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August 19, 2021

Kristen Owen, AICP, CFM
Floodplain and Dam Safety Manager
Department of Public Works
4305 E Parham Road
Henrico, VA 23228-2745

RE: Henrico County Resilience Plan Submission - CFPF

Dear Ms. Owen:

Thank you for providing an overview of your Resilience Plan, and informing DCR of the various plans that Henrico County will be utilizing to fulfill the Resilience Plan submission requirements. 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 June 2021 Community Flood Preparedness Grant Manual. This approval will remain in effect for a period of three years, ending on August 20, 2024.

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

Meets Criteria as Written.

- a. Project-based: Several mitigation projects have been already been completed, and additional projects have been proposed and prioritized based on the Flood Risk Score, developed by Henrico County and Virginia Tech's Urban Affairs and Planning Program, that incorporates the use of flood risk factors and score multipliers based on location and social vulnerability to identify increased risk areas, and can be found in the *Henrico County Resilience Plan*.

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

Meets Criteria as Written.

- a. Natural and nature-based flood management measures are cited in the recommendations for moving forward and as a strategy in projects throughout the community, in the *Henrico County Resilience Plan*.

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*State Parks • Soil and Water Conservation • Outdoor Recreation Planning
Natural Heritage • Dam Safety and Floodplain Management • Land Conservation*

3. Element 3: It includes considerations of all parts of a locality regardless of socioeconomics or race. DCR RESPONSE

Meets Criteria as Written.

- a. All parts of a locality: The entirety of Henrico County's floodplains were evaluated as part of the *Henrico County Resilience Plan*.
- b. Social vulnerability: Flood Risk Score Map developed with social vulnerability factors incorporated in the *Henrico County Resilience Plan*.
- c. Demographic Analysis: Low-income geographic areas identified and mapped in the *Henrico County Resilience Plan*.

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

Meets Criteria as Written.

- a. Includes coordination with other local and inter-jurisdictional projects, plans, and activities: Goals, action items, and planning priorities outlined in the County's Resilience Plan intersect with planned, ongoing, and extant activities and planning documents described in "*Plans or Projects Currently Underway or Recently Completed*" on page 3.
- b. Has a clearly articulated timeline or phasing for plan implementation: Plan identifies several projects aimed at increasing flood resilience in the County with accompanying timelines for anticipated completion in Appendix 9. Chapters 5 and 7 of the *Richmond-Crater Multi-Regional Hazard Mitigation Plan* also address project priorities for the region.

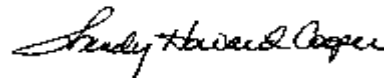
5. Element 5: Is based on the best available science, and incorporates climate change, sea level rise, storm surge (where appropriate), and current flood maps.

Meets Criteria as Written.

- a. The *Richmond-Regional-Crater PDC Multi-Regional Hazard Mitigation Plan* references best-available data regarding flood risk from FEMA and the NCDC in sections 5.3, 5.6.6 and 5.6.9.

VA DCR looks forward to working with you as you work to make Henrico County 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 M. Glover, DCR

Henrico County
Department of Public Works

Local Resilience Plan

August 2021



County of Henrico, Virginia
P.O. Box 90775
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Introduction

Henrico County, initially founded in 1611 as the City of Henrico, is in central Virginia and makes up about one third of the Richmond metro area. The county is approximately 425 square miles in land area and has a population around 330,000. The western part of the county encompasses the transitional zone of Virginia Piedmont to Atlantic Coastal Plain which results in the county having a lot of hydric soils that are slow to drain and areas that are naturally swampy environments. The demand for development, existing historic and cultural resources, and environmental characteristics of the county present unique challenges that must be considered when addressing flood risk.

Resilience Overview

As part of a regional resilience planning effort with PlanRVA, the following definition of resilience was established: *Resilience is the ability of individuals, institutions, and communities to adjust, adapt, and recover from short term events and long-term stressors. Resilience relies on flexibility, perseverance, planning, and inclusionary processes and is improved through collaboration across disciplines and across jurisdictions. Resilience is best achieved through a balance of regional cooperation and unique local solutions to challenges that exist at a range of scales.*

This plan was created to inventory existing plans and programs that will increase flood resilience in Henrico County. A Plan and Program Inventory can be found in [Appendix 1](#).

Flood Risk Overview

Henrico County is in the Chesapeake Bay Watershed and located between two major rivers – the James River to the south and the Chickahominy River to the north, with many tributaries in between. The James River is a very large, channelized system, with a watershed that stretches nearly to West Virginia. Major flooding along the James River has been reduced in some areas by the construction of the Richmond Flood Wall, but high water levels on sunny days are often observed from rain events happening in the western part of the state. The Chickahominy River is very flat and has a wide floodplain with lots of riparian areas that frequently experience standing water. Flash flooding also occurs in the more urbanized areas of the county. Additionally, parts of Eastern Henrico are tidally influenced and subject to future sea level rise. Given the variety of flood risks experienced, the County recognizes that a one-size-fits all approach to flood mitigation will not work.

Henrico County joined the National Flood Insurance Program (NFIP) on February 4, 1981. As part of this participation, the county has mapped the Special Flood Hazard Area (SFHA) or the 100-year floodplain throughout the county. In the early 2000s, Henrico County was a Cooperating Technical Partner with FEMA and created floodplain maps for both FEMA SFHAs and county-identified, Community SFHAs. FEMA SFHAs are based on drainage areas of one square mile or larger, while Community SFHAs are based on drainage areas of 100-acres, beyond what has been mapped by FEMA. These areas combined make up the SFHA that is regulated by the County's floodplain ordinance. The county's most recent SFHAs have been effective since December 18, 2007 and make up about 15% of the county's land area.

In addition to SFHAs, the county has mapped Repetitive Loss Areas and Recurrent Flood Areas. There are areas that have or are expected to experience repeated losses from flooding. These areas were created using SFHAs, NFIP flood insurance claims and policy data from FEMA, and county drainage complaints. The Repetitive Loss Areas include NFIP repetitive loss data. According to [FEMA](#), a repetitive loss structure

is “an NFIP-insured structure that has had at least 2 paid flood losses of more than \$1,000 each in any 10-year period since 1978.” Henrico County has 24 repetitive loss structures in the county. A map of the county’s SFHAs, Repetitive Loss Areas, and Recurrent Flood Areas is available in [Appendix 2](#).

Since the 1980s, Henrico County has adopted and enforced higher regulatory standards for development in the SFHA, such as prohibited dwellings in the SFHA. Because of this, potential flood risk faced by the county has been avoided. However, there are still approximately 1,200 existing residential structures and 200 commercial structures in the SFHA. Additionally, over 7,000 properties in the county experience problems with drainage.

Additionally, there are 35 dams in the county. Five of these dams are owned by the County and regulated by the state: Canterbury (Pump Rd.) Dam, Echo Lake Dam, Cox Rd. Dam, Wyndham Dam, and Wellesley Dam. While dams themselves are not a flood risk, overtopping or failure of a dam could result in significant flooding. For this reason, dams have a dam break inundation zone mapped depicting the area that is expected to be flooded based on different dam failure scenarios. These inundation areas must also be considered when reviewing new development.

Goals & Objectives

1. Protect citizens from the life-threatening hazards associated with flooding regardless of socioeconomics or race.
2. Protect public and private property from damage relating to flooding.
3. Preserve and restore the natural and beneficial functions of the floodplain.
4. Utilize best available science and consider the effects of climate change on flood risks.
5. Improve and maintain the public’s understanding of flooding risks and the impacts of those risks on residents, property owners, and businesses.
6. Utilize a collaborative approach to address flood risks.

Flood Risk Score Overview

Henrico County recently partnered with Virginia Tech’s Urban Affairs and Planning Program to develop a Flood Risk Score that could be used to help prioritize flood mitigation projects in the County. As part of this project, students in a graduate level Hazard Mitigation Planning class researched existing flood risk, ordinances, GIS data, and plans in the County, as well as potential mitigation strategies for addressing flood risk.

Using the [Flood Risk Assessment and Risk Reduction Plan for Charlotte-Mecklenburg County, North Carolina](#) as an example, students developed a Flood Risk Score for Henrico County. This scoring system considers different flood risk factors, such as if a property, structure, and/or driveway would be impacted by flood water, to establish an Impact Based Score. There are then score multipliers based on location, such as being in a repetitive loss area or dam break inundation zone, and social vulnerability. The social vulnerability information used in this score is based on the [Virginia Social Vulnerability Index Score](#) created by the Virginia Institute of Marine Science.

A breakdown of the Flood Risk Score is included in [Appendix 3](#), along with a property example in [Appendix 4](#). [Appendix 5](#) includes a map of the Flood Risk Score without the social vulnerability factor considered, while [Appendix 6](#) includes a map of the Flood Risk Score with the social vulnerability factor considered.

By comparing these maps, it's clear that more parcels have a higher flood risk when social vulnerability is considered.

Plans or Projects Currently Underway or Recently Completed

In addition to those included in the Plan and Program Inventory, Henrico County is currently in the process of developing or implementing several plans and projects that will continue to increase flood resilience.

- **Floodplain Ordinance Rewrite:** In 2021, the Department of Public Works and the County Attorney's Office rewrote the floodplain ordinance to clarify requirements, simplify the permitting process, and ensure compliance with state and federal programs. As part of this rewrite, the floodplain ordinance was moved in County Code from Chapter 24: Zoning to Chapter 10: Environment. This process also created a standalone floodplain development permit, to ensure all development in the Special Flood Hazard Area is properly permitted, as required by the NFIP.
- **Floodplain Technical Guidance Manual:** In 2021, the Department of Public Works completed a Floodplain Technical Guidance Manual to support the new floodplain ordinance. This manual includes additional information for how the ordinance is implemented, such as documentation submittal requirements for permitting, floodplain map change procedures, and more.
- **Floodplain Website Updates:** In 2021, the Department of Public Works completed a website update for the Design Division, including the Floodplain Management and Dam Safety pages. The website update added new pages, updated content, and changed the design of the webpages to simplify technical data and improve useability. This update also included updates to the online GIS maps for the public to view available flood and dam information.
- **Design Manual Update:** In 2021, the Department of Public Works revised the Design Manual, the first complete revision since 2012. This update included changes to address residential drainage issues in new construction and created a new Lot Grading Certification.
- **Zoning and Subdivision Ordinances Rewrite:** In 2021, the Planning Department completed a complete rewrite of the Zoning and Subdivision Ordinances, the first comprehensive revision of these key documents in six decades.
- **Regional Hazard Mitigation Plan Update:** The current regional Hazard Mitigation Plan was adopted in 2017. PlanRVA and the Crater Planning District Commission (PDC) are currently working on the regular, five-year update of this plan. This update will incorporate more recent data, revise risk assessments, and update mitigation strategies.
- **Floodplain Management Plan Development:** The Department of Public Works is currently working with the U.S. Army Corps of Engineers, Norfolk District to create a county-wide floodplain management plan. This plan is intended to go beyond what is included in the regional hazard mitigation plan to dive deeper into flood risk and identify strategies and solutions that are unique to the County.
- **Regional Resilience Plan Development:** PlanRVA is currently development a regional resilience plan, through funding from the Coastal Zone Management Program. This plan will look at resilience to multiple hazards, not just flooding, and may also align with the Virginia Coastal Resilience Master Plan goals. The items included in this Local Resilience Plan will be considered in the regional plan, and the regional plan is intended to replace this Local Resilience Plan once finalized.

- **FEMA Special Flood Hazard Area Map Updates:** The County’s current Flood Insurance Rate Maps have been effective since December 18, 2007. FEMA Region 3 is currently updating the special flood hazard areas created by FEMA in Henrico County. It is anticipated that preliminary maps will be available in late 2021, with the final maps going effective in Winter 2023-2024. As part of this effort, FEMA Region 3 is also working with the U.S. Army Corps of Engineers, Norfolk District to update additional streams with floodplains based on HEC-2 models from the 1970s that did not get incorporated into the FEMA update.
- **Community Special Flood Hazard Area Map Updates:** Henrico County has Community Special Flood Hazard Areas based on the 100-year floodplain for drainage areas of 100-acres, mapped beyond what FEMA mapped as Special Flood Hazard Areas. These maps were developed in the early 2000s when the County was a Cooperating Technical Partner with FEMA and have been effective since December 18, 2007. The County is planning to begin updates of the special flood hazard areas created by the County in 2022 to align with the FEMA updates.
- **Flood Inundation Mapping on the James River:** Henrico County has been working with the U.S. Army Corps of Engineers, Norfolk District and the Virginia Silver Jackets team to develop flood inundation mapping for the James River, based on the City Locks stream gage and the Westham stream gage. This inundation mapping will assist Henrico County, Chesterfield County, and the City of Richmond to be better prepared for potentially flooding from the James River by predicting areas that will flood based on weather forecasts. When complete, this mapping will be added to the National Weather Service’s Advanced Hydrologic Prediction Service website.
- **Green City Project:** This proposed, mixed-use development is envisioned as an “ecodistrict” and would be designed around principles that promote environmental sustainability, civic engagement, and inclusion. Work on the privately funded project may begin in late 2021. Additional information is available on the [Henrico County website](#).
- **Housing Assistance:** Each year the County allocates Community Development Block Grant funds, HOME Program funds, and local County funds for a variety of housing improvement programs and opportunities for new homeowners, such as critical home repairs. The use of these funds supports the County’s overall Comprehensive Revitalization Strategy and the related programs are designed to serve a variety of purposes intended to maintain an excellent quality of life.

Strategies to Increase Flood Resilience

1. Continue participation in the National Flood Insurance Program (NFIP).
2. Join and maintain participation in the Community Rating System (CRS) program.
3. Develop and implement a flood mitigation program for flood-prone structures to reduce flood risk and pursue available grant funding. As part of this program, identify equitable mitigation actions that address the county’s unique flood risks (riverine, tidal, flash flooding, stormwater runoff).
4. Preserve and restore floodplains to reduce flood risk, improve water quality, improve wildlife habitat, and provide useable green space for county residents.
5. Continue to enforce higher regulatory standards for development in and around mapped floodplains.
6. Incorporate flood resilience initiatives into existing county programs and plans.

7. Increase and continue outreach to county residents, businesses, and professional organizations (realtors, insurance agents, developers, etc.) about flood risk, flood insurance, floodplain development requirements, and available resources.
8. Increase and maintain floodplain management training for staff that process development permit applications and increase staff size to accommodate needs of increased or new resiliency efforts.

Recommendations for Moving Forward

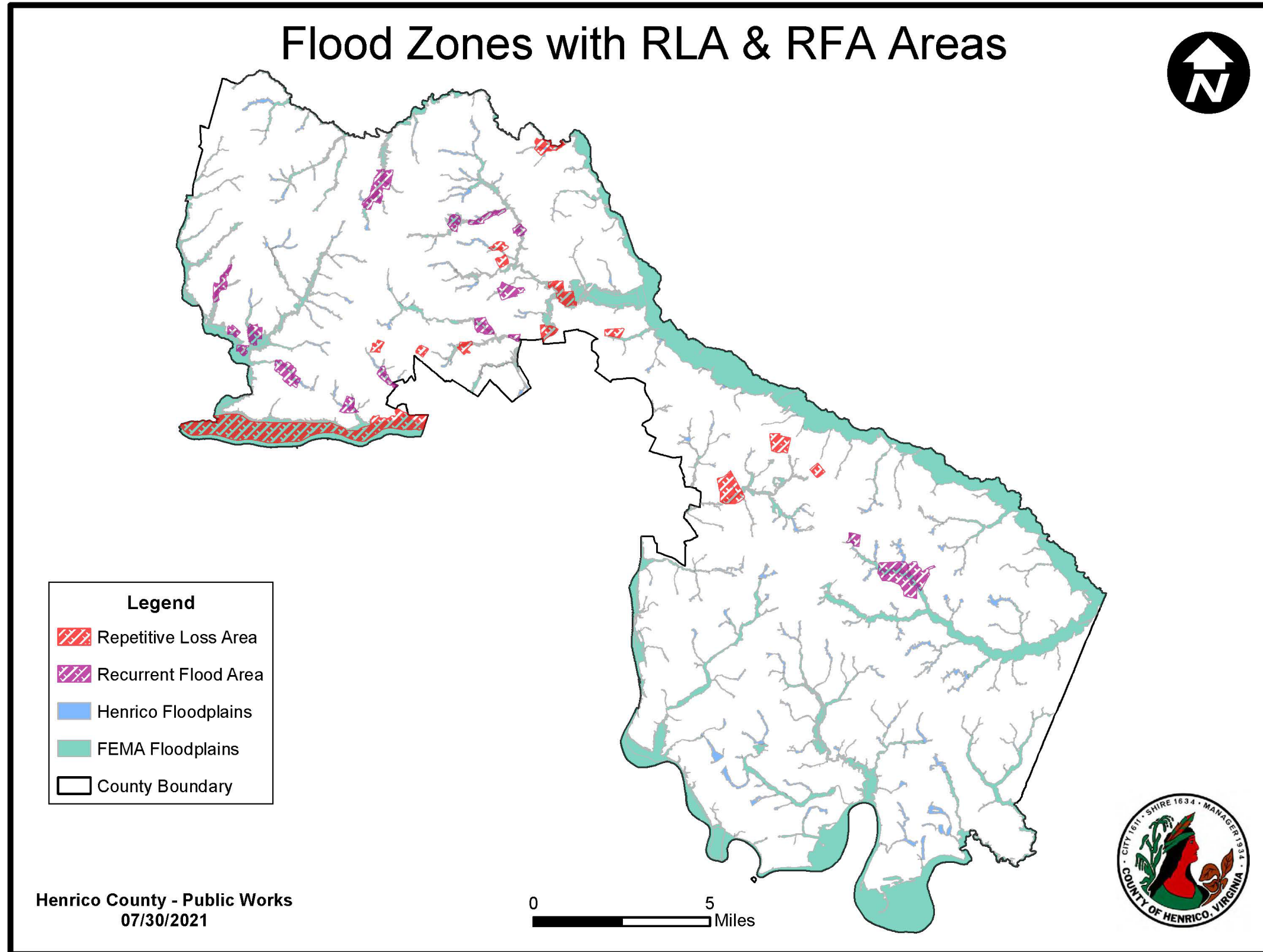
The following are recommendations for actions the County can take to increase its flood resilience.

1. Continue allocating dedicated funding to address residential drainage issues, acquisitions, and restoration work for creeks and streams, like that approved by the Board of Supervisors in 2021.
2. Place additional emphasis on the building permit process and improve education of internal staff and external stakeholders to prevent structures from being placed or improved in flood-prone areas.
3. Continue to pursue joining the CRS program and maintain participation in the future.
4. Install a regular schedule for dam inspections and maintenance activities for county-owned dam.
5. Build relationships with private dam owners and ensure available dam break inundation zone mapping and emergency action plans have been shared with the County.
6. Utilize existing data to identify priority mitigation areas for larger-scale acquisition projects with multiple benefits versus single property buyouts with limited possibilities for implementing nature-based solutions.
7. Evaluate existing county-owned properties for potential for floodplain open space and/or implementing nature-based solutions prior to selling or vacating the property.
8. Evaluate creative strategies for acquiring flood-prone properties, such as offering rent-back options, to accommodate various circumstances including the increased cost of living in areas outside of flood-prone areas.
9. Continue coordination efforts related to floodplain management, dam safety, and hazard mitigation with other local and regional agencies, such as Emergency Management, Fire, Police, Recreation and Parks, Planning, Community Revitalization, PlanRVA, etc.).
10. Regularly conduct tabletop exercises with Emergency Management and other public safety agencies related to dam safety and flooding.
11. Provide technical support to residents experiencing drainage issues, such as providing recommendations for solutions, survey support, and engineering. Additionally, the County may be able to provide support for projects that benefit multiple property owners or situations where projects are required to prevent or mitigate damages that would affect multiple properties.
12. Evaluate opportunities to retrofit existing structures to mitigate the risks of flooding such as elevation or dry floodproofing; however, the County will prioritize nature-based solutions.
13. Revise existing floodplain maps utilizing best available data and extend floodplain maps to include all streams beyond 100-acre drainage areas.
14. Develop future conditions mapping for flood risk that considers future development, climate change, sea level rise, etc.
15. Implement a Program for Public Information (PPI) to increase flood-related outreach in the County.
16. Increase the number of Certified Floodplain Managers (CFMs) on staff.


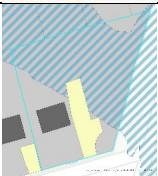
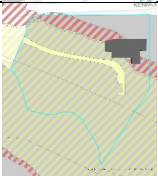
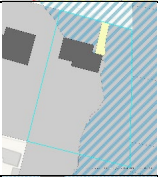
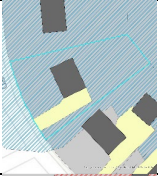

Appendix 1: Plan and Program Inventory

Plan/Program Components	Comprehensive Plan, 2026	Richmond-Crater Multi-Regional Hazard Mitigation Plan, 2017	Emergency Operations Plan, 2021	Floodplain Management Ordinance, 2021	Zoning Ordinance, 2021	Subdivision Ordinance, 2021	Capital Improvement Program (CIP), FY21-22 - FY30-31	Dam Safety Program	Watershed Program	Other
Equity based strategic policies for local government-wide flood protection & prevention	Chapter 4	Chapter 7	N/A	Division 1	Article 1, Division 1	Article 1, Division 1	N/A	N/A	N/A	Local Resilience Plan
Proposed projects that enable communities to adapt to and thrive through natural or human hazards	Chapter 9	Chapter 7	N/A	N/A	N/A	N/A	CIP	N/A	N/A	Local Resilience Plan
Documentation of existing social, economic, natural, and other conditions present in the local government	Chapter 3	Chapter 4, Chapter 5	Volume 1: Basic Plan	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Review of the vulnerabilities and stressors, both natural and social in the local government	Chapter 3, Chapter 5, Chapter 8, Appendices	Chapter 5	Volume 1: Basic Plan	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Forward-looking goals, actionable strategies, and priorities as seen through an equity-based lens	Chapter 4, Chapter 7	Chapter 7	Volume 1: Basic Plan	N/A	N/A	N/A	N/A	N/A	N/A	Local Resilience Plan
Strategies that guide growth and development away from high-risk locations that may include strategies in comprehensive plans or other land use plans or ordinances or other studies, plans or strategies adopted by a local government	Chapter 4, Chapter 5	N/A	N/A	Division 4	Article 3	Article 5	N/A	N/A	N/A	Local Resilience Plan
Proposed acquisition of land or conservation easements or identification of areas suitable for conservation particularly areas identified as having high flood attenuation benefit by <i>ConserveVirginia</i> or similar data driven tools	Chapter 6, Chapter 8, Chapter 9	N/A	N/A	N/A	Article 3	Article 5	N/A	N/A	N/A	Local Resilience Plan
Identification of areas suitable for property buyouts in frequently flooded areas	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Local Resilience Plan
Identification of critical facilities and their vulnerability throughout the local government such as water and sewer or other types identified as “lifelines” by FEMA	Chapter 11	Chapter 5	Volume 1: Basic Plan	N/A	N/A	N/A	CIP	N/A	N/A	N/A
Identified ecosystems/wetlands/floodplains suitable for permanent protection	Chapter 8, Chapter 9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Watershed Restoration Areas	N/A
Identified incentives for restoring riparian and wetland vegetation	Chapter 8	N/A	N/A	N/A	N/A	Article 5	N/A	N/A	Chesapeake Bay TMDL Credits	N/A
A framework for implementation, capacity building and community engagement	Chapter 12	Chapter 4, Chapter 7	Volume 1: Basic Plan	N/A	N/A	N/A	N/A	N/A	N/A	Local Resilience Plan

Plan/Program Components	Comprehensive Plan, 2026	Richmond-Crater Multi-Regional Hazard Mitigation Plan, 2017	Emergency Operations Plan, 2021	Floodplain Management Ordinance, 2021	Zoning Ordinance, 2021	Subdivision Ordinance, 2021	Capital Improvement Program (CIP), FY21-22 - FY30-31	Dam Safety Program	Watershed Program	Other
Strategies for creating knowledgeable, inclusive community leaders and networks	Chapter 12	Chapter 3	Volume 1: Basic Plan	N/A	N/A	N/A	CIP	N/A	N/A	Local Resilience Plan
A community dam safety inventory and risk assessment posed by the location and condition of dams	N/A	<i>Will be included in updated HMP.</i>	N/A	N/A	Article 2, Division 3	Article 2, Division 3	N/A	Dam EAPs	N/A	Local Resilience Plan
A characterization of the community including population, economics, cultural and historic resources, dependence on the built environment and infrastructure and the risks posed to such infrastructure and characteristics by flooding from climate change, sea level rise, tidal events or storm surges or other weather	Chapter 3	Chapter 4	Volume 1: Basic Plan	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Strategies to address other natural hazards that would cause, affect, or result from flooding events, including earthquakes, storage of hazardous materials, landslides/mud/debris flow/rock falls, prevention of wildfires that would result in denuded lands making flooding, mudslides, or similar events more likely, or preparations for severe weather events including tropical storms or other severe storms, including winter storms	N/A	Chapter 5	Volume 1: Basic Plan	Division 4	Article 3	Article 3, Article 5	N/A	N/A	N/A	N/A



Appendix 3: Flood Risk Score Breakdown

Table 1: Flood Risk Score – Impact Based Scoring Matrix					
Criteria	Property Flood Impacts	Base Points	Points Assigned Per Storm Event Recurrence Interval		
			100-yr (1% annual chance)	500-yr (0.2% annual chance)	
A	Flooding of any portion of the property		250	2.5	0.5
B	Flooding of any portion of the driveway		250	2.5	0.5
C	Driveway is completely surrounded by floodwater		750	7.5	1.5
D	Flood water is touching a portion of the structure		1000	10	2
E	Property is completely surrounded by flood water		1100	11	2.2
F	Structure is completely surrounded by flood water		500	5	1
G1	Structure is completely surrounded by flood water AND is residential			500	5
G2	Structure is completely surrounded by flood water AND is commercial			300	3
G3	Structure is completely surrounded by flood water AND is a critical facility			2700	27
G4	Structure is completely surrounded by flood water AND is a multi-family residential			1400	14

Note: Can only select one of the following per property: G1, G2, G3, G4.

Table 2. Location Based Multipliers	
Structure located near area impacted by storm drainage overflows*	1.3
Structure located in floodway	1.1
Structure is located within a dam inundation zone*	1.4
Structure is in a repetitive loss area	1.5
<i>Note: * indicates that this multiplier has not yet been implemented</i>	

Table 3. Social Vulnerability Multipliers	
Property SoVI Score: High social vulnerability	1.5
Property SoVI Score: Moderate Social Vulnerability	1.3
Property SoVI Score: Not Socially Vulnerable or Not Included in Analysis	1

Table 4: Flood Risk Level Based on Score	
Flood Risk Score (FRS)	Flood Risk Level
≤ 3.25	Low
≤ 15	Medium
≤ 40	High
> 44	Very High

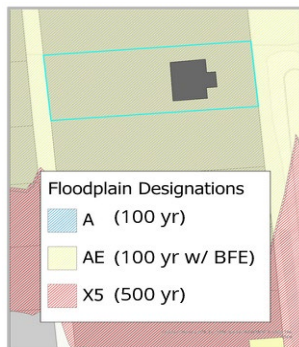
Appendix 4: Flood Risk Score – Property Example

GPIN: 783-744-4862

Property Flood Impact Base Score			
Criteria	Property Flood Impacts	Storm Event*	Points
A	Flooding of any portion of the property	100	2.5
B	Flooding of any portion of the driveway	NA	0
C	Driveway is completely surrounded by floodwater	NA	0
D	Flood water is touching a portion of the structure	100	10
E	Property is completely surrounded by flood water	100	11
F	Structure is completely surrounded by flood water	100	5
G1	Structure is completely surrounded by flood water AND is residential	100	5
G2	Structure is completely surrounded by flood water AND is commercial	NA	0
G3	Structure is completely surrounded by flood water AND is a critical facility	NA	0
G4	Structure is completely surrounded by flood water AND is a multi-family residential	NA	0
<i>*Storm event for which this first occurs.</i>			
Total Impact Based Score			33.5

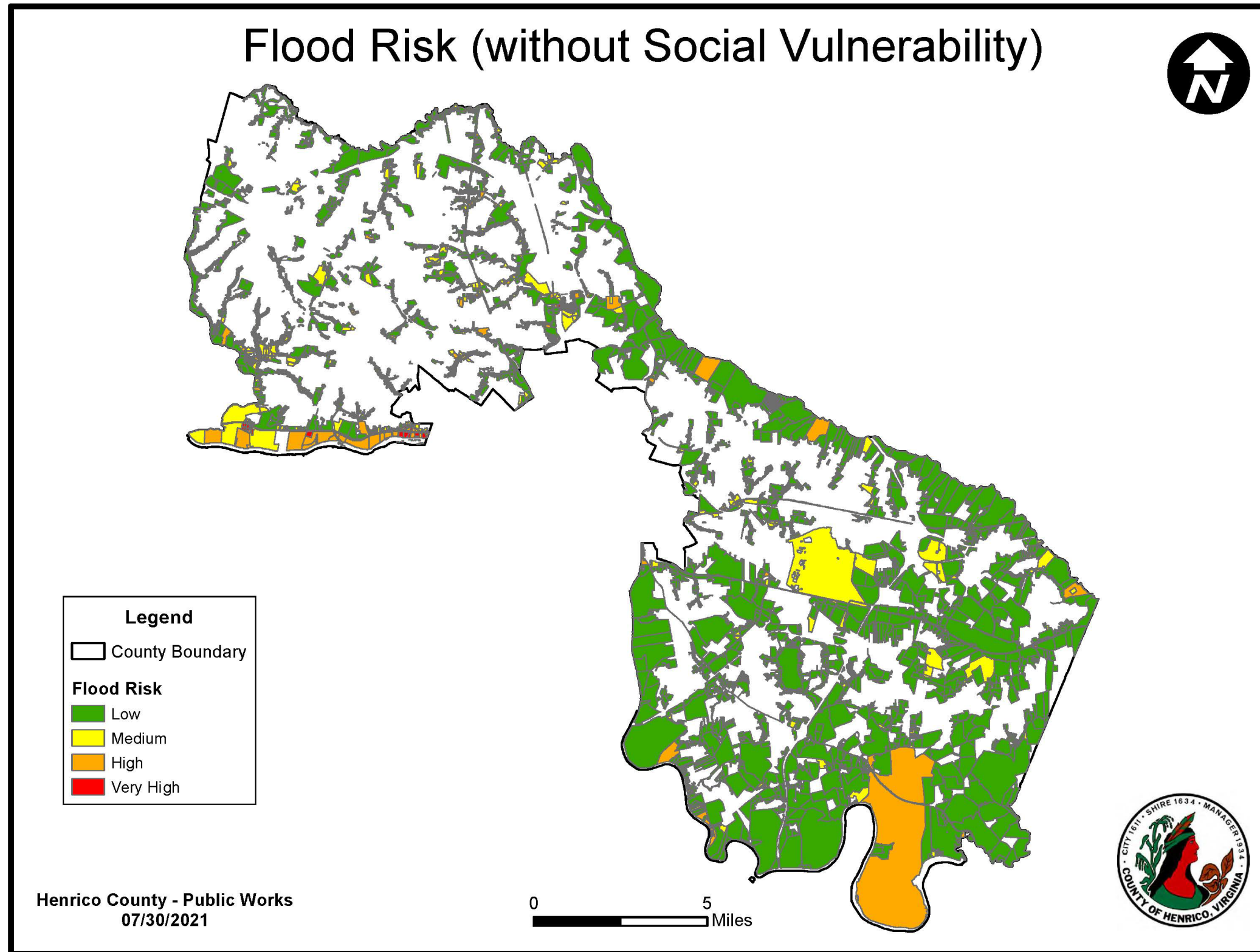
Location Based Factor			
Criteria	Multiplier	Applicability	Points
Structure located near area impacted by storm drainage overflows	1.3	N/A	0
Structure located in floodway	1.1	NO	0
Structure is located within a dam inundation zone	1.4	N/A	0
Structure is in a repetitive loss area	1.5	YES	1.5
<i>*Only the highest factor is selected if the property meets more than one criterion.</i>			
Location Based Factor			1.5
Property Score Before Social Vulnerability			50.25

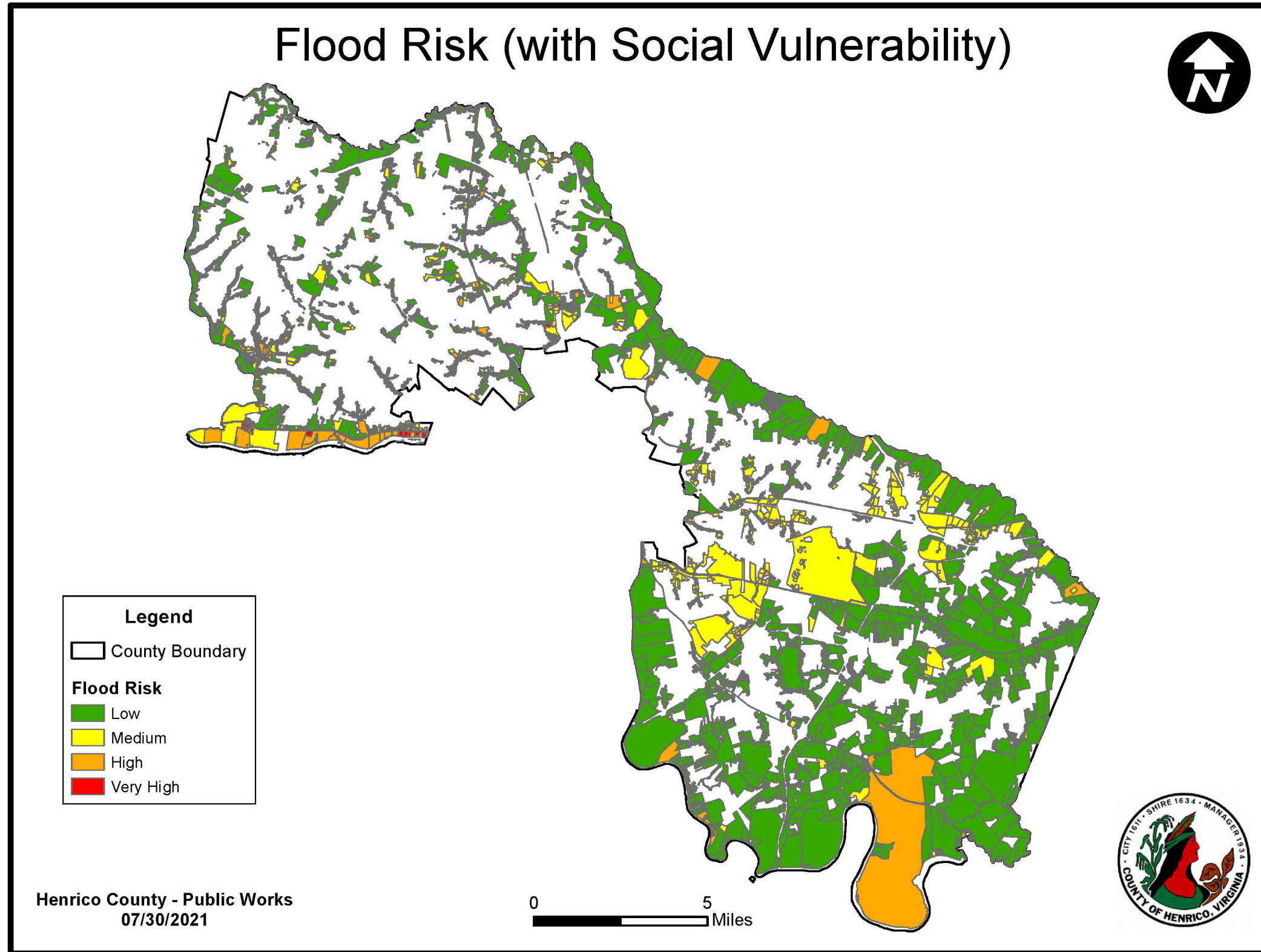
Social Vulnerability Factor			
Criteria	Multiplier	Applicability	Points
Property SoVI Score: High social vulnerability	1.5	YES	1.5
Property SoVI Score: Moderate Social Vulnerability	1.3	NO	0
Property SoVI Score: Not Socially Vulnerable or Not Included in Analysis	1	NO	0
<i>*Property can only fall into one of the three categories</i>			



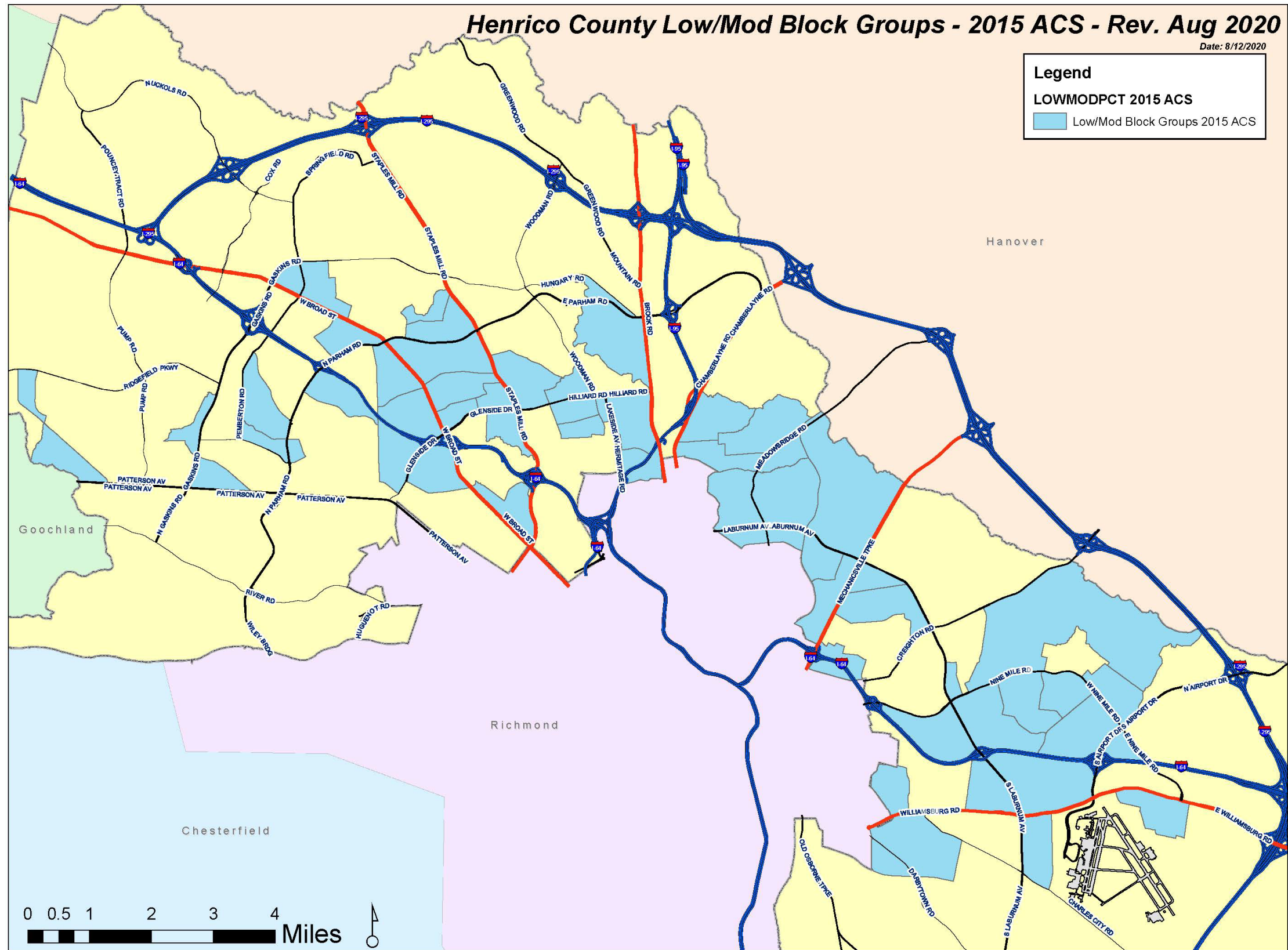
Social Vulnerability Factor	1.5
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Property Flood Risk Score	75.4
	Very High
<i>Property Flood Risk Score = Total Impact-Based Score * Location-Based Factor * Social Vulnerability Factor</i>	

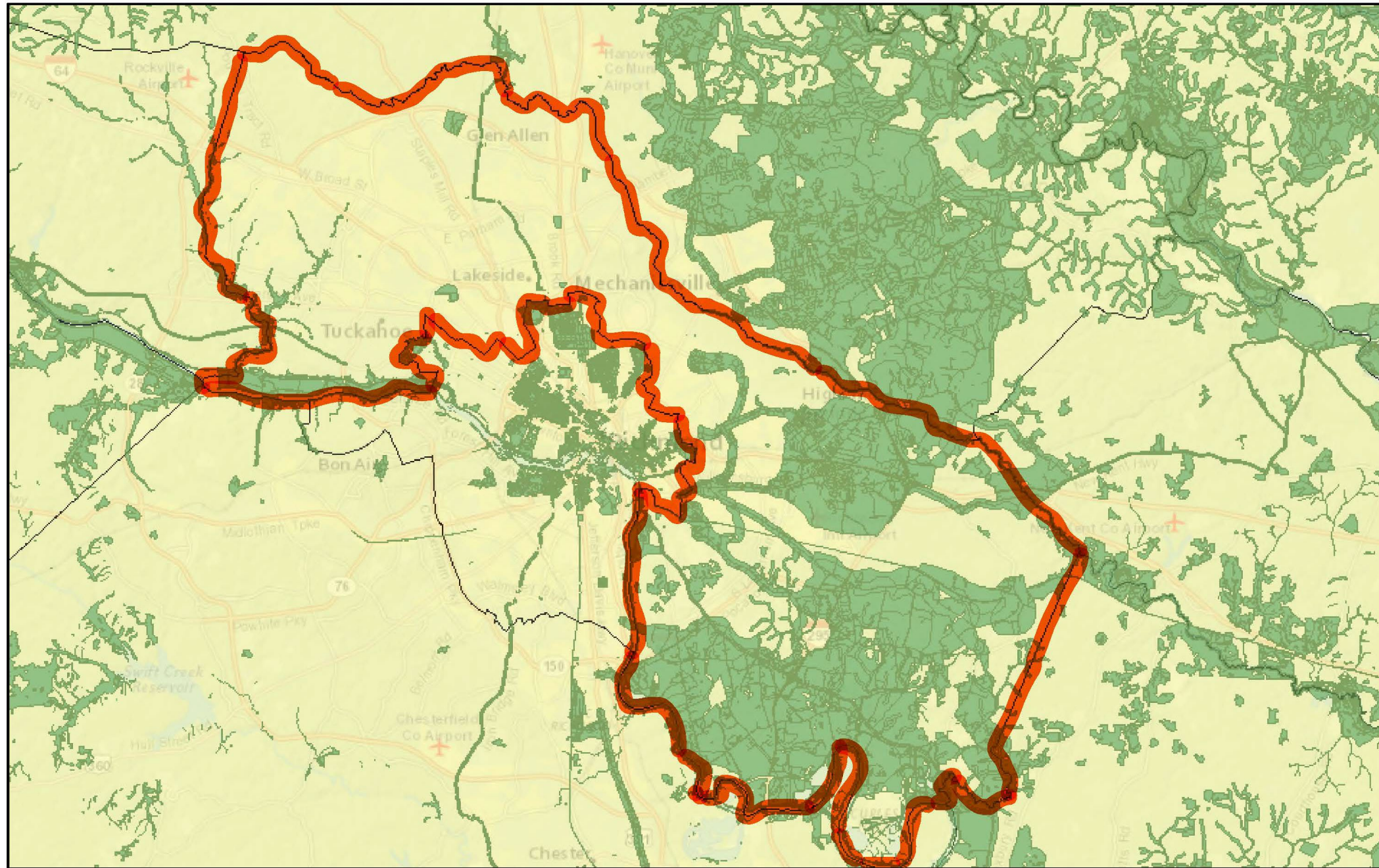




Appendix 7: Low Income Geographic Areas Map

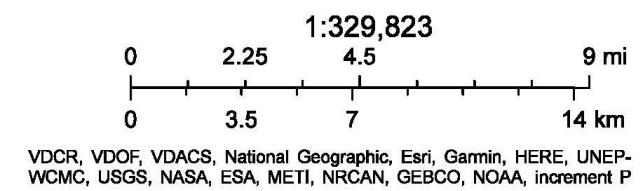


Appendix 8: ConserveVirginia Map



August 4, 2021

- Adjacent States
- ConserveVirginia Map
- Counties



Appendix 9: Resilient Project List

Project Name	Project Description	Project Status	Anticipated Completion Date
Water Reclamation Facility Stream Restoration	Utilize natural channel design to recreate natural and stable cross sections and profile of stream system, stabilize eroding stream banks, reconnect streams with their floodplains, Reestablish the stream with buffer.	Under Construction	2021
Old Nine Mile Landfill Stream Restoration	Utilize natural channel design to recreate natural and stable cross sections and profile of stream system, stabilize eroding stream banks, reconnect streams with their floodplains, Reestablish the stream with buffer.	Design (100%)	2022
Deitrick Rd Outfall Restoration	restore actively eroding outfall channels by utilizing stream restoration or hard armoring techniques, depending upon the site parameters.	Preliminary Design	2022
Graham Meadows Buffer Restoration	protect water resources and improve water quality by replacing maintained vegetation (lawns) with native trees, shrubs, and groundcovers.	Preliminary Design	2022
Wilder Middle Stream Restoration	Utilize natural channel design to recreate natural and stable cross sections and profile of stream system, stabilize eroding stream banks, reconnect streams with their floodplains, Reestablish the stream with buffer.	Design (70%)	2023
Three Lakes Park Stream Restoration	Utilize natural channel design to recreate natural and stable cross sections and profile of stream system, stabilize eroding stream banks, reconnect streams with their floodplains, Reestablish the stream with buffer.	Design (70%)	2024
Hidden Cr Park Stream Restoration	Utilize natural channel design to recreate natural and stable cross sections and profile of stream system, stabilize eroding stream banks, reconnect streams with their floodplains, Reestablish the stream with buffer.	Design (70%)	2023
Adams Elem Stream Restoration	Utilize natural channel design to recreate natural and stable cross sections and profile of stream system, stabilize eroding stream banks, reconnect streams with their floodplains, Reestablish the stream with buffer.	Design (70%)	2024
Meadowview Park Stream Restoration	Utilize natural channel design to recreate natural and stable cross sections and profile of stream system, stabilize eroding stream banks, reconnect streams with their floodplains, Reestablish the stream with buffer.	Preliminary Design	2026
JSRCC Stream Restoration	Utilize natural channel design to recreate natural and stable cross sections and profile of stream system, stabilize eroding stream banks, reconnect streams with their floodplains, Reestablish the stream with buffer.	Preliminary Design	2027

Project Name	Project Description	Project Status	Anticipated Completion Date
Gambles Mill Pump Station Water and Sewer Protective Measures (emergency generator)	The 2500kW generator is being added to provide redundancy for emergency operation if the existing primary and secondary power feeds from Dominion Energy are lost.	Preliminary Design	TBD
Firehouse #20 Staples Mill Firehouse Stormwater Basin	Drainage	Proposed	2022-2026
Minor Drainage Improvements	Drainage	Proposed	2022-2026
Countywide Creeks and Streams	Drainage	Proposed	2022-2026
Designated Drainage Projects	Drainage	Proposed	2022-2026
Chesapeake Bay TMDL/MS4 Compliance	Stormwater	Proposed	2022-2026
Lake Overton Retrofits	Convert existing pond into a wet pond for TMDL/MS4 compliance and made necessary dam repairs to comply with state regulations	Conceptual Design	2023-2024
Pump Rd. Dam Improvements	concrete spillway repairs, vegetation removal	Proposed	2021-2026
Echo Lake Dam Improvements	concrete spillway repairs, vegetation removal, low flow drain repair	Proposed	2021-2026
Wyndham Dam Improvements	concrete spillway repairs, vegetation removal	Proposed	2021-2026
Cox Rd. Improvements	concrete spillway repairs, vegetation removal	Proposed	2021-2026
Wellesley Dam Improvements	concrete spillway repairs, vegetation removal	Proposed	2021-2026
Floodplain Acquisition Program	Acquisition of flood-prone properties and implementation of nature-based solutions to restore natural floodplain functions	Proposed	TBD