISTRICT USES, ACTIVITIES AND DEVELOPMENT

Subdivision I. - In General

Sec. 58-76. - District provisions, generally.

(a) All uses, activities and development occurring within any floodplain district shall be undertaken only upon the issuance of a building permit and requisite zoning approval. Such development shall be undertaken only in strict compliance with the provisions of this article, chapter 102 and all other applicable codes and articles, such as the Virginia Uniform Statewide Building Code. Prior to the issuance of any such permit, the zoning administrator shall require all applications to include evidence of compliance with all applicable state and federal laws.

(b) Under no circumstances shall any use, activity or development adversely affect the capacity of the channels or floodways of any watercourse, drainage ditch, or any other drainage facility or system.

(c)

New construction and substantial improvements shall be according to the VA USBC, and anchored to prevent flotation, collapse or lateral movement of the structure.

(d) Manufactured homes shall be anchored to prevent flotation, collapse, or lateral movement. Methods of anchoring may include, but are not limited to, use of over-the-top or frame ties to ground anchors. This standard shall be in addition to and consistent with applicable state anchoring requirements for resisting wind forces.

(e) New construction and substantial improvements shall be constructed with materials and utility equipment resistant to flood damage.

(f) New construction or substantial improvements shall be constructed by methods and practices that minimize flood damage.

(g) Electrical, heating, ventilation, plumbing, air conditioning equipment and other service facilities, including duct work, shall be designed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding.

(h) New and replacement water supply systems shall be designed to minimize or eliminate infiltration of flood waters into the system.

(i) New and replacement sanitary sewage systems shall be designed to minimize or eliminate infiltration of flood waters into the systems and discharges from the systems into flood waters.

(j) On-site waste disposal systems shall be located and constructed to avoid impairment to them or contamination from them during flooding.

In addition to provisions (a)—(h) above, in all special flood hazard areas, the additional provisions shall apply:

(k) Prior to any proposed alteration or relocation of any channels or of any watercourse, stream, etc., within this jurisdiction a permit shall be obtained from the U. S. Corps of Engineers, the Virginia Department of Environmental Quality, and the Virginia Marine Resources Commission (a joint permit application is available from any of these organizations). Furthermore, in riverine areas, notification of the proposal shall be given by the applicant to all affected adjacent jurisdictions, the department of conservation and recreation (division of dam safety and floodplain management) and the Federal Insurance Administrator.

(l) The flood carrying capacity within an altered or relocated portion of any watercourse shall be maintained.

Sec. 58-77. - Specific standards.

In all special flood hazard areas where base flood elevations have been provided in the flood insurance study or generated according [to] article 4, section 4.6, the following provisions shall apply:

(a) Residential construction:

(1) New construction or substantial improvement of any residential structure (including manufactured homes) shall have the lowest floor, including basement, elevated to or above the base flood elevation (recommend ≥ one foot freeboard).

(b) Nonresidential construction:

(1) New construction or substantial improvement of any commercial, industrial, or nonresidential building (or manufactured home) shall have the lowest floor, including basement, elevated to or above the base flood elevation (recommend ≥ one foot freeboard). Buildings located in all A1-30, AE, and AH zones may be flood-proofed in lieu of being elevated provided that all areas of the building components below the elevation corresponding to the BFE plus one foot are water tight with walls substantially impermeable to the passage of water, and use structural components having the capability of resisting hydrostatic and hydrodynamic loads and the effect of buoyancy. A registered professional engineer or architect shall certify that the standards of this subsection are satisfied. Such certification, including the specific elevation (in relation to mean sea level) to which such structures are floodproofed, shall be maintained by (title of community administrator).

(c) Elevated buildings: fully enclosed areas, of new construction or substantially improved structures, which are below the regulatory flood protection elevation shall:

(1) Not be designed or used for human habitation, but shall only be used for parking of vehicles, building access, or limited storage of maintenance equipment used in connection with the premises. Access to the enclosed area shall be the minimum necessary to allow for parking of vehicles (garage door) or limited storage of maintenance equipment (standard exterior door), or entry to the living area (stairway or elevator).

(2) Be constructed entirely of flood resistant materials below the regulatory flood protection elevation;

(3) Include, in zones A, AO, AE, and A1-30, measures to automatically equalize hydrostatic flood forces on walls by allowing for the entry and exit of floodwaters. To meet this requirement, the openings must either be certified by a professional engineer or architect or meet the following minimum design criteria:

a. Provide a minimum of two openings on different sides of each enclosed area subject to flooding.

b. The total net area of all openings must be at least one square inch for each square foot of enclosed area subject to flooding.

c. If a building has more than one enclosed area, each area must have openings to allow floodwaters to automatically enter and exit.

d.

The bottom of all required openings shall be no higher than one foot above the adjacent grade.

e. Openings may be equipped with screens, louvers, or other opening coverings or devices, provided they permit the automatic flow of floodwaters in both directions.

f. Foundation enclosures made of flexible skirting are not considered enclosures for regulatory purposes, and, therefore, do not require openings. Masonry or wood underpinning, regardless of structural status, is considered an enclosure and requires openings as outlined above.

(d) Manufactured homes, as defined in this article, that are placed or substantially improved on sites:

(1) Outside of a manufactured home park or subdivision;

(2) In a new manufactured home park or subdivision;

(3) In an expansion to an existing manufactured home park or subdivision; or

(4) In an existing manufactured home park or subdivision on which a manufactured home has incurred substantial damage, as the result of a flood;

shall be elevated on a permanent foundation such that the lowest floor of the manufactured home is elevated to or above the base flood elevation and shall be securely anchored to an adequately anchored foundation system to resist floatation, collapse, and lateral movement.

(e) Manufactured homes to be placed or substantially improved on sites in an existing manufactured home park or subdivision that are not subject to the provisions of subsection (d) of this section shall be elevated so that either:

(1) The lowest floor of the manufactured home is at or above the base flood elevation; or

(2) The manufactured home chassis is supported by reinforced piers or other foundation elements of at least equivalent strength that are no less than 36 inches in height above grade and is securely anchored to an adequately anchored foundation system to resist floatation, collapse, and lateral movement.

(f) Recreational vehicles placed on sites shall:

(1) Be on the site for fewer than 180 consecutive days;

(2) Be fully licensed and ready for highway use; or

(3) Meet the permit requirements for placement and the elevation and anchoring requirements for manufactured homes in subsection (d) or (e) of this section as appropriate.

(Ord. No. 11-09, 1-18-2011)

Sec. 58-78. - Design criteria for utilities and facilities.

(a) *Sanitary sewer facilities.* All new or replacement sanitary sewer facilities and private package sewage treatment plants (including all pumping stations and collector systems) shall be designed to minimize or eliminate infiltration of floodwaters into the systems and discharges from the systems into the floodwaters. In addition, such facilities shall be located and constructed to minimize or eliminate flood damage or impairment.

(b) *Water facilities*. All new or replacement water facilities shall be designed to minimize or eliminate infiltration of floodwaters into the system, and shall be located and constructed to minimize or eliminate flood damages.

(c) *Drainage facilities*. All storm drainage facilities shall be designed to convey the flow of surface water, without damage to persons or property. The systems shall ensure drainage away from buildings and on-site waste disposal sites. The city council may require a primarily underground system to accommodate frequent floods and a secondary surface system to accommodate larger, less frequent floods. Drainage facilities shall be designed to prevent the discharge of excess runoff onto adjacent properties.

(d) *Utilities*. All utilities, such as gas lines and electrical and telephone systems, being placed in floodprone areas shall be located, elevated (where possible) and constructed to minimize the chance of impairment during an occurrence of flooding.

(e) *Streets and sidewalks*. Streets and sidewalks shall be designed to minimize their potential for increasing and aggravating the levels of flood flow. Drainage openings shall be required to sufficiently discharge flood flows without unduly increasing flood heights.

(Ord. No. 11-09, 1-18-2011)

Secs. 58-79—58-95. - Reserved.

Subdivision II. - Floodway District

Sec. 58-96. - Improvements to offset development.

Encroachments, including fill, new construction, substantial improvements and other developments are prohibited unless certification such as hydrologic and hydraulic analyses (with supporting technical data) is provided to the zoning administrator demonstrating that encroachments shall not result in any increase in flood levels during occurrence of the base flood. Hydrologic and hydraulic analyses shall be undertaken only by professional engineers or others of demonstrated qualifications, who shall certify that the technical methods used correctly reflect currently-accepted technical concepts. Such improvements also shall be approved by all appropriate local and state authorities, as required in section 58-76.

(Ord. No. 11-09, 1-18-2011)

Sec. 58-97. - Manufactured homes, recreational vehicles.

The placement of any manufactured home or recreational vehicle within the floodway district is specifically prohibited.

(Ord. No. 11-09, 1-18-2011)

Sec. 58-98. - Permitted activities; prerequisites.

In the floodway district the following activities are permitted, provided they are in compliance with the provisions of this article and are not prohibited by any other ordinance, and provided that they do not require structures, fill or storage of materials and equipment:

(1) Agricultural uses, such as general farming, pasture, grazing, outdoor plant nurseries, horticulture, truck farming, forestry, sod farming, and wild crop harvesting.

(2) Public and private recreational uses and activities, such as parks, day camps, picnic grounds, golf courses, boat launching, and swimming areas, hiking and horseback riding trails, wildlife and nature preserves, game farms, fish hatcheries, skeet game ranges, and hunting and fishing areas.

(3) Accessory residential uses, such as yard areas, gardens, play areas, and pervious parking and loading areas.

(4) Accessory industrial and commercial uses, such as yard areas, pervious parking and loading areas, airport landing strips, etc.

(Ord. No. 11-09, 1-18-2011)

Secs. 58-99—58-115. - Reserved.

Subdivision III. - Special Floodplain and Approximated Floodplain Districts

Sec. 58-116. - Standards for the special floodplain district and approximated floodplain district

Until a regulatory floodway is designated, no new construction, substantial improvements, or other development (including fill) shall be permitted within the areas of special flood hazard, designated as zones A1-30 and AE on the flood insurance rate map, unless it is demonstrated that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase the water surface elevation of the base flood more than one foot at any point within the City of Petersburg.

Development activities in Zones A1-30, AE, and AH, on the City of Petersburg's Flood Insurance Rate Map which increase the water surface elevation of the base flood by more than one foot may be allowed, provided that the applicant first applies - with the City of Petersburg's endorsement - for a conditional flood insurance rate map revision, and receives the approval of the Federal Emergency Management Agency.

No structure shall be located within ten feet of the boundary of the special floodplain district and approximated floodplain district.

(Ord. No. 11-09, 1-18-2011)

Secs. 58-117—58-135. - Reserved.

DIVISION 4. - MODIFICATIONS, EXCEPTIONS; EXISTING STRUCTURES

Subdivision I. - In General

Sec. 58-136. - Conditions.

In accordance with applicable provisions of the Virginia Uniform Statewide Building Code, the crater regional building code board of appeals shall grant modifications to the provisions of the Virginia Uniform Statewide Building Code, pertaining to the manner of construction or materials to be used in the erection, alteration or repair of a building or structure in a floodplain district, only under the following conditions:

(1) No modification shall be granted for any proposed development within a floodway district that will cause any increase in flood levels during the 100-year flood.

(2) A modification shall only be granted upon the following:

(a) A showing of good and sufficient cause.

(b) A determination that failure to grant the modification would result in exceptional hardship to the applicant.

(c) A determination that the granting of the modification shall not result in unacceptable or prohibited flood heights, additional threats to public safety, or extraordinary public expense; and will not create nuisances, cause fraud on or victimization of the public, or conflict with existing codes or ordinances.

(3) A modification shall only be granted upon a determination that the modification is the minimum necessary, considering the flood hazard, to afford relief.

(Ord. No. 11-09, 1-18-2011)

Sec. 58-137. - Notification by board of appeals of increase in cost of flood insurance.

Upon granting a modification to construct a structure below the 100-year flood level, the crater regional building code board of appeals shall notify the applicant, in writing, that the cost of flood insurance will be commensurate with the increased risk resulting from such construction.

(Ord. No. 11-09, 1-18-2011)

Sec. 58-138. - Board of appeals to maintain records.

Records shall be maintained, by the Crater Regional Building Code board of appeals, of all modifications granted, including the justification for each, and shall be included in any reports required by, and submitted to, the emergency management agency.

(Ord. No. 11-09, 1-18-2011)

Secs. 58-139—58-155. - Reserved.

Subdivision II. - Special Exceptions

Sec. 58-156. - Special exceptions to requirements of article; conditions; documentation of affecting factors; authority of building inspector.

(1) The building inspector of the city shall have the authority to grant special exceptions to the provisions of this article, other than such provisions as pertain to the requirements of the Virginia Statewide Uniform Building Code; provided, that the applicant shall furnish sufficient information and documentation to satisfy the inspector as to the following factors:

(a) The danger to life and property due to increased flood heights or velocities caused by encroachments. No special exception shall be granted for any proposed use, development or activity within any floodway district that will cause any increase in the 100-year flood elevation.

(b) The danger that materials may be swept on to other lands, or downstream, to the injury of others.

(c) The proposed water supply and sanitation systems and the ability of these systems to prevent disease, contamination, and unsanitary conditions.

(d) The susceptibility of the proposed facility and its contents to flood damage and the effect of such damage on the individual owners.

(e) The importance of the services provided by the proposed facility to the community.

(f) The requirements of the facility for a waterfront location.

(g) The availability of alternative locations, not subject to flooding, for the proposed use.

(h) The compatibility of the proposed use with existing development and development anticipated in the foreseeable future.

(i) The relationship of the proposed use to the comprehensive plan and floodplain management program for the area.

(j) The safety of access to the property, in time of flood, by ordinary and emergency vehicles.

(k) The expected heights, velocity, duration, rate of rise, and sediment transport of the floodwaters expected at the site.

(l) The repair or rehabilitation of historic structures upon a determination that the proposed repair or rehabilitation will not preclude the structure's continued designation as a historic structure and the special exception is the minimum necessary to preserve the historic character and design of the structure.

(2) The building inspector may refer any application and accompanying documentation pertaining to any request for a special exception to any engineer or other qualified person or agency for technical assistance in evaluating the proposed project in relation to flood heights and velocities, and the adequacy of the plans for flood protection and other related matters.

(3) Special exceptions shall be issued only after the building inspector has determined that the granting of such will not result in:

(a) Unacceptable or prohibited increases in flood heights;

(b) Additional threats to public safety;

(c) Extraordinary public expense; and will not

(d) Create nuisances;

(e) Cause fraud or victimization of the public; or

(f) Conflict with local laws or ordinances.

A special exception shall only be issued upon the determination that the special exception is the minimum required to provide relief from any hardship to the applicant.

(Ord. No. 11-09, 1-18-2011)

Sec. 58-157. - Notification by building inspector of increase in cost of flood insurance.

Upon issuance of a special exception for any development or activity below the 100-year flood level, the building inspector shall notify the applicant, in writing, that the cost of flood insurance will be commensurate with the increased risk resulting from such development or activity.

(Ord. No. 11-09, 1-18-2011)

Sec. 58-158. - Records to be maintained by building inspector.

Records shall be maintained by the building inspector of all special exceptions granted, including the justification for each, and shall be included in any reports required by, and submitted to, the Federal Emergency Management Agency.

(Ord. No. 11-09, 1-18-2011)

Secs. 58-159—58-175. - Reserved.

Subdivision III. - Existing Structures

Sec. 58-176. - Existing structures in floodplain districts; conditions for continuation.

A structure or use of a structure or premises which lawfully existed before September 18, 1990, but which is not in conformity with these provisions may be continued, subject to the following conditions:

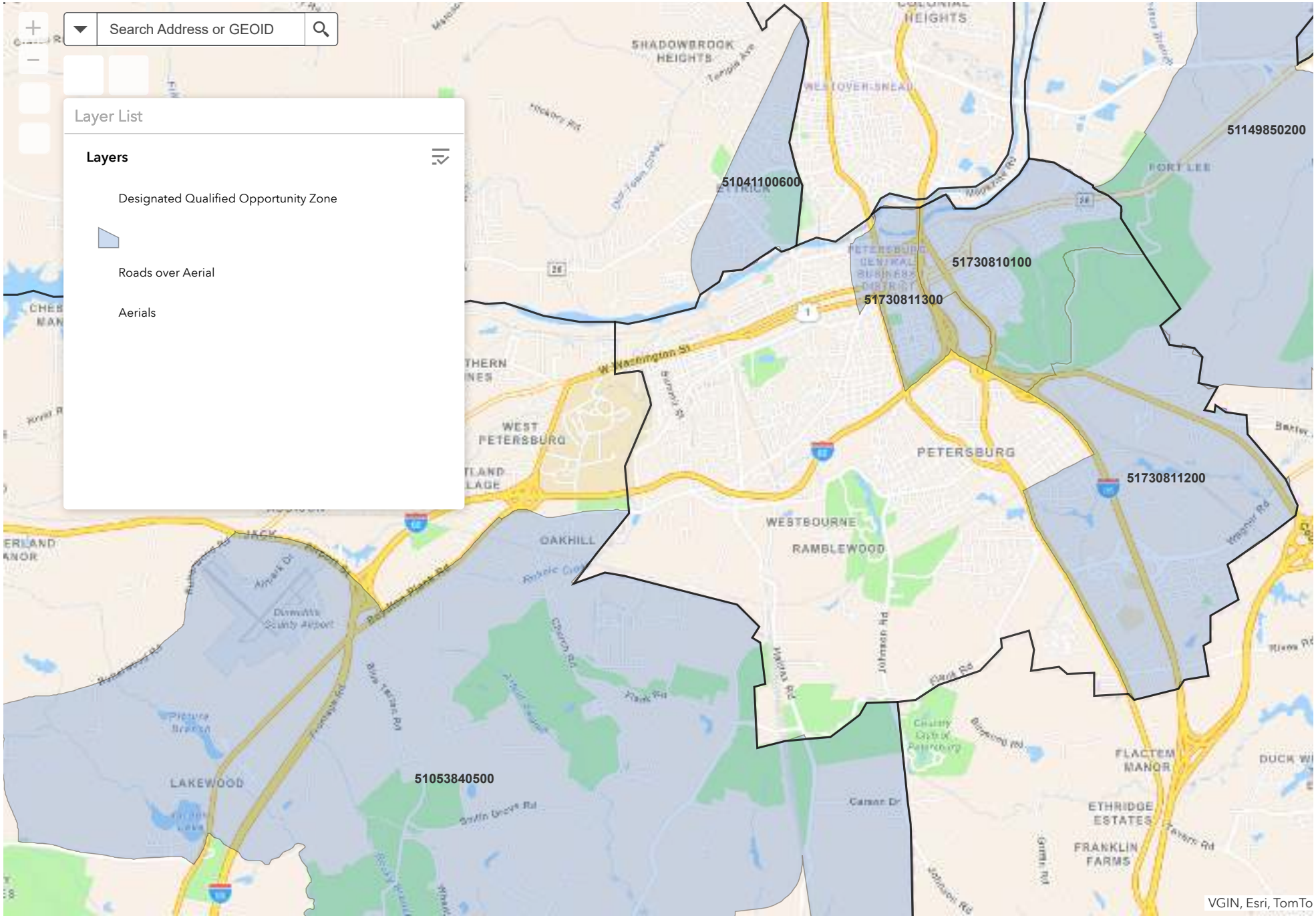
(1) Existing structures or uses located in floodway districts shall not be expanded or enlarged unless it has been demonstrated through hydrologic and hydraulic analyses performed in accordance with standard engineering practices that the proposed expansion would not result in any increase in the base flood elevation.

(2) Any modification, alteration, repair, reconstruction, or improvement of any kind to a structure and/or use located in any flood plain areas to an extent or amount of less than 50 percent of its market value shall conform to the VA USBC.

(3) The modification, alteration, repair, reconstruction, or improvement of any kind to a structure and/or use, regardless of its location in a floodplain area to an extent or amount of 50 percent or more of its market value shall be undertaken only in full compliance with this article and shall require the entire structure to conform to the VA USBC.

(4) Uses, or adjuncts thereof, which are, or become, nuisances shall not be permitted to continue.

(Ord. No. 11-09, 1-18-2011)



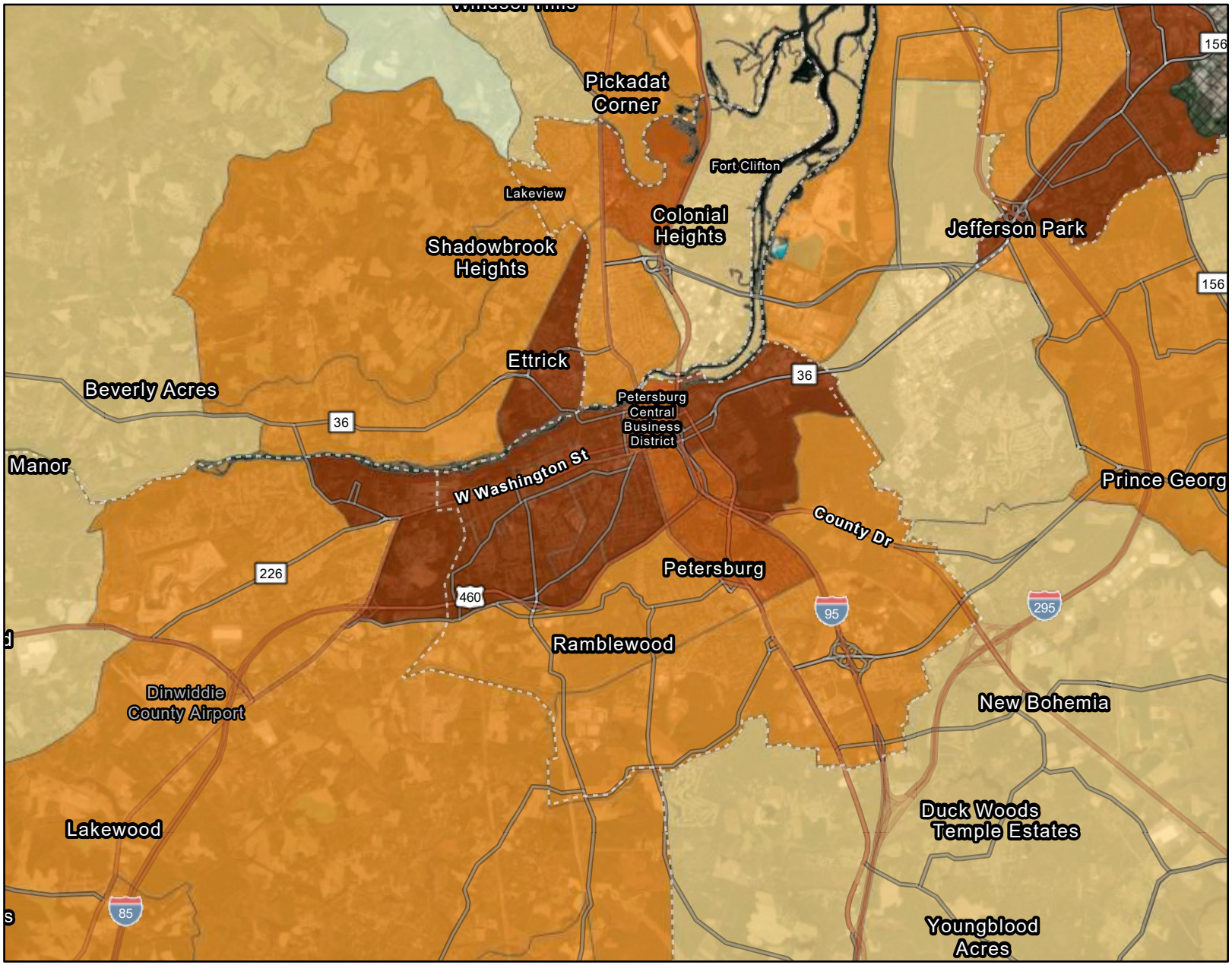
1mi

-77.259 37.266 Degrees

Petersburg SVI 2024

Social Vulnerability Index

- Very Low Social Vulnerability
- Low Social Vulnerability
- Moderate Social Vulnerability
- High Social Vulnerability
- Very High Social Vulnerability
- Not inlcuded in the analysis



December 13, 2024

Scale: 1:138,429

0 0.75 1.5 3 mi

0 1.25 2.5 5 km

VGIN, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, USDA, USFWS
Earthstar Geographics
William & Mary, Center for Coastal Resources Management (CCRM) at Virginia Institute of Marine Science (VIMS)

VIMS | William & Mary

ADAPT VA

Legend

- BMP
- Weir
- Riser
- PipeIO
- Unverified Structure

Manhole

- Revisit
- Revisit - Traffic
- Surveyed

Inlet

- Revisit
- Revisit - Traffic
- Surveyed
- FEMA Bridge & Culvert Cross Sections
- Streams
- OpenChannel

Pipe

- Revisit
- Revisit - Traffic
- Surveyed
- City Boundary

City Neighborhoods

- Not Yet Modeled
- Modeled in Phase I

Joseph Jenkins Robert St

Project Area

W. Bank Street

US Route 301

Virginia Geographic Information Network (VGIN)

N W E S

0 0.02 0.04 0.08 0.12 Miles

STORMWATER INFRASTRUCTURE MAPPING
PETERSBURG BANK STREET MAP

TIMMONS GROUP

Bank Street Phase 2 Benefit-Cost Analysis

The City of Petersburg is applying for Community Flood Preparedness Fund assistance to include the final design-build engineering plans and construction for the repair of the channel conveying Brickhouse Run located on the 110 W Bank St property. The existing drainage conveyance has segments of open channel and segments of block-type stone masonry construction which has failed, creating sink hole conditions for an existing structure on the property. The enclosed channel is believed to have been constructed in the 1800s and has been modified throughout the years. An emergency inspection of the channel and adjacent culvert identified conditions as poor and in need of immediate remediation. A DCR Site Visit also recommended mitigation measures be taken through mitigation to the parking lot as well as stabilization and reinforcement of Bank Street. The proposed work will daylight previously enclosed and failing sections of channel and convert the existing property into green space. The scope of work includes acquisition of the property which is currently privately owned. A schedule of benefits is provided below.

Property on Bank Street

Benefits

- Stabilization of underground conveyance will prevent sinkhole expansion on the property, safeguarding public safety and the usability of the space.
- Strategic retreat of existing land uses from areas vulnerable to flooding.
- Removal of impervious surfaces within the Resource Protection Area.
- Provide land cover change with the benefit of providing stormwater runoff pollutant reduction associated with the City's Chesapeake Bay TMDL Action Plan.
- Creation of open space for recreation use such as connection to existing trail systems.
- Habitat creation/ecological uplift associated with planting of vegetation within the Resource Protection Area.

These risk reduction benefits of the repair and construction of the channel and resulting benefits exceed the costs of the project. Therefore, the project is highly cost effective.

Figure 1. Photo depicting building collapse into exposed channel.

Maintenance and Management Plan

June 2025 – June 2035

The City of Petersburg will use funds from the CFPF to enable the completion of the repair of the underground channel, the daylighting construction for the section of the channel which has collapsed, and the conversion of the parcel the work exists on to green space. The City is committed to regularly funding maintenance and improvements to continue to identify and mitigate structural risks from the aging channel, in order to ensure consistent functionality of the channel and of the roadways and structures it runs under.

Matthew S. Wells
Director

Frank N. Stovall
Deputy Director for Operations

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

Laura Ellis
Interim Deputy Director for Administration and Finance

COMMONWEALTH of VIRGINIA
DEPARTMENT OF CONSERVATION AND RECREATION

April 6, 2022

Darryl Walker
Department of Public Works
1340 E. Washington St.
Petersburg, VA 23803

RE: City of Petersburg Resilience Plan - CFPF

Dear Mr. Walker:

Thank you for submitting the City of Petersburg Resilience Plan. After careful review and consideration, the Virginia Department of Conservation and Recreation has deemed the Plan complete and meets all the criteria outlined in the January 2022 Community Flood Preparedness Fund Grant Manual. This approval will remain in effect for a period of three years, ending on April 30, 2025.

The following elements were evaluated as part of this review:

1. **Element 1: It is project-based with projects focused on flood control and resilience. DCR RESPONSE**

    a. Project-based: Water Quality Master Plan (2018)—defines the watershed geographic areas within the City of Petersburg with discrete projects identified and completed technical studies.

Projects focused on flood control and resilience include:

Neighborhood	Flood Control Project
Battlefield	Flood remediation and drainage improvement
Robert E. Lee	Drainage improvement to alleviate localized flooding

**additional projects listed within the Chesapeake Bay TMDL Action Plan and Hazard Mitigation Plan.*

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

    a. Nature-based infrastructure: Flood mitigation projects throughout the city incorporate nature-based solutions and were identified for maximum use within specific watersheds through the Comprehensive Plan 2040 and the Water Quality Master Plan.

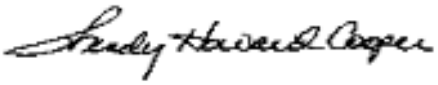
3. **Element 3: It includes considerations of all parts of a locality regardless of socioeconomics or race. DCR RESPONSE**
    a. All parts of a locality: Submitted Plans include all parts of the city and have community-scale benefits.
    b. Social vulnerability: Lakemont Drainage Study identifies social vulnerability characteristics of the neighborhood. Hazard Mitigation Plan incorporates demographic information for the entire city.

4. **Element 4: It includes coordination with other local and inter-jurisdictional projects, plans, and activities and has a clearly articulated timeline or phasing for plan implementation. DCR RESPONSE**
    a. Coordination with other projects, plans, and activities: Contains the planning processes and frameworks which outline local and Federal collaboration for integrated flood adaptation strategies.
    b. Clearly articulated timeline or phasing for plan implementation: Water Quality Master Plan contains a strategy with clearly articulated phases for implementation.

5. **Element 5: Is based on the best available science, and incorporates climate change, sea level rise, storm surge (where appropriate), and current flood maps.**
    a. Plans and studies based on scientifically supported water-resources analysis.

VA DCR looks forward to working with you as you work to make the City of Petersburg a more resilient community. 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.

Sincerely,



Wendy Howard Cooper, Director
Dam Safety and Floodplain Management

cc: Darryl Glover, DCR
cc: Angela Davis, DCR

City of Petersburg, Virginia

Resilience Plan

Prepared in accordance with the 2022 Grant Manual for the Virginia Community Flood Preparedness Fund

Community Identification Number (CID#): 510112

March 2022

TABLE OF CONTENTS

ACRONYMS & ABBREVIATIONS

Bay	Chesapeake Bay
BMP	Best management practice
CITY	City of Petersburg
CWA	Clean Water Act
DEQ	Virginia Department of Environmental Quality
DPU	Petersburg Department of Public Utilities
DPW	Petersburg Department of Public Works
EMA	Easement and Maintenance Agreement
EPA	United States Environmental Protection Agency
GIS	Geographic information systems
HHW	Household Hazardous Wastes
HUC	Hydrologic Unit Code
IDDE	Illicit Discharge Detection and Elimination
MEP	Maximum Extent Possible
MS4	Municipal Separate Storm Sewer System
NMP	Nutrient Management Plan
SWM	Stormwater Management
SWPPP	Stormwater Pollution Prevention Plan
TMDL	Total Maximum Daily Load
VPDES	Virginia Pollution Discharge & Elimination System Permit
VSMP	Virginia Stormwater Management Program

EXECUTIVE SUMMARY

Per the 2022 Grant Manual for the Virginia Community Flood Preparedness Fund, the Resilience Plan must include the following elements:

1. It is project-based with projects focused on flood control and resilience.
2. It incorporates nature-based infrastructure to the maximum extent possible.
3. It includes considerations of all parts of a locality regardless of socioeconomics or race.
4. It includes coordination with other local and inter-jurisdictional projects, plans, and activities and has a clearly articulated timeline or phasing for plan implementation.
5. Is based on the best available science, and incorporates climate change, sea level rise, storm surge (where appropriate), and current flood maps.

The City of Petersburg, by reference, has incorporated the following documents into its initial Resilience Plan, developed March 28, 2022:

- Richmond-Crater Multi-Regional Hazard Mitigation Plan (2017 Update): Executive Summary for the City of Petersburg: http://www.craterpdc.org/environment/documents/hazmit2017/Petersburg_HMP_JusSumMaps_2017.pdf
- City of Petersburg Comprehensive Plan (2014): http://www.petersburg-va.org/DocumentCenter/View/1836/Comprehensive-Plan-Working-Master-Copy-CC1?bidId=
- Draft Comprehensive Plan 2040: http://www.petersburg-va.org/DocumentCenter/View/6042/2021CompPlan?bidId=
- Water Quality Master Plan: Appendix A
- Chesapeake Bay TMDL Action Plan: https://www.petersburgva.gov/295/Stormwater-Management, and Chesapeake Bay TMDL Action Plan 2021: Appendix B
- Lakemont Drainage Study (2019): Appendix C
- Flood Maps: https://msc.fema.gov/portal/search?AddressQuery=petersburg#searchresultsanchor

Consistent with the multitude of objectives of the reference plans, the City of Petersburg is committed to implementing nature-based infrastructure to the maximum extent possible. Please refer to **Table *1*** for a list of required elements and the specific reference location.

Table 1. Required Element Reference Table.

Item #	Required Item	Reference Document (Page #)	Rationale
1	Project-based (focused on flood control and resilience).	Hazard Mitigation Plan (pages 9-11)	Please refer specifically to Petersburg-1 and Petersburg-15 of the Hazard Mitigation Plan.
2	Nature-based infrastructure (MEP).	Resilience Plan Executive Summary (pg. 3) Draft Comprehensive Plan 2040 (page 5) Chesapeake Bay TMDL Action Plan (all inclusive)	The City of Petersburg is committed to incorporating nature-based solutions to the maximum extent possible. Refer to the Executive Summary of this document and item number 4 of the Draft Comprehensive Plan 2040 where the City will include sustainable measures to provide quality groundwater and surface water. Further, stream restoration, a nature-based solution was specifically studied and identified as a strategy in the City's Chesapeake Bay TMDL Action Plans (2015 and 2021).
3	Inclusive City-wide regardless of socioeconomics or race.	Hazard Mitigation Plan (all inclusive) Draft Comprehensive Plan 2040 (all inclusive) City-wide Water Quality Master Plan (all inclusive) Chesapeake Bay TMDL Action Plan (all inclusive) Flood Maps (all inclusive)	The City has developed multiple planning documents that encompass the entire jurisdiction, regardless of socioeconomics or race. These planning level documents are then used to further localized studies to identify projects. An example of this model is the Water Quality Master Plan that identified the need for neighborhood drainage studies and the subsequent Lakemont Neighborhood Drainage Study.
4	Inter-jurisdictional with clearly articulated timeline or phasing.	Hazard Mitigation Plan (pages 9-11) Chesapeake Bay TMDL Action Plan (all inclusive) Lakemont Neighborhood Drainage Study (page 11)	The Hazard Mitigation Plan includes a table with projects, or strategies, identified on pages 9-11 that include a column titled timeframe for specific implementation. The Chesapeake Bay TMDL Action Plan includes nature-based solutions that are intended to be completed by June 30, 2025, in accordance with the City's MS4 Permit. The Lakemont Neighborhood Drainage Study, which is an outcome of the City's Water Quality Master Plan includes projects that were prioritized (phasing) by the impacted community and are currently being implemented.
5	Based on best available science, incorporates climate change, sea level rise, storm surge, and current flood maps.	Chesapeake Bay TMDL Action Plan (all inclusive) Water Quality Master Plan (pages 1, 3, 14, *etc*.) Lakemont Neighborhood Drainage Study (pages 7-25) Flood Maps (all inclusive)	The Chesapeake Bay TMDL Action Plan, Water Quality Master Plan, and Lakemont Neighborhood Drainage Study were all prepared by professional engineers by one of the City's on-call consultants, Timmons Group. Each document was prepared based on best available science, including the most recent and relevant guidance from the Department of Environmental Quality and best engineering practices current at the time of report preparation. The Flood Maps were updated based on best available science and published for public comment in 2021 by FEMA.

Appendix A

Appendix B

Appendix C