

1888 - CID510090_LoudounCounty_CFPF_Bull Run Watershed Management Plan

Application Details

Funding Opportunity: 1448-Virginia Community Flood Preparedness Fund - Study Grants - CY23 Round 4
Funding Opportunity Due Date: Nov 12, 2023 11:59 PM
Program Area: Virginia Community Flood Preparedness Fund
Status: Under Review
Stage: Final Application

Initial Submit Date: Nov 9, 2023 11:36 AM
Initially Submitted By: Barb Lawrence
Last Submit Date:
Last Submitted By:

Contact Information

Primary Contact Information

Active User*: Yes
Type: External User
Name*: Ms. Barb Lawrence
Salutation First Name Middle Name Last Name
Title:
Email*: barbara.lawrence@loudoun.gov
Address*: 1 Harrison Street SE

Leesburg Virginia 20175
City State/Province Postal Code/Zip
Phone*: 571-258-3996 Ext.
Phone

Fax: ### ###
Comments:

Organization Information

Status*: Approved
Name*: Loudoun County
Organization Type*: County Government
Tax ID*: 540948306

Unique Entity Identifier (UEI)*: T6BKTJUZV/29

Organization Website:

Address*: 1 Harrison Street SE

Leesburg Virginia 20175-
 City State/Province Postal Code/Zip

Phone*: 571-258-3996 Ext.
 ### ### ###

Fax: ### ### ###

Benefactor:

Vendor ID:

Comments:

VCFPF Applicant Information

Project Description

Name of Local Government*: Loudoun County
 Your locality's CID number can be found at the following link: [Community Status Book Report](#)

NFIP/DCR Community Identification Number (CID)*: 510090

If a state or federally recognized Indian tribe,

Name of Tribe:

Authorized Individual*: George Govan
 First Name Last Name

Mailing Address*: 1 Harrison Street SE
 Address Line 1
 Address Line 2
 Leesburg Virginia 20177
 City State Zip Code

Telephone Number*: 571-367-8604

Cell Phone Number*: 571-367-8604

Email*: George.Govan@loudoun.gov

Is the contact person different than the authorized individual?

Contact Person*: Yes

Contact: Chris Stone
 First Name Last Name
 1 Harrison Street SE
 Address Line 1
 Address Line 2
 Leesburg Virginia 20177
 City State Zip Code

Telephone Number: 571-258-3542

Cell Phone Number: 571-233-6559

Email Address: Chris.Stone@loudoun.gov

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

Project Description*:

Funds will go toward the development of a Watershed Management Plan for the Bull Run Watershed. The Plan will be used by the Department of General Services (DGS) to update flood risk throughout the Bull Run Watershed, better understand future land use considerations as it relates to flood risk, and identify and prioritize resilient projects which also provide POC reductions to meet Chesapeake Bay and local TMDL projects.

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*: No

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

Census Block(s) Where Project will Occur*: 1000-4044

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

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

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

Flood Insurance Rate Map Number(s) (if applicable): 51107C0365E, 51107C0370E, 51107C0390E, 51107C0410E, 51107C0335E

Eligibility - Round 4

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

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

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

Scope of Work - Studies - 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*: [CID510090_LoudounCounty_SOWNarrative.pdf](#)

Comments:

Budget Narrative

Budget Narrative Attachment*: [CID510090_LoudounCounty_BudgetNarrative.pdf](#)

Comments:

Scoring Criteria for Studies - Round 4

Scoring

Revising floodplain ordinances to maintain compliance with the NFP 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 or freeboard, or correcting issues identified in a Corrective Action Plan.

Revising Floodplain Ordinances*: No
Select

Creating tools or applications to identify, aggregate, or display information on flood risk or creating a crowd-sourced mapping platform that gathers data points about real-time flooding. This could include a locally or regionally based web-based mapping product that allows local residents to better understand their flood risk.

Mapping Platform*: Yes
Select

Conducting hydrologic and hydraulic studies of floodplains. Applicants who create new maps must apply for a Letter of Map Revision or a Physical Map Revision through the Federal Emergency Management Agency (FEMA).

Hydrologic and Hydraulic Studies*: Yes
Select

Studies and Data Collection of Statewide and Regional Significance. Funding of studies of statewide and regional significance and proposals will be considered for the following types of studies:

Updating precipitation data and IDF information (rain intensity, duration, frequency estimates) including such data at a sub-state or regional scale on a periodic basis.

Updating Precipitation Data and IDF Information*: No
Select

Regional relative sea level rise projections for use in determining future impacts.

Projections*: No
Select

Vulnerability analysis either statewide or regionally to state transportation, water supply, water treatment, impounding structures, or other significant and vital infrastructure from flooding.

Vulnerability Analysis*: Yes
Select

Flash flood studies and modeling in riverine regions of the state.

Flash Flood Studies*: Yes
Select

Statewide or regional stream gauge monitoring to include expansion of existing gauge networks.

Stream Gauge Monitoring*: Yes
Select

New or updated delineations of areas of recurrent flooding, stormwater flooding, and storm surge vulnerability in coastal areas that include projections for future conditions based on sea level rise, more intense rainfall events, or other relevant flood risk factors.

Delineations of Areas of Recurrent Flooding*: Yes
Select

Regional flood studies in riverine communities that may include watershed-scale evaluation, updated estimates of rainfall intensity, or other information.

Regional Flood Studies*: Yes
Select

Regional Hydrologic and Hydraulic Studies of Floodplains

Regional Hydrologic and Hydraulic Studies of Floodplains*: Yes
Select

Studies of potential land use strategies that could be implemented by a local government to reduce or mitigate damage from coastal or riverine flooding.

Potential Land Use Strategies*: Yes
Select

Other proposals that will significantly improve protection from flooding on a statewide or regional basis.

Other Proposals*: Yes
Select

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*: Moderate Social Vulnerability (0.0 to 1.0)

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

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*: No

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*: No

Comments:

While this is not a project based grant, the study will identify projects to help identify projects which offer both resiliency improvements and reductions of nutrient and sediment pollution.

Scope of Work Supporting Information - Studies

Scope of Work Supporting Information

Is the proposed study a new study or updates on a prior study?

New or Updated Study*: Updates on a Prior Study

Describe the relationship of the study to the local government's needs for flood prevention and protection, equity, community improvement, identification of nature-based solutions or other priorities contained in this manual

Relationship of Study to Priorities Contained in this Manual*:

The study is related to establishing accurate and up-to-date base flood elevations within the Bull Run watershed of Loudoun County by developing accurate hydrologic conditions using the latest available land cover, topographic and rainfall data. The study will allow Loudoun to ensure that infrastructure meets its intended level of service, that disenfranchised populations receive improvements equitably, and that projects are identified based on wholistic and community scale opportunities. The limited locations of critical public safety and health facilities in this watershed make the need for accessible transportation routes more critical, which increases the importance of ensuring that the County understands actual flood risk to its infrastructure. Further, due to the presence of both the Chesapeake Bay TMDL and the local Bull Run Sediment TMDL, resiliency projects leveraging nature based solutions will provide the County will substantial water quality benefits and be competitive projects to pursue additional grant funding. All quality measures implemented in this watershed tackle both of these TMDLs, as well as improve water quality to the Occoquan Reservoir which supplies drinking water to municipalities in Northern Virginia. Lastly, this study will put into place a mechanism for the County to understand and model future rainfall and land use considerations to inform infrastructure planning, floodplain overlay district management and water quality management. This will allow the County to be proactive in how it manages stormwater runoff and water quality, as opposed to reactive.

Describe the qualifications of the individuals or organizations charged with conducting the study or the elements of any request for proposal that define those qualifications

Qualifications of Individuals Conducting

Study*:

The Kimley-Horn project team pursued the Loudoun County stormwater management on-call RFQ in 2021 in competition with 13 other engineering firms. The qualifications for this contract are outlined and including in the additional supporting documents section. Kimley-Horn was awarded this contract, along with three other firms, due to our team's expertise in providing stormwater management MS4 and programmatic support services. As part of this specific pursuit, a team of engineers has been hand selected with skill sets specifically catered to the needs of a large-scale watershed model. Skill sets selected for this work are individuals who have extensive experience planning, modeling and designing stormwater management improvements for both flood mitigation and water quality management. The project team resumes are included in the above supporting document.

Describe the expected use of the study results in the context of the local resilience plan or, in the case of regional plans, how the study improves any regional approach

Expected use of Study Results*:

The outcome of this study will include detailed mapped minor and major floodplains within the Bull Run watershed. Proposed and existing infrastructure will be evaluated to assess functionality based on present day rainfall, and during subsequent phases, based on future rainfall data. As flooding becomes a greater concern in existing and newly developed communities, modeling efforts will be able to tie into time series data from the more widely modeled floodplains and assess actual capacity during 2D unsteady state flow conditions. Additional gage locations will be recommended as part of this effort to further validate and refine flow estimates, and to better assess flood conditions in real time. Immediate outcomes will include a CIP list for the Bull Run watershed with an implementation schedule for the resiliency projects that have been prioritized to address existing flood risks in the watershed and improve water quality. At this time, the County does not have a Resiliency Plan dedicated to project identification and implementation consistent with what CFPF details. Subsequent efforts are anticipated to include preparing a Resiliency Plan which meets DCR's standards and develops a roadmap for implementing these projects. Looking at the broader picture, the IFM will include a pollutant loading model which will be leveraged to work collaboratively with Prince William County, Fauquier County and Fairfax County to address impairments in the Occoquan Watershed. This effort will allow Loudoun to improve water quality management in the Bull Run Watershed, further advancing the Environmental Commission's mission.

If applicable, describe how the study may improve Virginia's flood protection and prevention abilities in a statewide context (type N/A if not applicable)

Statewide Improvements*:

Currently, the majority of streams within the Bull Run Watershed of Loudoun County do not have detailed studies. Further, there are multiple locations in the watershed where critical infrastructure is at risk from a flood event, and public safety during emergencies is a concern. This watershed also drains to both Prince William County and Fairfax County. Improvements in mapping and hydrologic studies to these systems will provide these neighboring municipalities with improved data in refining their own flood risk and understanding of resiliency. See the narrative above for additional detail.

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

Repetitive Loss and/or Severe Repetitive Loss Properties*: [CID510090_LoudounCounty_RepetitiveLossRecord.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 these structures in the project area

Residential and/or Commercial Structures*:

Within the project watershed, existing land use consists of 178 commercial properties and 14,681 residential properties.

CLASSIFICATION - BUILDING TYPE - TOTAL

COMMERCIAL CHURCH 11

COMMERCIAL DATA CENTER 3

COMMERCIAL FARM FARM 3

COMMERCIAL GOLF COURSE 2

COMMERCIAL HEAVY IND 13

COMMERCIAL HOTEL 1

COMMERCIAL LIGHT INDUSTRIAL 30

COMMERCIAL OFFICE GENERAL 5

COMMERCIAL OFFICE MEDICAL 4

COMMERCIAL OTHER_NON PUBLIC 37

COMMERCIAL OTHER PUBLIC 16

COMMERCIAL RETAIL 53

RESIDENTIAL MULTI-FAMILY ATTACHED 15

RESIDENTIAL MULTI-FAMILY STACKED 97

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

Critical Facilities/Infrastructure*:

There are a variety of critical pieces of infrastructure located throughout the Bull Run Watershed. The Scope of Work narrative discusses this in greater detail but the mix of infrastructure consists of:

- Roadway stream culverts,
- Schools
- Data center Facilities
- Urgent Care Facilities
- Fire Stations
- Police Stations
- Natural Gas Pipelines

Budget

Budget Summary

Grant Matching Requirement*: Flood Prevention and Protection Studies - Fund 50%/Match 50%

Total Project Amount*: \$495,651.75

REQUIRED Match Percentage Amount: \$247,825.88

BUDGET TOTALS

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

Match Percentage: 50.00%
 Verify that your match percentage matches your required match percentage amount above.

Total Requested Fund Amount: \$247,825.87

Total Match Amount: \$247,825.88

TOTAL: \$495,651.75

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
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No Data for Table

Construction

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

Contracts

Description	Requested Fund Amount	Match Amount	Match Source
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Consultant / Engineering Costs	\$247,825.87	\$247,825.88	Environment and Energy Fund and Department of General Services Budget
	\$247,825.87	\$247,825.88	

Pre-Award and Startup Costs

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

Other Direct Costs

Description	Requested Fund Amount	Match Amount	Match Source
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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	CID510090_LoudounCounty_DetailedProjectMap.pdf	pdf	876 KB	11/09/2023 09:31 AM
FIRMe of the project area(s) (Projects/Studies)		Bull Run Watershed FIRMPanels	CID510090_LoudounCounty_FIRMMaps.pdf	pdf	8 MB	11/09/2023 09:33 AM
Historic flood damage data and/or images (Projects/Studies)		Historic flood risk and critical infrastructure	CID510090_LoudounCounty_HistoricFloodRisk.pdf	pdf	1 MB	11/09/2023 09:35 AM
A link to or a copy of the current floodplain ordinance		Floodplain Ordinance	CID510090_LoudounCounty_FloodplainOrdinance.pdf	pdf	266 KB	11/09/2023 09:36 AM
Maintenance and management plan for project						
A link to or a copy of the current hazard mitigation plan		Hazard Mitigation Plan	CID510090_LoudounCounty_HazardMitigationPlan.pdf	pdf	3 MB	11/09/2023 09:37 AM
A link to or a copy of the current comprehensive plan		Loudoun County Comprehensive Plan	CID510090_LoudounCounty_ComprehensivePlan.pdf	pdf	258 KB	11/09/2023 09:38 AM
Social vulnerability index score(s) for the project area		Social Vulnerability Index Map	CID510090_LoudounCounty_SocialVulnerabilityIndexMap.pdf	pdf	1 MB	11/09/2023 09:38 AM
Authorization to request funding from the Fund from governing body or chief executive of the local government		Internal County authorization of funding	CID510090_LoudounCounty_AuthorizationForFunding.pdf	pdf	293 KB	11/09/2023 09:40 AM
Signed pledge agreement from each contributing organization						
Maintenance Plan						
<i>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.</i>						
Benefit Cost Analysis						
Other Relevant Attachments		Bull Run Watershed Compiled Application	CID510090_LoudounCounty_BullRunCompiledApplication.pdf	pdf	21 MB	11/09/2023 09:47 AM

Letters of Support

Description	File Name	Type	Size	Upload Date
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No files attached.



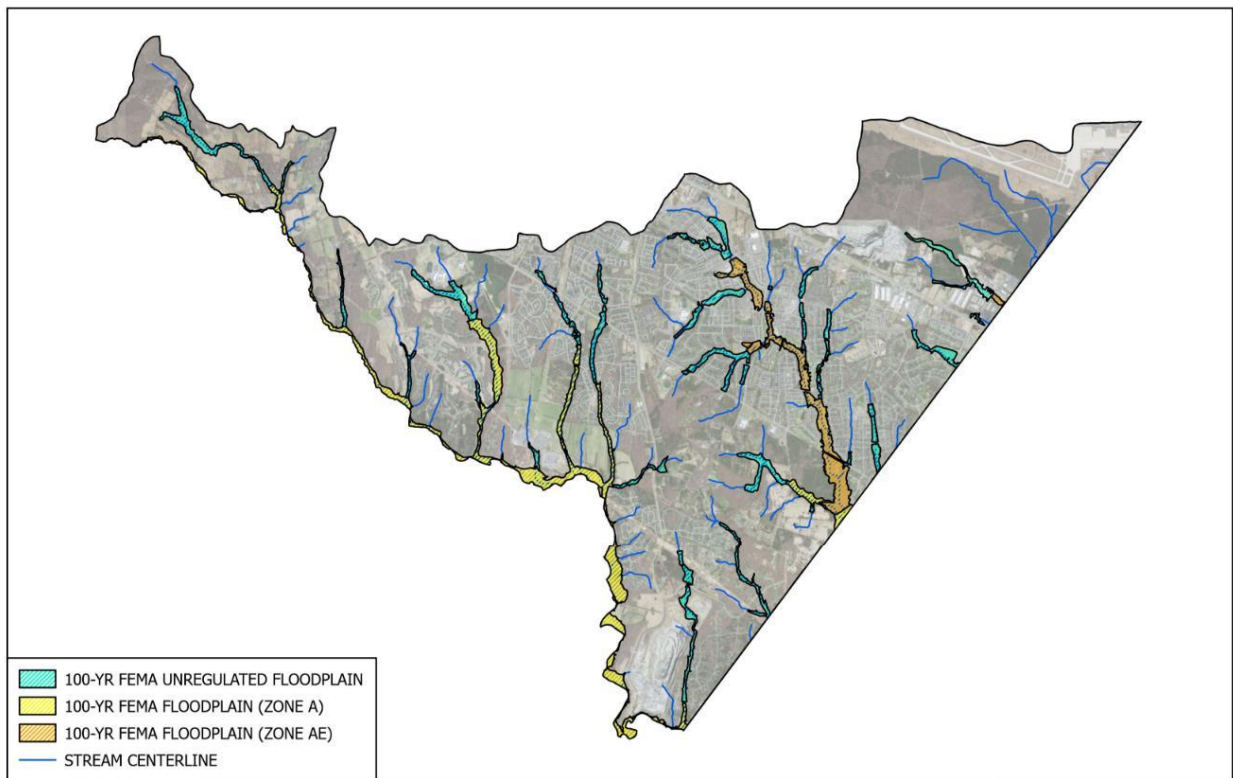
Bull Run Watershed

Loudoun County Virginia

Watershed Management Plan

Community Flood Preparedness Fund (CFPF)

Grant Application Package



Submitted by:

Loudoun County Department of General Services
PO Box 7100
801 Sycolin Road, SE Suite 300
Leesburg, VA 20175



SECTION A - APPENDIX

SECTION OUTLINE

- Appendix A – Application Form for Grant and Loan Requests for All Categories
- Scope of Work Narrative and Supporting Documents for Study Applications
 - Exhibit 1- Floodplain Administrator Coordination
 - Exhibit 2 – Resumes for Qualifications of Project Team



Application Form for Grant and Loan Requests for All Categories

Applicants must have prior approval from the Department to submit applications, forms, and supporting documents by mail in lieu of the WebGrants portal.

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) 510090A

Name of Authorized Official and Title: George Govan, Director of Finance and Procurement

Signature of Authorized Official: _____

Mailing Address (1): P.O. Box 7000

Mailing Address (2): 1 Harrison Street, SE, 5th Floor

City: Leesburg State: Virginia Zip: 20177

Telephone Number: 571-367-8604 Cell Phone Number: (____) _____

Email Address: george.govan@loudoun.gov

Contact and Title (If different from authorized official): _____

Mailing Address (1): _____

Mailing Address (2): _____

City: _____ State: _____ Zip: _____

Telephone Number: (____) _____ Cell Phone Number: (____) _____

Email Address: _____

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

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 modifications to existing 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)

- 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.

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.

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

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

Storm water system upgrades.

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

- 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.
- 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 Appendix C

NFIP Community Identification Number (CID#) : 510090A

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): Zone AE, Zone A, Zone X

Flood Insurance Rate Map Number(s) (If Applicable): 51107C0365E, 51107C0370E, 51107C0390E, 51107C0410E, 51107C0335E

Total Cost of Project: \$495,651.75

Total Amount Requested \$247,825.88

Amount Requested as Grant \$247,825.88

Amount Requested as Project Loan (not including short-term loans for up-front costs)
Not Applicable

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

For projects, planning, capacity building, and studies in low-income geographic areas: Are you requesting that match be waived? Yes No (*Not Applicable*)

Additional Information for Loan Requests

Requested Loan Security: Not Applicable

(General Obligation, Lease, Revenue, Special Fund Revenue, and/or Moral obligation from other government entity)

Desired loan term: Not Applicable

Since the date of your latest financial statements, did the applicant issue any new debt? Not Applicable
(If yes, provide details)

Is there any pending or potential litigation by or against the applicant? Not Applicable

Attach five years of current audited financial statements (FY18-22) or refer to website if posted
(Not necessary for existing VRA borrowers)

Attach FY2024 adopted budget or refer to website

Not Applicable

Attach current Capital Improvement Plan

Not Applicable

Attach adopted Financial Policies

Not Applicable

Attach a list of the ten largest employers in the Applicant's jurisdiction.

Not Applicable

Attach a list of the ten largest taxpayers in the Applicant's jurisdiction

Not Applicable



Scope of Work Narrative and Supporting Documents for Study Applications



Scope of Work Narrative

General Requirements

In 2008, Loudoun County contracted a consultant to development a watershed management plan which encompassed all 17 subwatersheds. The result of this effort was a qualitative assessment with limited actionable items for the County to implement. Fast forward to today, the County is looking forward towards future planning efforts and has decided to pursue a more innovative and progressive approach to watershed management.

The Bull Run Watershed in Loudoun County is actively being redeveloped in accordance with the County's 2019 Comprehensive Plan. Based on estimates by the Census Bureau, portions of this watershed will experience significant increases in population and housing units, which will result in the addition of impervious area and populations at risk from inadequate infrastructure. Under present day conditions, the majority of the existing flood sources have not been studied (see Table 1); the streams that have been studied have not been since approximately 2013.

Table 1: FEMA Hydrologic and Hydraulic Anlaysis Summary of Bull Run

Stream Name	Date of Hydrologic and Hydraulic Analysis	Method	FIRM Panel
Bull Run	No Detailed Study	N/A	MULTIPLE
Tributary No. 1 to Bull Run	No Detailed Study	N/A	51107C0410E
Tributary No. 2 to Bull Run	No Detailed Study	N/A	51107C0365E / 51107C0370E
Tributary No. 3 to Bull Run	No Detailed Study	N/A	51107C0365E
Tributary No. 5 to Bull Run	No Detailed Study	N/A	51107C0365E
South Fork Broad Run	2013	Regression Equation for Loudoun County	51107C0365E
Sand Branch	1976	TR-20	51107C0390E
Foley Branch	No Detailed Study	N/A	51107C0370E
Elklick Run	2013	Regression Equation for Loudoun County	51107C0370E
Tributary No. 1 to Elklick Run	No Detailed Study	N/A	51107C0370E
Tributary No. 3 to Elklick Run	2013	Regression Equation for Loudoun County	51107C0370E



For the systems that have been studied, flow estimates for many of these streams are no longer representative of present-day hydrology. Further, topographic data at the time of these analyses was based on 2012 LiDAR data (resolution of this data was 0.5' horizontal accuracy) and mapped at 2' intervals. In 2024, the County will receive brand new high-resolution LiDAR data which will be the basis for updating the topographic data for all studied systems in the Bull Run watershed.

From an infrastructure perspective, within this watershed, there are 50 roadway stream culverts presently, of which approximately 33 roads are assumed to flood during the 100-YR design storm based on current FEMA estimates. There are also 16 public schools within the watershed in proximity to streams, with limited assessment of flood risk during extreme weather events, and 3 data center facilities. Based on the current comprehensive transportation plan, an additional 11 roadway stream crossings are anticipated to be constructed. There is only one hospital/urgent care facility within the watershed, two fire stations and one police station. With such limited access to public safety facilities, a flood resilient transportation network is critical to ensuring the safety and well-being of County residents.

Presently, there are no reported locations of repetitive loss structures within the Bull Run Watershed; however, the County does not track these occurrences outside the FEMA Flood Zone. Understanding that most flood issues occur outside of the FEMA mapped flood zones, and that future flood risks will only further challenge existing infrastructure, the County has identified the need to develop accurate tailwater conditions throughout the watershed for existing and proposed storm drainage infrastructure.

In order to address these needs, the County intends on developing a Bull Run Watershed Management plan with the following goals and outcomes:

- Develop a living [to be kept current] 1D/2D Integrated Flood Model capable of modeling future flow conditions
- Accurately map the present-day 100-YR and 500-YR floodplains for all streams identified in this project scope; present day flood overlay districts will be updated as a result of these efforts under a future project
- Establish a baseline model which can be integrated with on-site storm sewer systems for future infrastructure assessment of public and private developments
- Incorporate existing pond facilities into the model to understand peak flow attenuation in existing facilities
- Perform a feasibility assessment for resiliency projects aimed at mitigating flood risk and providing nutrient removal benefits towards both the Chesapeake Bay TMDL and the Local Bull Run Sediment TMDL
- Develop a CIP list for the Bull Run Watershed with clear funding guidelines and implementation schedule goals
- Assess water quality pollutant loads throughout the watershed to better understand stream impairments; Bull Run drains to the Occoquan Reservoir which serves Virginians across multiple municipalities
- Public feedback on known flooding issues, preferred project implementation approaches and resiliency needs throughout the community

The Bull Run Watershed is also the headwaters to the Occoquan Reservoir, a major water supply source for Prince William County, Fairfax County, and the City of Alexandria. Improvements within this watershed



to water quantity and quality have a regional benefit which can directly impact the TMDL classifications of the downstream receiving systems.

The County feels that the discussed goals and needs are best achieved through developing a technically detailed 1D/2D inundation model for the entire watershed. This approach is consistent with present day industry best practices for flood modeling, and provides the County with an IFM that has the capability to accurately model all storm infrastructure, including stormwater management facilities. Instead of producing a static report that requires frequent updates, the County will receive a live model that can be used for:

- Resiliency Planning,
- Land Use Planning,
- Comprehensive Plan Updates,
- Floodplain Overlay District Refinement,
- Transportation Planning,
- Emergency Management Response,

If Loudoun County does not receive this funding, then the level of effort which can be dedicated to this modeling approach will be significantly reduced. The effort to tackle this is being spearheaded through the County's new Environmental Commission, a recently Board-Appointed group of citizens dedicated to implementing and guiding Loudoun County's approved Environmental and Energy Work Plan. The Committee is dedicated to the following goals:

- Energy sustainability
- Enhancing natural resources
- Environmental justice
- Government by Example
- Increased public engagement in environmental and sustainability initiatives.

In an effort to improve County resiliency, the Commission successfully secured \$200,000 to develop a watershed management plan in the County which aligns with the Commission's goals. This pursuit for CFPF funds is intended to bolster those funds to build a comprehensive WMP for the Bull Run Watershed which has yet to experience the same level of increased floods and environmental degradation as other watersheds within the County.

Based on the Commission's goals, the WMP will be throttled back to be primarily a project feasibility assessment and WMP development, rather than a floodplain model overhaul. The resulting project will not perform detailed studies of flooding in the Bull Run Watershed, but rather focus strictly on nature based project implementation to improve water quality.

The project must be complete by the end of 2025, with schedule primarily to be impacted based on the timing of public involvement and community feedback, as well as the timing of the new LiDAR data.

Overall Project Workplan:

The PCSWMM model being proposed as the backbone of this effort is going to function as a living model which will be updated over time to ensure that project implementation can be validated against present and future land use and rainfall scenarios. The intent is to develop an integrated flood model (IFM) which will include all minor (100 acres – 1 square mile) and major floodplains as a baseline condition for



understanding existing flood risk. Hydrology will be developed for all headwaters to accurately model runoff conditions throughout the entire system, and provide the framework for future efforts to tie in 1D storm sewer networks into these modeled tailwater conditions. Looking towards future rainfall scenarios, building the model now will put the County in a position to input NOAA Atlas 15 future rainfall estimates when this data comes out in 2027. Planned infrastructure and roadway maintenance can be performed based on future flood conditions to shift flood control from reactive to proactive.

The IFM will include stormwater management ponds to assess their individual impacts on flood mitigation to the downstream receiving systems. Opportunities to retrofit these facilities to provide additional resilience – whether that be a BMP retrofit or to simply alter the existing control structure to detain additional flow – can be evaluated holistically to assess large-scale impacts. In developing an IFM in this fashion, future land use considerations can be modeled to understand the impact to the watershed. As part of this effort, water quality pollutant loads will also be built into the model to better understand pollutant removal opportunities for nature-based solutions. These efforts will be collaborated with the Northern Virginia Regional Commission and Occoquan Monitoring Lab to ensure consistent loads are being applied throughout the Occoquan Watershed.

Below is a work plan overview summarizing the work to be completed and anticipated outcomes over the course of the project. Kimley-Horn will be responsible for implementing this work with the support of the Loudoun County Department of General Services, the Environmental Commission and public stakeholders. The County and its constituents will be key partners in the proper development of this WMP, from data collection and community partnerships to flood model validation and local reports of known flood locations. The County and the Commission will be updated throughout the process to ensure that the WMP aligns with the intended goals of the Commission and this WMP. The timeframe for each task will be refined during the project based on collaboration with these parties.

Step 1: Initial Public Involvement

- Initial Meeting In-Person
 - Outline Problems, Goals, and Funding Opportunities
 - Outline roles and origin of the funds dedicated to efforts of this nature
 - Provide an Overview of Approach
 - Setup Overall Project Schedule
 - Identify Key Meeting Opportunities
 - Survey Communities for interest in working with the County to implement projects on their land

Outcomes:

- Initial coordination with communities in Bull Run established
- Identification of communities that are open to collaboration with the County

Step 2: DATA REVIEW and modeling

A. Water Quantity and Baseline Hydraulic Conditions

- Establish Project Boundary for Modeling
 - Entirety of Bull Run Watershed within Loudoun County
 - Up to 25 Ponds for Integration into the Model
- Develop Flows for all Open Channels
 - FEMA Approved Flow Data will act as a validation metric.
 - PCSWMM Hydrology will be developed for all open channels to model actual flows, not those estimated using the Loudoun County Regression Equation. These flows will be further validated against known and future gauge data.
- Create velocity raster maps to understand where erosive conditions exist in open channels



throughout the County

- Assess quantity capacity of existing BMPs to determine opportunities for additional water quality improvements
- Establish 100-YR and 500-YR Minor and Major Floodplains
 - Minor Floodplain → 100 – 640 Acres
 - Major Floodplain → FEMA Regulated > 640 Acres (1 Square Mile)
- Coordinate with Loudoun County Office of Emergency Management to identify critical infrastructure that floods

Outcomes:

- Integrated Flood Model Developed for Present Day and Future Scenarios
- County-wide floodplains mapped (these will not attempt to update FEMA effective floodplains)
- Flood risk locations identified throughout watershed
- Provide estimates of erosive flows in existing streams for stream restoration prioritization
- Setup model with capabilities to have pollutant loading incorporated (Note this is heavily dependent on available monitoring data to calibrate it)
- Evaluate capacity of existing BMPs to assess feasibility of retrofitting them for improved treatment without acquiring additional land

B: Water Quality

- Develop Watershed-Wide Map identifying known streams which are impaired or have a documented TMDL
- Identify common pollutant sources for improved source management (i.e. agriculture)
- Compile Available Water Quality Data:
 - EPA 303d List
 - EPA MyWaterWay
 - Occoquan Monitoring Lab
 - Citizen Led Groups in the County
- Prioritize Stream Restoration Opportunities for Water Quality Benefit
 - Stream prioritization will be supported through the Bank Assessment for Non-Point Source Consequences of Sediment (BANCS)
 - Water quantity model will be used to estimate streams with high velocities and shears, which is an indicator of actively eroding systems
 - Installation of Banc Pins
- Document approved BMPs and BMP co-benefits (environmental outcomes besides nutrient reductions) Examples may include practices that provide wildlife habitat, remove toxic contaminants, or provide improved climate adaptation potential.
- Examine existing BMPs for retrofit opportunities leveraging preferred BMP list based on capacity results from the Water Quantity Model
- Identify potential opportunities for implementing new BMPs based on known pollutant sources and hydrologic conditions (drainage area size, pollutant loads available for treatment)

Outcomes:

- Identification of EPA impaired streams and environmentally sensitive systems
- Compilation of available water quality data for project prioritization and baseline metrics
- Documentation of preferred BMPs
- Preliminary identification of potential new BMPs and modified existing BMPs

Step 3: Nature-Based Solutions (NBS) Opportunity Assessments

- Develop minimum siting constraints for feasible facilities. This will encompass both physical site constraints, flood reduction and resiliency benefits, environmental benefits, likelihood of implementation (access, easements), hydrologic/hydraulic benefits, crediting opportunities, and funding mechanisms.
- Conduct site visits in the field to verify constraints, and identify additional feasibility considerations.
- Develop suite of preferred BMPs for future County land development in the Watershed. This will be developed in conjunction with the County and include a public comment period.
- Develop weighting criteria for the various constraints.



- Perform desktop review of proposed suitable project locations. Review approved crediting for existing regional wet ponds to assess if all existing credit opportunities have been claimed for both Chesapeake Bay TMDL and Bull Run Sediment TMDL.
- Conduct preliminary crediting analyses on opportunities to estimate pounds of reduction for Phosphorus, Nitrogen and Total Suspended Solids
- Create a prioritization matrix of identified projects to create a ranking of opportunities. Solicit feedback from residents on identified opportunities and incorporate their preferences as a criteria.
- Prepare preliminary concept plans for top opportunities
- Proposed condition modeling for optimal flood mitigation opportunities

Outcomes:

- Feasibility Assessment of Potential Opportunities
- Preliminary Concept Plan
- Preliminary Proposed Modeling Results for Resiliency Projects

Step 4: Cost Estimates, Funding Opportunities and Implementation Schedules

- Development of High Level Planning Cost Ranges. These will be based on limited available data and will only act as an indicator for overall cost ranges. CIP or Grant Funding level estimates will be generated as part of a separate task once the County has identified projects which it would like to move forward with for future planning efforts.
- Outline of County Budget for Implementation Opportunities
- Research potential grant funding opportunities
- Identify public-private partnership opportunities in flood-prone areas

Outcomes:

- EOPCCs for identified opportunities
- Summary of grants and financial resources for project implementation

Step 5: Monitoring and Validation

- Develop a set of metrics for monitoring and validating project performance as part of the WMP. This will consist of existing protocols within the County, and identify additional opportunities to improve the County's data collection network and validation metrics. Examples may include:
 - Structural BMPs (Wet Ponds, Constructed Wetlands, Bioretentions)
 - Evaluate influent and effluent monitors for implemented BMP projects for a period of five (5) years
 - Stream Restoration
 - Conduct post-construction monitoring for a period of seven (7) years to ensure ongoing stabilization
 - Conduct macro-invertebrate sampling for a period of four (4) years to monitor biological uplift

Outcomes:

- Validation metrics for establishing efficacy of projects
- Post-construction monitoring in place to ensure projects are a long-term success

Step 6: Ongoing Public Involvement

- Enhance public understanding of the projects and encourage their early and continued participation in selecting, designing, and implementing the prioritized BMPs through public outreach
- Update County website support on the development of the Watershed Management Plan
- Align watershed management messaging with existing MS4 MCMs for public outreach
- Schedule virtual town-halls throughout the project to provide updates on the progress of the Watershed Management Plan

Outcomes:

- Community driven project prioritization

Refer to the Scope of Services included in Section B for additional information about the proposed work that will be covered under this study grant.



Long Term maintenance of the IFM will be the responsibility of the Loudoun County Department of General Services. At the completion of this effort, it is anticipated that the County will develop a task order contract with an on-call consultant, or train internal staff, who can keep the model up to date over its lifespan to ensure that projects and models reflect present day conditions. The County anticipates the release of future flood rainfall data from NOAA Atlas 15 rainfall efforts in 2027 to lead to further refinement of this model to consider future flood conditions.

Success Metrics:

The project will be considered successful based on the following metrics:

- A functional IFM that is kept up to date as a living model over time
- Studied 100-YR and 500-YR floodplains along project reaches throughout the Bull Run Watershed which are validated by public feedback
- Identified HOAs/Private Entities interested in public-private partnerships
- Active public participation
- A new CIP plan for Bull Run with clear funding schedules and implementation timelines with offer both resiliency benefits and crediting opportunities to tackle both the Chesapeake Bay TMDL and Local Bull Run Sediment TMDL
- Support of the Environmental Commission in the outcome and quality of the work performed

A likely outcome of the WMP are recommended locations for installations of stream gauges and water quality monitoring equipment. These items will serve as validation metrics to further refine the developed hydrology and water quality loading estimated as part of this IFM. Community driven monitoring of streams and habitats for indicators of strong ecosystems will be continued by local organizations and used as a means of determining whether implementation efforts have resulted in improvements. The timeline for these kinds of benefits can take 5 plus years; therefore success will depend on the support of the Environmental Commission in maintaining these relationships with the public into the future.

Public involvement will be critical throughout this process. It is a priority of the County, the Commission and Kimley-Horn to actively engage residents early on and frequently within this process to develop a well-supported WMP with implementable projects. The County recognizes that the majority of publicly owned land has been assessed for projects and may not represent the most ideal locations for future projects. The County has successfully completed past public-private partnerships with subdivisions and HOAs to implement resiliency and retrofit opportunities, and in order to replicate this process, public support is essential. The objective of the public involvement piece of this effort is to identify projects with receptive communities who will experience resiliency benefits while offering the County community-scale opportunities to both address flood mitigation and improve water quality.

Project progress and budget will be tracked on a monthly basis and reported to the County with a monthly progress report containing documentation of services provided and meetings, action items, and deliverables will be coordinated with County staff. Developing a Stormwater Master Plan utilizing the tasks and procedures in Kimley-Horn's scope of services will help strengthen Waterford's resilience to flooding on a local and basin-wide scale and will allow for the design of drainage infrastructure improvement projects to aid in protecting historic landmarks and Waterford's NHL status.



Supporting Documents Required for Study Applicants:

1. The specific type of study proposed including whether the study is new or updates a prior study.

The specific type of study being performed is an update to the existing HEC-RAS model prepared by FEMA for watershed-wide hydrologic and hydraulic modeling of the Bull Run watershed. This study will revise the mapped and unmapped floodplains in the Bull Run Watershed. Also included are feasibility assessments for project implementation and a general update to a Watershed Management Plan which prioritizes these opportunities. See Appendix A for specific categories.

2. The relationship of the study to the local government's needs for flood prevention and protection, equity, community improvement, identification of nature-based solutions or other priorities contained in this manual.

The study is related to establishing accurate and up-to-date base flood elevations within the Bull Run watershed of Loudoun County. The study will allow Loudoun to ensure that infrastructure meets its intended level of service, that disenfranchised populations receive improvements equitably, and that projects are identified based on wholistic and community scale opportunities. Due to the present of both the Chesapeake Bay TMDL and the local Bull Run Sediment TMDL, resiliency projects leveraging nature based solutions will provide the County will substantial water quality benefits and be competitive projects to pursue grant funding. Lastly, this study will put into place a mechanism for the County to understand and model future rainfall and land use considerations to inform infrastructure planning, floodplain overlay district management and water quality management.

3. The qualifications of the individuals or organizations charged with conducting the study or the elements of any request for proposal that define those qualifications.

See Exhibit 2 for Project Team Resumes.

4. The expected use of the study results in the context of the local resilience plan or, in the case of regional plans, how the study improves any regional approach.

The outcome of this study will include a CIP list for the Bull Run watershed with an implementation schedule for the resiliency projects that have been prioritized. At this time, the County does not have a Resiliency Plan dedicated to project identification and implementation consistent with what CFPF details. Subsequent efforts are anticipated to include preparing a Resiliency Plan which meets DCR's standards and develops a roadmap for implementing these projects. Looking more broadly, the IFM will include a pollutant loading model which will be leveraged to work collaboratively with Prince William County, Fauquier County and Fairfax County to address impairments in the Occoquan Basin Watershed. This effort will allow Loudoun to improve water quality management in the Bull Run Watershed, further progressing the Environmental Commission's mission.



5. How the study may improve Virginia’s flood protection and prevention

Currently, the majority of streams within the Bull Run Watershed of Loudoun County do not have detailed studies. Further, there are multiple locations in the watershed where critical infrastructure is at risk from a flood event, and public safety during emergencies is a concern. See the narrative above for additional detail.

6. Other necessary information to establish project priority

The above information presented within this narrative summarizes the benefits of implementing this project. Without these matching funds, the Bull Run Watershed will continue to be not studied hydraulically and existing at risk infrastructure will be left as is for the foreseeable future.

7. Repetitive Loss and/or Severe Repetitive Loss Properties

Presently, there are no reported locations of repetitive loss structures within the Bull Run Watershed; however, the County does not track these occurrences outside the FEMA Flood Zone. An email attachment is included in Exhibit X where the Floodplain Administrator confirms that the County does not track these events at this time. It is a goal of this study to give a voice to the public to identify known flood risk locations, and assist the County in developing a better database of these occurrences.

Within the project watershed, existing land use consists of 178 commercial properties and 14,681 residential properties. The following table breaks these down between types:

CLASSIFICATION	BUILDING TYPE	TOTAL
COMMERCIAL	CHURCH	11
COMMERCIAL	DATA CENTER	3
COMMERCIAL	FARM FARM	3
COMMERCIAL	GOLF COURSE	2
COMMERCIAL	HEAVY IND	13
COMMERCIAL	HOTEL	1
COMMERCIAL	LIGHT INDUSTRIAL	30
COMMERCIAL	OFFICE GENERAL	5
COMMERCIAL	OFFICE MEDICAL	4
COMMERCIAL	OTHER_NON PUBLIC	37
COMMERCIAL	OTHER PUBLIC	16
COMMERCIAL	RETAIL	53
RESIDENTIAL	MULTI-FAMILY ATTACHED	15
RESIDENTIAL	MULTI-FAMILY STACKED	97
RESIDENTIAL	SINGLE FAMILY ATTACHED	5980
RESIDENTIAL	SINGLE FAMILY DETACHED	8589

8. Critical Facilities/Infrastructure



There are a variety of critical pieces of infrastructure located throughout the Bull Run Watershed. This narrative discusses this in greater detail but the mix of infrastructure includes:

- Roadway stream culverts presently,
- Schools
- Data center Facilities
- Urgent Care Facilities
- Fire Stations
- Police Stations



Exhibit 1 - Floodplain Administrator Coordination

Arizzi, Joseph

From: Auer, Maggie <Maggie.Auer@loudoun.gov>
Sent: Wednesday, September 20, 2023 12:33 PM
To: Arizzi, Joseph
Cc: Stone, Chris; Moore, Keara; Kight, Casey
Subject: RE: Repetitive Flood Loss Properties in the County

Follow Up Flag: Follow up
Flag Status: Flagged

Categories: External

Joe,

The County does not have any documented repetitive loss structures in that watershed, most of the repetitive losses are in the Broad Run watershed.

Thanks,

Maggie Auer, CFM | Floodplain Management Team Leader
Building and Development | Loudoun County
1 Harrison Street, S.E. | Leesburg, VA 20175 | 3rd Floor, MSC #60
Maggie.Auer@loudoun.gov | (O) 703-777-0222 | (C) 571-420-1863

From: Arizzi, Joseph <Joseph.Arizzi@kimley-horn.com>
Sent: Wednesday, September 20, 2023 11:16 AM
To: Auer, Maggie <Maggie.Auer@loudoun.gov>
Cc: Stone, Chris <Chris.Stone@loudoun.gov>; Moore, Keara <Keara.Moore@loudoun.gov>; Kight, Casey <Casey.Kight@kimley-horn.com>
Subject: [EXTERNAL] RE: Repetitive Flood Loss Properties in the County

Hi Maggie –

Thanks very much – this is going to be a watershed-wide analysis for the Bull Run Watershed. Is that enough for you to provide the addresses in the project area? I can also figure out where they are spatially if you the County is able to release those 15 addresses.

Joe Arizzi, P.E. (VA)
Kimley-Horn | 11400 Commerce Park Drive, Suite 400, Reston, VA 20191
Direct: 703 674 1330 | Mobile: 631 275 7094 | www.kimley-horn.com
Connect with us: [Twitter](#) | [LinkedIn](#) | [Facebook](#) | [Instagram](#)

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From: Auer, Maggie <Maggie.Auer@loudoun.gov>
Sent: Wednesday, September 20, 2023 10:53 AM
To: Arizzi, Joseph <Joseph.Arizzi@kimley-horn.com>
Cc: Stone, Chris <Chris.Stone@loudoun.gov>; Moore, Keara <Keara.Moore@loudoun.gov>; Kight, Casey

<Casey.Kight@kimley-horn.com>

Subject: RE: Repetitive Flood Loss Properties in the County

Good morning Joe,

The last update we received from FEMA about the number of repetitive losses was 9/2019 and at that time there were 15 addresses County-wide that qualified as repetitive loss. We have the addresses of the repetitive losses so we can provide the number for the proposed project area if needed. Currently, the County does not track repetitive losses outside of the FEMA Special Flood Hazard area so our data only reflects what is captured by the NFIP.

Thanks,

Maggie Auer, CFM | Floodplain Management Team Leader
Building and Development | Loudoun County
1 Harrison Street, S.E. | Leesburg, VA 20175 | 3rd Floor, MSC #60
Maggie.Auer@loudoun.gov | (O) 703-777-0222 | (C) 571-420-1863

From: Arizzi, Joseph <Joseph.Arizzi@kimley-horn.com>

Sent: Tuesday, September 19, 2023 3:24 PM

To: Auer, Maggie <Maggie.Auer@loudoun.gov>

Cc: Stone, Chris <Chris.Stone@loudoun.gov>; Moore, Keara <Keara.Moore@loudoun.gov>; Kight, Casey <Casey.Kight@kimley-horn.com>

Subject: [EXTERNAL] Repetitive Flood Loss Properties in the County

Hi Maggie,

Our team is working with DGS to submit a watershed management plan as part of the CFPF Grant Opportunity and one of the required items from the application is a record of the following:

Repetitive Loss and/or Severe Repetitive Loss Properties

Do not provide the addresses for these properties but **include an exact number of repetitive loss and/or severe repetitive loss structures within the project area**. Work with the local floodplain administrator or emergency manager to find this information. **If they do not have a list of repetitive loss/severe repetitive loss structures, the Department can assist them in accessing these lists for NFIP insured structures**. Please note, that repetitive loss and/or severe repetitive loss often occurs outside of the SFHA and to properties not captured in NFIP reporting. All flooding involving these properties should be tracked and addressed by the community. Residential and/or Commercial Structures – 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.

Is this information you are able to provide our team?

Thank you,

Joe Arizzi, P.E. (VA)
Kimley-Horn | 11400 Commerce Park Drive, Suite 400, Reston, VA 20191
Direct: 703 674 1330 | Mobile: 631 275 7094 | www.kimley-horn.com
Connect with us: [Twitter](#) | [LinkedIn](#) | [Facebook](#) | [Instagram](#)

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Exhibit 2 - Resumes for Qualifications of Project Team



Loudoun County, Virginia

REQUEST FOR PROPOSAL

**ENGINEERING SERVICES FOR THE
LOUDOUN COUNTY STORMWATER MANAGEMENT PROGRAM**

ACCEPTANCE DATE: Prior to 4:00 p.m. January 19, 2021 "Atomic Time"

RFP NUMBER: RFQ 338784

ACCEPTANCE PLACE: Department of Finance and Budget
Division of Procurement
1 Harrison Street, SE, 1st Floor
Leesburg, Virginia 20175

PLEASE NOTE:

Due to restrictions surrounding the COVID-19 pandemic, public access to County facilities is extremely limited. The mailing of proposals is preferred. However, if a proposal is hand delivered, it will be received in the lobby of 1 Harrison Street, SE, Leesburg, VA 20175 ONLY in the Drop Box labeled "Procurement Bids and Proposals" between the hours of 8:30 a.m. and 5:00 p.m.

ALL PROPOSALS MUST BE SUBMITTED AT THIS LOCATION PRIOR TO 4:00 P.M. on the Acceptance Date of the proposal in order to be considered. Proposals will not be accepted at any other building locations or after 4:00 P.M. Failure by an offeror to address and label their proposal in accordance with the requirements of Section 7.1 may result in proposal being delivered to an incorrect location which will ultimately result in proposal rejection for late submission.

Requests for information related to this Proposal should be directed to:

Samira Mkaimel, CPPB
Contracting Officer
(571) 258-3820

Samira.Mkaimel@loudoun.gov

This document can be downloaded from our web site:

www.loudoun.gov/procurement

Issue Date: December 10, 2020

IF YOU NEED ANY REASONABLE ACCOMMODATION FOR ANY TYPE OF DISABILITY IN ORDER TO PARTICIPATE IN THIS PROCUREMENT, PLEASE CONTACT THIS DIVISION AS SOON AS POSSIBLE.

REQUEST FOR PROPOSAL

**ENGINEERING SERVICES FOR THE
LOUDOUN COUNTY STORMWATER MANAGEMENT PROGRAM**

<u>SECTION/TITLE</u>	<u>PAGE</u>
1.0 PURPOSE	3
2.0 COMPETITION INTENDED.....	3
3.0 BACKGROUND INFORMATION	3
4.0 OFFEROR'S MINIMUM QUALIFICATIONS	3
5.0 SCOPE OF SERVICES	4
6.0 EVALUATION OF PROPOSALS & SELECTION PROCEDURES.....	6
7.0 INSTRUCTIONS FOR SUBMITTING PROPOSALS.....	6
8.0 TERMS AND CONDITIONS	15
9.0 PROPOSAL SUBMISSION FORMS	32

ATTACHMENT 1: DETAILED SCOPE OF SERVICES

Prepared By: _____ s/Samira Mkaimel, CPPB _____ Date: December 10, 2020
Contracting Officer

ENGINEERING SERVICES FOR THE LOUDOUN COUNTY STORMWATER MANAGEMENT PROGRAM

1.0 PURPOSE

The intent of this Request for Proposal (RFP) is to obtain the services of qualified engineering firms to provide professional services in support of the County of Loudoun, Virginia (County), Loudoun County Stormwater Management Program. It is also the intent of this RFP to establish one or more fixed fee open-end Contracts on an "as needed" basis for Professional Engineering services for a one (1) year base period with four (4) additional option years. The number of Contracts will depend on the number and quality of the proposals received, with a maximum of four (4) Contracts. The successful firms must demonstrate proven management skills and technical competence in assisting communities in the management of stormwater programs to meet Virginia Pollutant Discharge Elimination System (VPDES) Phase II Municipal Separate Storm Sewer System (MS4) General permit requirements. Further, the successful firms must be knowledgeable in Best Management Practices (BMP) development, design, and execution.

2.0 COMPETITION INTENDED

It is the County's intent that this RFP permits competition. It shall be the offeror's responsibility to advise the Purchasing Agent in writing if any language, requirement, specification, etc., or any combination thereof, inadvertently restricts or limits the requirements stated in this RFP to a single source. Such notification must be received by the Purchasing Agent not later than fifteen (15) days prior to the date set for acceptance of proposals.

3.0 BACKGROUND INFORMATION

As defined in the Code of Federal Regulations (40CFR122.26) [Revised as of July 1, 2001], the federal Clean Water Act requires cities and urbanized counties having populations more than 50,000 to develop stormwater management plans and obtain discharge permits for stormwater outfalls. The eastern unincorporated portion of Loudoun County (an area of approximately 81 square miles) currently falls under these requirements; however, it is anticipated over time that much of Loudoun County will be subject to Phase II regulation. In Virginia, the program is managed by the Department of Environmental Quality (DEQ) which issues VPDES permits to localities.

The Virginia Stormwater Management Act requires the County to establish and execute a management plan and to adopt ordinances that will result in a comprehensive program to enhance control and treatment of stormwater runoff to prevent flooding and to minimize contamination of local waterways.

To meet these requirements, the County has prepared a Stormwater Management Plan and has developed a Stormwater Management Program as required by the federal and state regulations. The overall program includes programs and procedures to support the six (6) Minimum Control Measures (MCMs) identified in the Phase II permitting process.

BMPs have been developed in each of the six (6) MCMs:

- A. Public Education and Outreach

- B. Public Involvement and Participation
- C. Illicit Discharge Detection and Elimination
- D. Construction Site Runoff Control
- E. Post Construction Runoff Control
- F. Pollution Prevention/Good Housekeeping

4.0 OFFEROR'S MINIMUM QUALIFICATIONS

Offerors must demonstrate that they have the resources and capability to provide the materials and services as described herein. All offerors must submit the documentation indicated below with their proposal. Failure to provide any of the required documentation shall be cause for proposal to be deemed non-responsible and rejected.

In order to be eligible for this contract, Offerors shall meet the following criteria:

- 4.1. Any offeror wishing to submit a proposal and be considered for this Solicitation will have and must demonstrate successful experience relating to the development of stormwater management plans to meet National Pollution Discharge Elimination System (NPDES) Phase I or Phase II requirements for governmental agencies of similar size to Loudoun County and similar to the Scope of Services for the RFP within the past five (5) years. Offerors shall provide this information as required by RFP Section 6.3D of the Proposal Content Section.
- 4.2. Project Manager shall have ten (10) years' experience with a focus on stormwater management engineering and design. Reference Paragraph 6.3E.
- 4.3. Debarment: By signing and submitting a proposal, Offerors certifying that they are not currently debarred by any local or state government or the Federal Government. Offerors shall provide in their proposal, documentation related to all debarments that occurred within the last ten (10) years.

5.0 SCOPE OF SERVICES

All proposals must be made on the basis of, and either meet or exceed, the requirements contained herein. All offerors must be able to provide professional expertise in each of the service groups for which they desire consideration for selection. Individual tasks may require the Consultant to provide the supervision, manpower, materials, equipment, and supplies necessary to complete any services outlined below.

5.1 General Scope of Services:

- A. A purchase order must be issued for each task prior to the start of work. The purchase order will constitute the notice to proceed, unless otherwise indicated.
- B. All individuals performing work under this Contract must have the appropriate licenses, certifications, or credentials that prove competence in tasks being performed.
- C. Consultant shall perform all services in compliance with industry standards and all federal, state, VDOT and local laws, ordinances and regulations

including State Health Department, Virginia USBC, Virginia Occupational Safety and Health Agency (VOSHA) and OSHA rules and regulations.

- D. The services to be provided under this Contract include but are not be limited to the following:
1. Involvement by the Consultant throughout all phases of the project, including but not limited to preparation of reports; periodic progress reports/meetings; preparation for and participation in briefings and presentations to staff groups, citizen groups, the County Board of Supervisors and federal or state agencies; processing of invoices for services; timely processing of project correspondence.
 2. Coordination with County staff and Consultants.
 3. Other types of services of a nature consistent with the intent of this RFP as so directed by the County.
- E. A Scope of Work will be developed by the County Project Manager for each task order under this Contract. See Section 8.27 or additional details on Scope of Work development.
1. The level of supervision, quality assurance and staff assigned by the Consultant to an individual task order will be clearly defined in the Scope of Work.
 2. Prior to issuing a notice to proceed (purchase order), the Consultant and County shall agree in writing to a Scope of Work, schedule and fee structure (including a not-to-exceed value).
 3. The Consultant shall assign a Project Manager to each task order to provide consultation and management services. The Consultant's Project Manager will be responsible for staffing the work and the review of reports for accuracy and completeness prior to submission to the County. The Consultant's Project Manager shall have the final responsibility for quality control.

5.2 Fee/rate Schedule: Hourly rates established under this Contract will include:

- A. Administrative items such as fax transmissions, long distance phone calls, mailing services, courier services, and materials required in the preparation of presentations, cost of reports, submittals and other expenses deemed typical in the conduct of business.
- B. Transportation to and from job sites, vehicles, fuel, vehicle maintenance, cell phones, personal computers, printers, cameras, video equipment, software, general office supplies, home office and administrative support and all overhead and incidental costs.

5.3 The services to be provided under this Contract include but not be limited to the following:

- A. Evaluations, investigations, analysis, recommendations, cost and time estimates, testing, reports, studies, designs, preparation of documents

(including drawings in latest AutoCAD version and specifications) field inspections and investigation.

- B. Professional involvement throughout all phases of the project, including but not limited to development of programs; preparation of reports; periodic progress reports/meetings; processing of invoices for service; timely processing of project correspondence, Consultants' requests for payment, and material and equipment submittals.

5.4 Consultant Selection for Each Task Order

The County may award an individual Task Order to any Consultant awarded a contract. Selection of the Consultant and award of the Task Order will be in compliance with the following criteria:

- A. Rotational selection among all Contractors, unless otherwise determined by the County.
- B. Type of project as it relates the Consultant's experience.
- C. Size of project, as it relates to the County's independent cost estimate.
- D. Balancing of work load (Task Order dollar volume and consultants backlog) among Consultants over the lifetime of the contract.
- E. Evaluation of past and current performance on Task Orders of a similar nature and type of work, project size, construction management challenges, schedule performance, design management requirements, etc.
- F. Contractor's responsiveness to the County on Task Orders.

5.5 Detailed Scope of Services is contained in Attachment 1.

6.0 EVALUATION OF PROPOSALS & SELECTION PROCEDURES

The Instructions for Submitting Proposals set forth certain criteria which will be used in the evaluation of proposals and selection of the successful offeror. In addition, the criteria set forth below will be considered.

6.1 Proposal Analysis Group

The Proposal Analysis Group (PAG) will include representatives from the Department of General Services.

6.2 Schedule

The following schedule is **tentative**. The number of proposals received will determine actual schedule.

Proposals Due	January 19, 2021
Shortlist Announcement	February 19, 2021
Interviews	March 15, 2021
Final Ranking Announcement	March 19, 2021

6.3 Proposal Content

Failure to provide the following items with your proposal may be cause for rejection of proposal as non-responsive and/or non-responsible.

The PAG will review and evaluate each proposal and selection will be made on the basis of the criteria listed below. Offerors are to make written proposals that present the offerors qualifications and understanding of the work to be performed. Offerors shall provide each of the following items below in the order presented. Failure to include any of the requested information may be cause for the proposal to be considered non-responsive and rejected.

- *Do not include cost information in your proposal. This information will be requested from the shortlisted offerors only.*
- *Do not use Federal Government forms such as Standard Form 330; Architect – Engineer Qualifications in your proposal response.*
- *Do not include proposed modifications to the terms and conditions contained in this RFP, in your proposal.*

- A. Signature Page
- B. Documents: Include required documents but not limited to: Proof of Authority to Transact Business Form; W-9, insurance certificate; Addendum and the “How did you Hear” form
- C. Table of Contents
- D. Management Skills and Technical Expertise

(This is the Offeror’s Minimum Qualifications Response to RFP: Section 4.1)

Include as a minimum:

1. Provide a narrative description (maximum of one (1) page per project with no more than (2) pages of graphics) of three (3) similar projects that are in progress or have been completed within the past five (5) years that best illustrate the capabilities of your organization in relation to this RFP Scope of Services. In the project narrative, provide a summary of the project including the timely delivery of contracted services, completion date, contract cost and any unique problems encountered and solutions devised. Provide a contact name, phone number, and email address for the main point of contact for each project.
2. References: All offerors shall include with their proposals a minimum of three (3) current references from projects completed in the last five (5) years. This list shall include company name, person to contact, address, telephone number, fax number, e-mail address, and the nature of the work performed. Failure to include references may be cause for rejection of the proposal as non-responsive. Offeror hereby releases listed references from all claims and liability for damages that may result from the information provided by the reference.
3. Identify all Stormwater Management term contracts held within the last five (5) years including a brief contract or project description, scope, project cost, and owner’s contact information.

4. Describe your organizations quality control program and provide an example of how your quality control program saved client funds or improved the quality of the end product (two-page maximum).
5. Awards and letters of commendation received.

E. Credentials of the Project Team

Credentials of the project team, including: project manager and major subconsultants portfolio of related projects and a history of the proposed team working together on past projects. The entire project team will be evaluated.

Include as a minimum:

1. An organizational chart or staffing plan showing the “chain of command” of the proposed project team, including individuals responsible for pertinent disciplines, proposed on the Offeror’s team. Identify major functions to be performed and their reporting relationships in managing the Project.
2. Project Manager resume and portfolio of related projects:
 - Project Manager shall have ten (10) years’ experience with a focus on stormwater management engineering and design.
 - Project Portfolio: Submit written description (maximum one (1) page) of not more than three (3) stormwater related designs completed within the past ten (10) years attributed to the Project Manager. Narratives shall discuss the design challenges and resolutions. Identify areas of responsibility for projects in portfolio. Portfolio is a list of projects, separate from the resume, demonstrating the Project Manager’s experience on managing projects similar to the scope
3. Identify proposed project team’s previous experience working together as a team to include a list of previous projects with proposed subconsultants.
4. Provide resumes (two page maximum) of key project staff, subconsultants; and technicians to include; professional licenses; years of experience, project related experience and technical certifications.
5. Identify sub consultants and provide portfolio of related projects.

F. Understanding of Contract as Depicted in the Proposal

Provide a narrative describing how you intend to accomplish task requirements contained in Attachment 1 of this RFP. Address your understanding of overall RFP requirements.

G. Management of the Project

1. Identify primary work location (City/town and State) of all team members identified in the proposal.

2. Acknowledgement and understanding of required response times as set forth in Section 8.27 of this RFP
- H. Overall quality and completeness of proposal (and interview, if short listed):
Proposals will be reviewed for: completeness, attention to detail, clarity, organization and appearance. Two sided printing is preferred.

6.4 Evaluation Process

The PAG will review, and evaluate each proposal and selection will be made for each service group on the basis of the criteria listed below and as more particularly described in Section 6.3.

- A. Management skills and technical expertise. **(30 points)**
- B. Credentials of project team. **(25 points)**
- C. Understanding of Contract as depicted in the proposal **(25 Points)**
- D. Management of the Project. **(15 points)**
- E. Overall quality and completeness of proposal. **(5 points)**

Once the PAG has evaluated each proposal, a composite preliminary rating will be developed which indicates the group's collective ranking of the highest rated proposals in a descending order. The preliminary rating will be used to select the offerors for further consideration—the short-list. Thereafter, the PAG will conduct interviews and have discussions with only the short-listed firms.

6.5 Negotiations with the Top Ranked Offerors.

- A. After the interviews and discussions are completed, the PAG will finalize the rankings and select the top ranked firms, the Notice of Final Ranking.
- B. Final negotiations with the top ranked offerors will begin with terms and conditions.

The Agreement for Service (“Contract” or “Agreement”) with the successful offeror will contain the terms and Conditions from Section 8.0 of the RFP. If the Top Ranked Offeror intends to take exception to these Terms and Conditions or propose additional or alternative language, they must:

- (1) Identify with specificity the Terms and Conditions to which they take exception to or seek to amend or replace and provide their additional or alternate terms and conditions to the County within five (5) business days after being notified by of being the Top Ranked Offeror, the Notice of Final Ranking;
- (2) Failure to both identify with specificity those terms and conditions the Top Ranked Offeror takes exception to or seeks to amend or replace as well as to provide Offeror's additional or alternate terms and conditions may result in termination of negotiations.
- (3) While the County may accept additional or different language if so provided during negotiations, the Terms and Conditions marked with an asterisk (*) in Section 8.0 of the RFP, are mandatory and non-negotiable.

- C. Final negotiations with the top ranked offerors for a binding fee/rate schedule.
The County **IS NOT** requesting Cost proposals at the present time. The County will request a Cost proposal under separate cover from the top ranked offeror(s) at a later date. The specific cost proposal format will be provided to the top-rated offeror(s) at the time the request is made. The County reserves the right to require that Cost proposals be submitted by a specified deadline. The County may reject any Cost proposals that are submitted after the designated date and time.
- D. If a contract containing both terms and conditions acceptable to the County and rates considered fair and reasonable by the County cannot be negotiated, negotiations shall be terminated and negotiations will be conducted with the next-ranked offeror, and so on. The PAG will conduct all subsequent negotiations and will make a recommendation to the Board of Supervisors for the resulting Contract award. The rankings shall remain confidential until after the Contract award.

7.0 INSTRUCTIONS TO OFFERORS

7.1 Preparation and Submission of Proposals

- A. Before submitting a proposal, read the ENTIRE solicitation including the Contract Terms and Conditions. Failure to read any part of this solicitation will not relieve an offeror of the Contractual obligations.
- B. All proposals must be submitted to the Division of Procurement in a sealed container. The face of the sealed container shall indicate the RFP number, time and date of opening and the title of the RFP as well as "Division of Procurement".
- C. All proposals shall be signed in ink by the individual or authorized principals of the firm.
- D. All attachments to the RFP requiring execution by the firm are to be returned with the proposal.
- E. Proposals must be received by the Division of Procurement prior to 4:00 p.m., local Atomic time on date identified on the cover of this RFP. The time can be verified by visiting <http://www.time.gov> and selecting Eastern Time. Requests for extensions of this time and date will not be granted, unless deemed to be in the County's best interest. Offerors mailing their proposals or using a private carrier shall allow for sufficient mail time to ensure receipt of their proposals by the Division of Procurement by the time and date fixed for acceptance of the proposals. Do not rely on overnight delivery capabilities of private carriers to guarantee timely delivery of proposals. Proposals or unsolicited amendments to proposals received by the County after the acceptance date and time will not be considered.
- F. Proposals may be submitted via:
 - US Mail to:
County of Loudoun, Virginia

Division of Procurement
PO Box 7000
Leesburg, Virginia 20177-7000

OR

Hand delivered to:
County of Loudoun, Virginia
Division of Procurement
1 Harrison Street, S.E., **1st Floor, Procurement Bids and Proposals Drop Box**
Leesburg, Virginia 20175.

OR

Private carrier (UPS/FedEx) to:
County of Loudoun, Virginia
Division of Procurement
1 Harrison Street, S.E.,
ATTN: PROCUREMENT BIDS & PROPOSALS
Leesburg, Virginia 20175

Faxed and e-mailed proposals will not be accepted.

Please note: Offerors choosing to submit proposals via US Mail should allow at least an additional twenty-four (24) hours in the delivery process for internal County mailroom distribution.

Due to restrictions surrounding the COVID-19 pandemic, public access to County facilities is extremely limited. The mailing of proposals is preferred. However, if a proposal is hand delivered, it will be received in the lobby of 1 Harrison Street, SE, Leesburg, VA 20175 ONLY in the Drop Box labeled: Procurement Bids and Proposals between the hours of 8:30 a.m. and 5:00 p.m.

ALL HAND DELIVERED PROPOSALS MUST BE SUBMITTED AT THIS LOCATION PRIOR TO 4:00 P.M. on the Acceptance Date of the proposal in order to be considered. Proposals will not be accepted at any other building locations or after 4:00 P.M. Failure by an offeror to address and label their proposal in accordance with the requirements of this section may result in proposal being delivered to an incorrect location which will ultimately result in proposal rejection for late submission.

- G. Each offeror shall submit **one (1) original hard copy** and **one (1) electronic copy in a single PDF file on a USB flash drive** of their proposal to the County's Division of Procurement as described herein.

7.2 Questions and Inquiries

Questions and inquiries, both oral and written, will be accepted from any and all offerors. However, when requested, complex oral questions shall be submitted in writing. The Division of Procurement is the sole point of contact for this solicitation unless otherwise instructed herein. Unauthorized contact with other Loudoun County staff regarding the RFP may result in the disqualification of the offeror. Inquiries pertaining to the RFP must give the RFP number, time and date of opening and the title of the RFP. Material questions will be answered in writing with an Addendum provided, however, that all questions are received **by 5:00 p.m. Tuesday, December 28, 2020**. It is the responsibility of all offerors to ensure that they have received all Addendums and to include signed copies with their proposal. Addendums can be downloaded from www.loudoun.gov/procurement.

7.3 Addendum and Supplement to Request

If it becomes necessary to revise any part of this request or if additional data are necessary to enable an exact interpretation of provisions of this request, an Addendum will be issued. It is the responsibility of the offeror to ensure that he has received all Addenda prior to submitting a proposal. Addendums can be downloaded from www.loudoun.gov/procurement.

7.4 Proprietary Information

Trade secrets or proprietary information submitted by an offeror in connection with this solicitation shall not be subject to disclosure under the Virginia Freedom of Information Act; however, **pursuant to § 2.2-4342 of the Code of Virginia, the offeror must invoke the protections of this section prior to or upon submission of the data or other materials, and must clearly identify the data or other materials to be protected and state the reasons why protection is necessary. Failure to abide by this procedure may result in disclosure of the offeror's information.** Offerors shall not mark sections of their proposal as proprietary if they are to be part of the award of the contract and are of a "Material" nature.

7.5 Authority to Bind Firm in Contract

Proposals MUST give full firm name and address of offeror. Failure to manually sign proposal may disqualify it. Person signing proposal should show TITLE or AUTHORITY TO BIND THE FIRM IN A CONTRACT. Firm name and authorized signature must appear on proposal in the space provided on the pricing page. Those authorized to sign are as follows:

If a sole proprietorship, the owner may sign.

If a general partnership, any general partner may sign.

If a limited partnership, a general partner must sign.

If a limited liability company, a "member" may sign or "manager" must sign if so specified by the Articles of Organization.

If a regular corporation, the CEO, President or Vice-President must sign.

Others may be granted authority to sign but the County requires that a corporate document authorizing him/her to sign be submitted with proposal.

7.6 Withdrawal of Proposals

- A. All proposals submitted shall be valid for a minimum period of one hundred and eighty (180) calendar days following the date established for acceptance.
- B. Proposals may be withdrawn on written request from the offeror at the address shown in the solicitation prior to the time of acceptance.
- C. Negligence on the part of the offeror in preparing the proposal confers no right of withdrawal after the time fixed for the acceptance of the proposals.

7.7 County Furnished Support/Items

The level of support required from County personnel for the completion of each task shall be estimated by position and man days.

The offeror shall indicate the necessary telephones, office space and materials the offeror requires. The County may furnish these facilities if the County considers them reasonable, necessary, and available for the offeror to complete its task.

7.8 Subconsultants

Offerors shall include a list of all subconsultants with their proposal. Proposals shall also include a statement of the subconsultants' qualifications. The County reserves the right to reject the successful offeror's selection of subconsultants for good cause. If a subconsultant is rejected, the offeror may replace that subconsultant with another subconsultant subject to the approval of the County. Any such replacement shall be at no additional expense to the County, nor shall it result in an extension of time without the County's approval.

7.9 Quantities

The quantities specified in this Request for Proposal are estimated only, and are given for the information of offerors and for the purpose of proposal evaluation. They do not indicate the actual quantity which will be ordered, since such volume will depend upon requirements which develop during the contract period.

Quantities shown shall not be construed to represent any amount which the County shall be obligated to purchase under the contract, or relieve the consultant of his obligation to fill all orders placed by the County.

NO PROPOSAL WILL BE CONSIDERED WHICH STIPULATES THAT LOUDOUN COUNTY SHALL GUARANTEE TO ORDER A SPECIFIC QUANTITY OF ANY ITEM.

7.10 Late Proposals

LATE proposals will be returned to offeror UNOPENED, if RFP number, acceptance date and offeror's return address is shown on the container.

7.11 Rights of County

The County reserves the right to accept or reject all or any part of any proposal, waive informalities, and award the contract to best serve the interest of the County. Informality shall mean a minor defect or variation of a proposal from the exact requirements of the Request for Proposal which does not affect the price, quality, quantity, or delivery schedule for the goods, services or construction being procured.

7.12 Prohibition as Subconsultants

No offeror who is permitted to withdraw a proposal shall, for compensation, supply any material or labor to or perform any subcontract or other work agreement for the person or firm to whom the contract is awarded or otherwise benefit, directly or indirectly, from the performance of the project for which the withdrawn proposal was submitted.

7.13 Deviations from Scope of Services

If there is any deviation from that prescribed in the Scope of Services, the appropriate line in the Scope of Services shall be ruled out and the substitution clearly indicated. The County reserves the right to determine the responsiveness of any deviation.

7.14 Notice of Award

A Notice of Award will be posted on the County's web site (www.loudoun.gov).

7.15 Protest

Offerors may refer to §§ 2.2-4357 through 2.2-4364 of the Code of Virginia to determine their remedies concerning this competitive process. Protests shall be submitted to the Director, Finance and Budget.

7.16 Miscellaneous Requirements

- A. The County will not be responsible for any expenses incurred by an offeror in preparing and submitting a proposal. All proposals shall provide a straight-forward, concise delineation of the offeror's capabilities to satisfy the requirements of this request. Emphasis should be on completeness and clarity of content.
- B. Offerors who submit a proposal in response to this RFP may be required to make an oral presentation of their proposal. The Division of Procurement will schedule the time and location for this presentation.
- C. The contents of the proposal submitted by the successful offeror as well as this RFP will become part of any contract awarded as a result of the Scope of Services contained herein. The successful offeror will be expected to sign a contract with the County.
- D. The County reserves the right to reject any and all proposals received by reason of this request, or to negotiate separately in any manner necessary to serve the best interests of the County. Offerors whose proposals are not accepted will be notified in writing.

7.17 Debarment

By submitting a proposal, the offeror is certifying that he is not currently debarred by the County, or in a procurement involving federal funds, by the Federal Government. A copy of the County's debarment procedure in accordance with § 2.2-4321 of the Code of Virginia is available upon request.

7.18 Proof of Authority to Transact Business in Virginia

An offeror organized or authorized to transact business in the Commonwealth pursuant to Title 13.1 or Title 50 of the Code of Virginia shall include in its bid or proposal the identification number issued to it by the State Corporation Commission.

Any offeror that is not required to be authorized to transact business in the Commonwealth as a foreign business entity under Title 13.1 or Title 50 of the Code of Virginia or as otherwise required by law shall include in its bid or proposal a statement describing why the offeror is not required to be so authorized. Any offeror described herein that fails to provide the required information shall not receive an award unless a waiver of this requirement and the administrative policies and procedures established to implement this section is granted by the Purchasing Agent or his designee. The SCC may be reached at (804) 371-9733 or at <http://www.scc.virginia.gov/default.aspx>.

7.19 W-9 Form Required

Each offeror shall submit a completed W-9 form with their proposal. In the event of contract award, this information is required in order to issue purchase orders and payments to your firm. A copy of this form can be downloaded from <http://www.irs.gov/pub/irs-pdf/fw9.pdf>.

7.20 Insurance Coverage

Offerors shall include with their proposal a copy of their current Certificate of Insurance that illustrates the current level of coverage the offeror carries. The Certificate can be a current file copy and does not need to include any "additional insured" language for the County.

7.21 Legal Action

No bidder or potential bidder shall institute any legal action until all statutory requirements have been met.

7.22 Certification by Contractor as to Felony Convictions

No one with a felony conviction may be employed under this Contract and by the signature of its authorized official on the response to this Solicitation, the Contractor certifies that neither the contracting official nor any of the Contractor's employees, agents or subcontractors who will work under this Agreement have been convicted of a felony.

8.0 TERMS AND CONDITIONS

While the County may accept additional or different language if so provided with the proposal, the Terms and Conditions marked with an asterisk (*) are mandatory and non-negotiable.

8.1 Procedures

The extent and character of the services to be performed by the Consultant shall be subject to the general control and approval of the Director, Department of General Services or their authorized representative(s). The Consultant shall not comply with requests and/or orders issued by other than the Director, Director, Department of General Services or their authorized representative(s) acting within their authority for the County. Any change to the Contract must be approved in writing by the Purchasing Agent and the Consultant.

8.2 Quantities

The quantities specified in this Agreement are estimated only. They may not indicate the actual quantity which will be ordered, since such volume will depend upon requirements which develop during the term of this Agreement.

Quantities shown shall not be construed to represent any amount which the County shall be obligated to purchase under the Agreement, or relieve the Consultant of its obligation to fill all orders placed by the County.

8.3 Term

The Contract will cover the period from May 1, 2021 through April 30, 2022, or an equivalent period depending upon date of Contract award.

This Agreement may be renewed at the expiration of the initial term at the request of the County. The renewal may be for up to four (4) additional one (1) year periods. Unless otherwise agreed to by the parties or as may be required by law, any renewal shall be based on the same terms and conditions as the initial term with the exception of the price or rates. Initial prices or rates and subsequent renewal prices or rates are guaranteed for a minimum of twelve (12) months. Any increase in prices or rates after the initial term or any renewal term shall be limited to the prior year's increase in the Consumer Price Index for Urban Wage Earners and Clerical Workers (CPI-W), Special Indexes, all items less food and energy (unadjusted for seasonal changes) for the current twelve (12) month period. In no circumstances shall any increase exceed four percent (4%) per year.

8.4 Delay and Delivery Failures

Time is of the essence. The Consultant must keep the County advised at all times of status of parties' agreement. If delay is foreseen, the Consultant shall give immediate written notice to the Division of Procurement. Should the Consultant fail to deliver the proper item(s)/service(s) at the time and place(s) contracted for, or within a reasonable period of time thereafter as agreed to in writing by the Division of Procurement, or should the Consultant fail to make a timely replacement of rejected items/services when so required, the County may purchase items/services of comparable quality and quantity in the open market to replace the undelivered or rejected items/services. The Consultant shall reimburse the County for all costs in excess of the Agreement price when purchases are made in the open market; or, in the event that there is a balance the County owes to the Consultant from prior transactions, an amount equal to the additional expense incurred by the County as a result of the Consultant's nonperformance shall be deducted from the balance as payment.

8.5 County Reserved Rights

The County reserves the right, at its sole discretion, to issue Requests for Proposal for similar work and other projects as the need may occur. The County also reserves the right to issue Purchase Orders, and to expand or otherwise modify existing Purchase Orders, to other Open-End Consultants based on its sole discretion, in consideration of its knowledge and/or evaluation of each Consultant's qualifications, expertise, capabilities, performance record, current ability to perform, location and/or distance to

the project, and any and all other factors as may be pertinent to the particular project and for the convenience of the County.

8.6 Business, Professional, and Occupational License Requirement

All firms or individuals located or doing business in Loudoun County are required to be licensed in accordance with the County's "Business, Professional, and Occupational Licensing (BPOL) Tax" Ordinance.

Wholesale and retail merchants without a business location in Loudoun County are exempt from this requirement. Questions concerning the BPOL Tax should be directed to the Office of Commissioner of Revenue, telephone (703) 777-0260.

8.7 Payment of Taxes

All Consultants located or owning property in Loudoun County shall assure that all real and personal property taxes are paid.

The County will verify payment of all real and personal property taxes by the Consultant prior to the award of any Contract or Contract renewal.

8.8 Insurance

- A. The Consultant shall be responsible for its work and every part thereof, and for all materials, tools, equipment, appliances, and property of any and all description used in connection therewith. The Consultant assumes all risk of direct and indirect damage or injury to the property or persons used or employed on or in connection with the work contracted for, and of all damage or injury to any person or property wherever located, resulting from any action, omission, commission or operation under the Contract.
- B. The Consultant and all subconsultants shall, during the continuance of the work under the Contract, provide the following:
 - 1. Workers' Compensation and Employer's Liability to protect the Consultant from any liability or damages for any injuries (including death and disability) to any and all of its employees, including any and all liability or damage which may arise by virtue of any statute or law in force within the Commonwealth of Virginia.
 - 2. Comprehensive General Liability insurance to protect the Consultant, and the interest of the County, its officers, employees, and agents against any and all injuries to third parties, including bodily injury and personal injury, wherever located, resulting from any action or operation under the Contract or in connection with the contracted work. The General Liability insurance shall also include the Broad Form Property Damage endorsement, in addition to coverage for explosion, collapse, and underground hazards, where required.
 - 3. Automobile Liability insurance, covering all owned, non-owned, borrowed, leased, or rented vehicles operated by the Consultant.
 - 4. Professional Liability against any and all wrongful acts, errors, or omissions on the part of the Consultant resulting from any action or

operation under the Contract or in connection with the contracted work.

- C. The Consultant agrees to provide the above referenced policies with the following limits. Liability insurance limits may be arranged by General, Automobile and Professional Liability policies for the full limits required, or by a combination of underlying policies for lesser limits with the remaining limits provided by an Excess or Umbrella Liability policy

1. Workers' Compensation:

Coverage A:	Statutory
Coverage B:	\$100,000

2. General Liability:

Per Occurrence:	\$1,000,000
Personal/Advertising Injury:	\$1,000,000
General Aggregate:	\$2,000,000
Products/Completed Operations:	\$2,000,000
Fire Damage Legal Liability:	\$100,000

GL Coverage, excluding Products and Completed Operations, should be on a Per Project Basis

3. Automobile Liability:

Combined Single Limit:	\$1,000,000
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4. Professional Liability

Per Occurrence:	\$1,000,000
General Aggregate:	\$1,000,000

- D. The following provisions shall be agreed to by the Consultant:

1. No change, cancellation, or non-renewal shall be made in any insurance coverage without a forty-five (45) day written notice to the County. The Consultant shall furnish a new certificate prior to any change or cancellation date. The failure of the Consultant to deliver a new and valid certificate will result in suspension of all payments until the new certificate is furnished.

2. Liability Insurance "Claims Made" basis:

If the liability insurance purchased by the Consultant has been issued on a "claims made" basis, the Consultant must comply with the following additional conditions. The limits of liability and the extensions to be included as described previously in these provisions, remain the same. The Consultant must either:

- a. Agree to provide, prior to commencing work under the Contract, certificates of insurance evidencing the above coverage for a period of two (2) years after final payment for the Contract for General Liability policies and five (5) years for Professional Liability policies. This certificate shall evidence a "retroactive

- date" no later than the beginning of the Consultant's work under this Contract, or
- b. Purchase the extended reporting period endorsement for the policy or policies in force during the term of this Contract and evidence the purchase of this extended reporting period endorsement by means of a certificate of insurance or a copy of the endorsement itself.
3. The Consultant must disclose the amount of deductible/self-insured retention applicable to the General Liability, Automobile Liability and Professional Liability policies, if any. The County reserves the right to request additional information to determine if the Consultant has the financial capacity to meet its obligations under a deductible/self-insured plan. If this provision is utilized, the Consultant will be permitted to provide evidence of its ability to fund the deductible/self-insured retention.
 4.
 - a. The Consultant agrees to provide insurance issued by companies admitted within the Commonwealth of Virginia, with the Best's Key Rating of at least A:VII.
 - b. European markets including those based in London, and the domestic surplus lines market that operate on a non-admitted basis are exempt from this requirement provided that the Consultant's broker can provide financial data to establish that a market's policyholder surpluses are equal to or exceed the surpluses that correspond to Best's A:VII Rating.
 5.
 - a. The Consultant will provide an original signed Certificate of Insurance and such endorsements as prescribed herein.
 - b. The Consultant will provide on request certified copies of all insurance coverage related to the Contract within ten (10) business days of request by the County. These certified copies will be sent to the County from the Consultant's insurance agent or representative. Any request made under this provision shall be deemed confidential and proprietary.
 - c. Any certificates provided shall indicate the Contract name and number.
 6. The County, its officers and employees shall be Endorsed to the Contractor's Automobile and General Liability policies as an "additional insured" with the provision that this coverage "is primary to all other coverage the County may possess." (Use "loss payee" where there is an insurable interest). A Certificate of Insurance evidencing the additional insured status must be presented to the County along with a copy of the Endorsement.
 7. Compliance by the Consultant with the foregoing requirements as to carrying insurance shall not relieve the Consultant of their liabilities provisions of the Contract.

- E. Contractual and other Liability insurance provided under this Contract shall not contain a supervision, inspection or engineering services exclusion that would preclude the County from supervising and/or inspecting the project as to the end result. The Consultant shall assume all on-the-job responsibilities as to the control of persons directly employed by it.
- F. Precaution shall be exercised at all times for the protection of Persons (including employees) and property.
- G. The Consultant is to comply with the Occupational Safety and Health Act of 1970, Public Law 91-956, as it may apply to this Contract.
- H. Any loss insured under subparagraph 8.8.B.4 is to be adjusted with the County and made payable to the County as trustee for the requirements of any applicable mortgagee clause.
- I. If an "ACORD" Insurance Certificate form is used by the Consultant's insurance agent, the words "endeavor to" and ". . . but failure to mail such notice shall impose no obligation or liability of any kind upon the company" in the "Cancellation" paragraph of the form shall be deleted.
- J. The Consultant agrees to waive all rights of subrogation against the County, its officers, employees, and agents.

8.9 Hold Harmless

The Consultant shall indemnify and hold harmless the County, including its officials and employees, from all liability, losses, costs, damages, claims, causes of action, suits of any nature (specifically including reasonable attorney's fees and defense costs incurred with the defense of third party claims) incidental to or brought as a consequence of any negligent act, error, omission, or breach of the applicable professional standard of care by the Consultant and/or its subconsultants. The Consultant agrees that this clause shall include, but is not limited to, claims involving infringement of patent or copyright. This section shall survive completion of the Contract. The County is prohibited from indemnifying Consultant and/or any other third parties.

8.10 Safety

All Consultants and subconsultants performing services for the County are required and shall comply with all Occupational Safety and Health Administration (OSHA), State and County Safety and Occupational Health Standards and any other applicable rules and regulations. Also all Consultants and subconsultants shall be held responsible for the safety of their employees and any unsafe acts or conditions that may cause injury or damage to any persons or property within and around the work site area under this Contract.

8.11 Notice of Required Disability Legislation Compliance *

The County is required to comply with state and federal disability legislation: The Rehabilitation Act of 1973 Section 504, The Americans with Disabilities Act (ADA) for 1990 Title II and The Virginians with Disabilities Act of 1990.

Specifically, the County may not, through its contractual and/or financial arrangements, directly or indirectly avoid compliance with Title II of the Americans with Disabilities Act, Public Law 101-336, which prohibits discrimination by public entities on the basis of disability. Subtitle A protects qualified individuals with disability from discrimination on the basis of disability in the services, programs, or activities of all State and local governments. It extends the prohibition of discrimination in federally assisted programs established by the Rehabilitation Act of 1973 Section 504 to all activities of state and local governments, including those that do not receive Federal financial assistance, and incorporates specific prohibitions of discrimination on the basis of disability in Titles I, III, and V of the Americans with Disabilities Act. The Virginians with Disabilities Act of 1990 follows the Rehabilitation Act of 1973 Section 504.

8.12 Ethics in Public Contracting *

The provisions contained in §§ 2.2-4367 through 2.2-4377 of the Virginia Public Procurement Act as set forth in the 1950 Code of Virginia, as amended, shall be applicable to all Contracts solicited or entered into by the County. A copy of these provisions may be obtained from the Purchasing Agent upon request.

The above-stated provisions supplement, but do not supersede, other provisions of law including, but not limited to, the Virginia State and Local Government Conflict of Interests Act (§ 2.2-3100 et seq.), the Virginia Governmental Frauds Act (§ 18.2-498.1 et seq.) and Articles 2 and 3 of Chapter 10 of Title 18.2. The provisions apply notwithstanding the fact that the conduct described may not constitute a violation of the Virginia State and Local Government Conflict of Interests Act.

8.13 Employment Discrimination by Consultants Prohibited *

Every Contract of over \$10,000 shall include the following provisions:

- A. During the performance of this Contract, the Consultant agrees as follows:
1. The Consultant will not discriminate against any employee or applicant for employment because of race, religion, color, sex, national origin, age, disability, status as a service disabled veteran, or any other basis prohibited by state law relating to discrimination in employment, except where there is a bona fide occupational qualification reasonably necessary to the normal operation of the Consultant. The Consultant agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the provisions of this nondiscrimination clause.
 2. The Consultant, in all solicitations or advertisements for employees placed by or on behalf of the Consultant, shall state that such Consultant is an equal opportunity employer.
 3. Notices, advertisements and solicitations placed in accordance with federal law, rule or regulation shall be deemed sufficient to meet this requirement.

B. The Consultant will include the provisions of the foregoing paragraphs, 1, 2, and 3 in every subcontract or purchase order of over \$10,000, so that the provisions will be binding upon each subconsultant or vendor.

8.14 Drug-free Workplace *

Every Contract of over \$10,000 shall include the following provisions:

During the performance of this Contract, the Consultant agrees to (i) provide a drug-free workplace for the Consultant's employees; (ii) post in conspicuous places, available to employees and applicants for employment, a statement notifying employees that the unlawful manufacture, sale, distribution, dispensation, possession, or use of a controlled substance or marijuana is prohibited in the Consultant's workplace and specifying the actions that will be taken against employees for violations of such prohibition; (iii) state in all solicitations or advertisements for employees placed by or behalf of the Consultant that the Consultant maintains a drug-free workplace; and (iv) include the provisions of the foregoing clauses in every subcontract or purchase order of over \$10,000, so that the provisions will be binding upon each subconsultant or vendor.

For the purposes of this section, "drug-free workplace" means a site for the performance of work done in connection with a specific Contract awarded to a Consultant in accordance with this chapter, the employees of whom are prohibited from engaging in the unlawful manufacture, sale, distribution, dispensation, possession, or use of a controlled substance or marijuana during the performance of the Contract.

8.15 Faith-Based Organizations *

The County does not discriminate against faith-based organizations.

8.16 Immigration Reform and Control Act of 1986 *

By entering this Contract, the Consultant certifies that it does not and will not during the performance of this Contract violate the provisions of the Federal Immigration Reform and Control Act of 1986, which prohibits employment of illegal aliens.

8.17 Exemption from Taxes *

Pursuant to Va. Code § 58.1-609.1, the County is exempt from Virginia State Sales or Use Taxes and Federal Excise Tax, therefore the Consultant shall not charge the County for Virginia State Sales or Use Taxes or Federal Excise Tax on the finished goods or products provided under the Contract. However, this exemption does not apply to the Consultant, and the Consultant shall be responsible for the payment of any sales, use, or excise tax it incurs in providing the goods required by the Contract, including, but not limited to, taxes on materials purchased by a Consultant for incorporation in or use on a construction project. Nothing in this section shall prohibit the Consultant from including its own sales tax expense in connection with the Contract in its Contract price.

8.18 Ordering, Invoicing and Payment

All work requested under this Contract shall be placed on a County issued Purchase Order. The Consultant shall not accept credit card orders or payments.

The Consultant shall submit invoices, in duplicate, on a monthly basis, such statement to include a detailed breakdown of all charges for that monthly period. Invoices shall be based upon completion of tasks and deliverables.

All invoices shall be forwarded to the following address:

County of Loudoun, Virginia
Department of General Services
801 Sycolin Road SE
Suite 300
Leesburg, Virginia 20175

Upon receipt of invoice and final inspection and acceptance of the equipment and/or service, the County will render payment within forty-five (45) days unless any items thereon are questioned, in which event payment will be withheld pending verification of the amount claimed and the validity of the claim. The Consultant shall provide complete cooperation during any such investigation. Unless invoice items are questioned, the interest shall accrue at the rate of one percent (1%) per month for any late payments.

Individual Consultants shall provide their social security numbers, and proprietorships, partnerships, and corporations shall provide their federal employer identification number on the pricing form.

8.19 Payments to Subconsultants *

Within seven (7) days after receipt of amounts paid by the County for work performed by a subconsultant under this Contract, the Consultant shall either:

- A. Pay the subconsultant for the proportionate share of the total payment received from the County attributable to the work performed by the subconsultant under this Contract; or
- B. Notify the County and subconsultant, in writing, of his intention to withhold all or a part of the subconsultant's payment and the reason for non-payment.

The Consultant shall pay interest to the subconsultant on all amounts owed that remain unpaid beyond the seven (7) day period except for amounts withheld as allowed in item B. above.

Unless otherwise provided under the terms of this Contract, interest shall accrue at the rate of one percent (1%) per month.

The Consultant shall include in each of its subcontracts a provision requiring each subconsultant to include or otherwise be subject to the same payment and interest requirements as set forth above with respect to each lower-tier subconsultant.

The Consultant's obligation to pay an interest charge to a subconsultant pursuant to this provision may not be construed to be an obligation of the County.

8.20 Substitutions

NO substitutions, additions or cancellations, including those of key personnel, are permitted after award without written approval by the Division of Procurement. Where specific employees are proposed by the Consultant for the work, those employees

shall perform the work as long as that employee works for the Consultant, either as an employee or subconsultant, unless the County agrees to the substitution. Requests for substitutions shall be reviewed and may be approved by the County in its reasonable discretion.

8.21 Assignment *

The Agreement may not be assigned in whole or in part without the prior written consent of the Division of Procurement. The rights and obligations of the Consultant are personal and may be performed only by the Consultant. Any purported assignment that does not comply with this provision is void. This Agreement is binding upon and inures to the benefit of the parties and their respective permitted successors and assigns.

8.22 Termination

Subject to the provisions below, the Contract may be terminated by the County upon thirty (30) days advance written notice to the other party; but if any work or service hereunder is in progress, but not completed as of the date of termination, then the Contract may be extended upon written approval of the County until said work or services are completed and accepted.

A. Termination for Convenience

The County may terminate this Contract for convenience at any time in which the case the parties shall negotiate reasonable termination costs.

B. Termination for Cause

In the event of Termination for Cause, the thirty (30) days advance notice is waived and the Consultant shall not be entitled to termination costs.

C. Termination Due to Unavailability of Funds in Succeeding Fiscal Years

If funds are not appropriated or otherwise made available to support continuation of the performance of this Contract in a subsequent fiscal year, then the Contract shall be canceled and, to the extent permitted by law, the Consultant shall be reimbursed for the reasonable value of any non-recurring costs incurred but not amortized in the price of the supplies or services delivered under the Contract.

8.23 Contractual Disputes *

The Consultant shall give written notice to the Purchasing Agent of his intent to file a claim for money or other relief within ten (10) calendar days of the occurrence giving rise to the claim or at the beginning of the work upon which the claim is to be based, whichever is earlier.

The Consultant shall submit its invoice for final payment within thirty (30) days after completion or delivery.

The claim, with supporting documentation, shall be submitted to the Purchasing Agent by US Mail, return receipt requested, courier, or overnight delivery service, no later than sixty (60) days after final payment. If the claim is not disposed of by agreement, the Purchasing Agent shall reduce his/her decision to writing and mail via U.S. mail or

otherwise forward a copy thereof to the Consultant within thirty (30) days of the County's receipt of the claim.

The Purchasing Agent's decision shall be final unless the Consultant appeals within thirty (30) days by submitting a written letter of appeal to the County Administrator, or his designee. The County Administrator shall render a decision within sixty (60) days of receipt of the appeal.

No Consultant shall institute any legal action until all statutory requirements have been met. Each party shall bear its own costs and expenses resulting from any litigation, including attorney's fees.

8.24 Construction Bidding Redesign

If all construction proposals received exceed the County's construction budget by ten percent (10%) or more, the A/E shall redesign as required to provide a facility within the budgeted funds at no additional cost to the County.

8.25 Consultant Responsibilities

The Consultant(s) shall be responsible for completely supervising and directing the work under the Contract(s) and all subconsultants that they may utilize. Subconsultants who perform work under the Contract shall be responsible to the Consultant. The Consultant agrees to be fully responsible for the acts and omissions of their subconsultants and of persons employed by them.

8.26 Cost Proposals/Response Time

A. The County will notify the Consultant when work is required. The Consultant shall respond to the County within forty-eight (48) hours after notification. The County will then schedule a meeting with the Consultant and the proper County representatives to discuss the work required. Based upon those discussions, the Consultant shall submit to the County a lump sum cost proposal to perform the work based upon their fixed hourly rates contained in the Contract. The estimate shall contain the estimated number of hours broken out by category of service, Consultant hourly rates for each category, a narrative describing work to be performed, estimated time for completion and all non-labor related costs. All costs to complete the task must be identified in the cost proposal including those costs typically considered to be "reimbursable". No project costs are to be left out of the task order cost proposal. After review and acceptance of the proposal, the County will issue a purchase order to perform the work. The proposals shall be prepared at no cost to the County. Subconsultant mark-ups shall not exceed ten percent (10%).

When the scope of services involves work of such nature that the Consultant cannot reasonably estimate the time which would be required to provide the services, the County may agree to an Hourly Rate Purchase Order based on the actual hours worked times the hourly rates indicated in the Consultant's binding fee schedule and other approved expenses. A maximum Purchase Order fee or cost not to exceed limitation shall be agreed upon for Hourly Rate Purchase Orders. When an Hourly Rate Purchase Order is used, the Consultant shall submit detailed time records, documentation for other

expenses, and such other evidence as the County may require supporting its billing request.

- B. For services required by the County that are not specifically identified in the Contract Labor Categories but covered under the Scope of Services, the Consultant shall submit to the County project manager, in the task order cost proposal, detailed costs for these services and tests. Any additional labor categories and fixed hourly rates developed apply only to the specific task order unless added to the contract by amendment.
- C. Emergency Response: In the event of a catastrophic event or other condition where the County Administrator has declared an emergency and there exists a need to use professional engineering services to assist in resolving the emergency, the Consultant shall respond within two (2) hours of notification.
- D. Travel expenses, not including to and from the job site, must be included in the task order cost proposal if required and will be based upon the current Loudoun County per diem rates.

8.27 Ownership of Documents

Any reports, specifications, blueprints, negatives or other documents prepared by the Consultant in the performance of its obligations under the Contract shall be the exclusive property of the County, and all such materials shall be returned to the owner upon completion, termination, or cancellation of this Contract. The Consultant shall not use, willingly allow, or cause such materials to be used for any purpose other than performance of all Consultant's obligations under the Contract without the prior written consent of the County. Documents and materials developed by the Consultant under the Contract shall be the property of the County; however, the Consultant may retain file copies, which cannot be used without prior written consent of the Owner. the County agrees that the Consultant shall not be liable for any damage, loss, or injury resulting from the future use of the provided documents for other than the project specified, when the Consultant is not the firm of record.

8.28 Submissions

All project correspondence, design/review documents, reports, etc. prepared by the Consultant shall be distributed to the County's Project Manager for each task in the format and number of copies as directed by the task statement of work.

Within thirty (30) days of project completion, the Consultant shall prepare and submit a Project Completion Report with project closeout documents and submit to the County's Project Manager.

8.29 Responsibility for Claims and Liabilities

The County's review, approval, or acceptance of, or payment for, any services required shall not be construed to operate as a waiver by the County of any rights or of any cause of action arising out the Contract. The Consultant shall be and remains liable to the County for the accuracy and competency of plans, specifications, or other documents or work and Consultant is responsible for to the County for any costs incurred resulting from any errors, acts or omissions in the performance of any services furnished.

8.30 Severability *

In the event that any provision shall be adjudged or decreed to be invalid, by a court of competent jurisdiction, such ruling shall not invalidate the entire Agreement but shall pertain only to the provision in question and the remaining provisions shall continue to be valid, binding and in full force and effect.

8.31 Governing Law/Forum

This Agreement shall be governed and construed in all respects by its terms and by the laws of the Commonwealth of Virginia. Any judicial action shall be filed in the Commonwealth of Virginia, County of Loudoun. Consultant expressly waives any objection to venue or jurisdiction of the Loudoun County Circuit Court, Loudoun County, Virginia. Consultant expressly consents to waiver of service of process in an action pending in the Loudoun County Circuit Court pursuant to Virginia Code Section 8.01-286.1.

8.32 Notices

All notices and other communications hereunder shall be deemed to have been given when made in writing and either (a) delivered in person, (b) delivered to an agent, such as an overnight or similar delivery service, or (c) deposited in the United States mail, postage prepaid, certified or registered, addressed as follows:

TO CONSULTANT:

TBD

TO COUNTY:

County of Loudoun, Virginia
Division of Procurement
Attn: Samira Mkaimel

Via delivery method (a) or (b)

1 Harrison Street SE
Leesburg, VA 20175

Or

Via delivery method (c)

PO Box 7000
Leesburg, VA 20175

Notice is deemed to have been received: (i) on the date of delivery if delivered in person; (ii) on the first business day after the date of delivery if sent by same day or overnight courier service; or (iii) on the third business day after the date of mailing, if sent by certified or registered United States Mail, return receipt requested, postage and charges prepaid.

8.33 Licensure

To the extent required by the Commonwealth of Virginia (see e.g. 54.1-1100 *et seq.* of the Code of Virginia) or the County, the Consultant shall be duly licensed to perform the services required to be delivered pursuant to this Contract.

8.34 Authority to Transact Business in Virginia *

A Consultant organized as a stock or nonstock corporation, limited liability company, business trust, or limited partnership or registered as a registered limited liability partnership shall be authorized to transact business in the Commonwealth as a domestic or foreign business entity if so required by Title 13.1 or Title 50 of the Code of Virginia or as otherwise required by law. Any business entity described herein that enters into a Contract with the County pursuant to the Virginia Public Procurement Act 2.2-4300 et seq. shall not allow its existence to lapse or its certificate of authority or registration to transact business in the Commonwealth, if so required under Title 13.1 or Title 50 of the Code of Virginia, to be revoked or cancelled at any time during the term of the Contract. The County may void any Contract with a business entity if the business entity fails to remain in compliance with the provisions of this section.

8.35 Counterparts

This Contract and any amendments or renewals hereto may be executed in a number of counterparts, and each counterpart signature, when taken with the other counterpart signatures, is treated as if executed upon one original of this Contract or any amendment or renewal. A signature by any party to this Contract provided by facsimile or electronic mail is binding upon that party as if it were the original.

8.36 No Smoking

Smoking in all County buildings is prohibited. The County may designate a smoking area outside County facilities. Contractor shall only use those designated smoking areas. Certain County facilities, both inside and outside, may be entirely smoke free. Contractor shall inquire of the Contract Administrator or designee if a facility is entirely smoke free. Failure to adhere to the County's no smoking policies may lead to removal of Contractor employees and possible Contract termination.

8.37 Confidentiality

A. Consultant Confidentiality

The Consultant acknowledges and understands that its employees may have access to proprietary, business information, or other confidential information belonging to the County. Therefore, except as required by law, the Consultant agrees that its employees will not:

1. Access or attempt to access data that is unrelated to their job duties or authorizations as related to this Agreement.
2. Access or attempt to access information beyond their stated authorization.
3. Disclose to any other person or allow any other person access to any information related to the County or any of its facilities or any other user of this Agreement that is proprietary or confidential. Disclosure of information includes, but is not limited to, verbal discussions, FAX transmissions, electronic mail messages, voice mail communication, written documentation, "loaning" computer access codes and/or another transmission or sharing of data.

The Consultant understands that the County, or others may suffer irreparable harm by disclosure of proprietary or confidential information and that the County may seek legal remedies available to it should such disclosure occur. Further, the Consultant understands that violations of this provision may result in termination of the Agreement.

The Consultant understands that information and data obtained during the performance of this agreement shall be considered confidential, during and following the term of this Agreement, and will not be divulged without the Purchasing Agent's written consent and then only in strict accordance with prevailing laws. The Consultant shall hold all information provided by the County as proprietary and confidential, and shall make no unauthorized reproduction or distribution of such material.

B. County Confidentiality

The County understands that certain information provided by the Contractor during the performance of this Agreement may also contain confidential or proprietary information. Contractor acknowledges that this Contract and public records (as defined by §2.2-3701 of the Virginia Freedom of Information Act) provided pursuant to this Contract are subject to the Virginia Freedom of Information Act §§2.2-3700 et seq. and the Virginia Public Procurement Act §2.2-4342 of the Code of Virginia.

8.38 Force Majeure

A party is not liable for failure to perform the party's obligations if such failure is as a result of Acts of God (including fire, flood, earthquake, storm, hurricane or other natural disaster), war, invasion, act of foreign enemies, hostilities (regardless of whether war is declared), civil war, rebellion, revolution, insurrection, military or usurped power or confiscation, terrorist activities, nationalization, government sanction, blockage, embargo, strikes at national level or industrial disputes at a national level, or strike or industrial disputes by labor not employed by the affected party, its subcontractors or its suppliers and which affect an essential portion of the contracted for works but excluding any industrial dispute which is specific to the performance of the works or this contract, interruption or failure of electricity or telephone service.

If a party asserts Force Majeure as an excuse for failure to perform the party's obligation, that party must immediately notify the other party giving full particulars of the event of force majeure and the reasons for the event of force majeure preventing that party from, or delaying that party in performing its obligations under this contract and that party must use its reasonable efforts to mitigate the effect of the event of force majeure upon its or their performance of the contract and to fulfill its or their obligations under the contract.

An event of force majeure does not relieve a party from liability for an obligation which arose before the occurrence of that event, nor does that event affect the obligation to pay money in a timely manner which matured prior to the occurrence of that event.

The Consultant has no entitlement and County has no liability for: (1) any costs, losses, expenses, damages or the payment of any part of the contract price during

an event of force majeure; and (2) any delay costs in any way incurred by the contractor due to an event of force majeure.

8.39 Survival of Terms

Upon discharge of this Agreement, Sections (Notice, Hold Harmless, Governing Law/Forum, Contractual Disputes) of these Terms and Conditions continue and survive in full force and effect.

8.40 Non-Waiver

No waiver of any provision of this Agreement shall constitute a waiver of any other provision nor shall any waiver of this Agreement constitute a continuing waiver unless otherwise expressly provided.

8.41 Audits:

- A. The Consultant shall maintain books, records and documents of all costs and data in support of the services provided. Loudoun County or its authorized representative shall have the right to audit the books, records and documents of the Consultant under the following conditions:
1. If the contract is terminated for any reason in accordance with the provisions of these contract documents in order to arrive at equitable termination costs;
 2. In the event of a disagreement between the Consultant and the County on the amount due the Consultant under the terms of this contract.
 3. To check or substantiate any amounts invoiced or paid which are required to reflect the costs of services, or the Consultant's efficiency or effectiveness under this contract; and,
 4. If it becomes necessary to determine the County's rights and the Consultant's obligations under the contract or to ascertain facts relative to any claim against the Consultant that may result in a charge against the County.
- B. These provisions for an audit shall give Loudoun County unlimited access during normal working hours to the Consultant's books and records under the conditions stated above.
- C. Unless otherwise provided by applicable statute, the consultant, from the effective date of final payment or termination hereunder, shall preserve and make available to Loudoun County for a period of three (3) years thereafter, at all reasonable times at the office of the Consultant but without direct charge to the County, all its books, records documents and other evidence bearing on the costs and expenses of the services relating to the work hereunder.
- D. Loudoun County's right to audit and the preservation of records shall terminate at the end of three (3) years as stated herein. The Consultant shall include this "Right of Audit and Preservation of Records" clause in all subcontracts issued by it and they shall require same to be inserted by all lower tier subconsultants in their subcontracts, for any portion of the work.

- E. Should the Consultant fail to include this clause in any such contract or lower tier contract, or otherwise fail to insure Loudoun County's rights hereunder, the Consultant shall be liable to Loudoun County for all reasonable costs, expenses and attorney's fees which Loudoun County may have to incur in order to obtain an audit or inspection of or the restoration of records which would have otherwise been available to Loudoun County from said persons under this clause. Such audit may be conducted by Loudoun County or its authorized representative.

8.42 Workmanship, Inspection, Employee Conduct

- A. All work under this Agreement shall be performed in accordance with the applicable standard of care. In the event the Consultant provides services that do not conform to the Contract Documents, the Consultant will re-perform such services at no additional cost to the County. The Consultant will be given an opportunity to correct the deficiencies in work. If the deficiency persists beyond thirty (30) days, the County may exercise its rights to terminate the Agreement pursuant to Section 8.22 of this RFP; provided, however, that if the Consultant is diligently pursuing a correction, the County may extend the time for the Consultant to cure the deficiency.

Additionally, the County may, from time to time, make inspections of the work performed under the resulting Agreement. Any inspection by the County does not relieve the Consultant of any responsibility in meeting the resulting Agreement requirements, and shall not constitute approval or acceptance of any work or deliverable.

- B. The Consultant and its employees shall be professional and courteous at all times. The County reserves the right to require the Consultant to remove any Consultant employee from County service who the County deems unfit for service for any reason, not contrary to law. The County will provide written notice to the Consultant identifying the employee(s) to be removed and the date by which they must be removed from the project. The Consultant shall provide an approved replacement within thirty (30) days after such notice. This right is non-negotiable and the Consultant agrees to this condition by accepting the resulting Agreement. The parties agree to work in good faith to address impacts to the project schedule as a result of the removal of project personnel.
- C. The Consultant shall provide all of its employees working at County sites with photo identification (frontal face). This identification must be prominently displayed at all times. No one with a felony conviction may be employed under this Agreement. The Consultant MUST remove any employee from County service who is convicted of a felony during his or her employment.



Loudoun County, Virginia

Department of Finance and Budget
Division of Procurement
One Harrison Street, SE, 4th Floor
Leesburg, Virginia 20175

**9.0 PROPOSAL SUBMISSION FORMS
ENGINEERING SERVICES FOR THE
LOUDOUN COUNTY STORMWATER MANAGEMENT PROGRAM**

THE FIRM OF: _____

Address: _____

FEIN: _____

Hereby proposes to provide the requested services as defined in Request for Proposal (RFP) RFQ 338784.

I understand that the omission of any items listed below from this proposal may be cause for rejection of the proposal as nonresponsive. I have ensured that I have received and acknowledged any and all Addenda.

A. Return the following with your proposal. If offeror fails to provide with their proposal, items shall be provided within twenty-four (24) hours of proposal opening.

ITEM:	INCLUDED: (X)
1. W-9 Form:	_____
2. Certificate of Insurance:	_____
3. Addenda, if any (Informality):	_____
4. One (1) electronic copy on USB Flash drive	_____

B. Failure to provide the following items with your proposal shall be cause for rejection of proposal as non-responsive and/or non-responsible. It is the responsibility of the offeror to ensure that it has received all addenda and to include signed copies with their proposal.

ITEM:	INCLUDED: (X)
1. Addenda, if any:	_____
2. Payment Terms:	____ net 30 or ____ Other
3. Proof of Authority to Transact Business in Virginia Form :	_____
4. One (1) original hard copy of Proposal	_____

Person to contact regarding this proposal: _____

Title: _____ Phone: _____ Fax: _____

Email: _____

Name and title of person authorized to bind the offeror (7.5):

Name: _____ Title: _____

Signature: _____ Date: _____

By signing and submitting a proposal, your firm acknowledges and agrees that it has read and understands the RFP documents and that your Firm is not currently Debarred by a local or state government or the Federal Government.



Loudoun County, Virginia

www.loudoun.gov/procurement

Department of Finance and Budget

Division of Procurement

1 Harrison Street, S.E., 4th Floor, Leesburg, VA 20175

PROOF OF AUTHORITY TO TRANSACT BUSINESS IN VIRGINIA

THIS FORM MUST BE SUBMITTED WITH YOUR BID/PROPOSAL. FAILURE TO INCLUDE THIS FORM SHALL RESULT IN REJECTION OF YOUR BID/PROPOSAL

Pursuant to Virginia Code §2.2-4311.2, a bidder/offeror organized or authorized to transact business in the Commonwealth pursuant to Title 13.1 or Title 50 of the Code of Virginia shall include in its bid/ proposal the identification number issued to it by the State Corporation Commission ("SCC"). Any bidder/offeror that is not required to be authorized to transact business in the Commonwealth as a foreign business entity under Title 13.1 or Title 50 of the Code of Virginia or as otherwise required by law shall include in its bid or proposal a statement describing why the offeror is not required to be so authorized. Any bidder/offeror described herein that fails to provide the required information shall not receive an award unless a waiver of this requirement and the administrative policies and procedures established to implement this section is granted by the Purchasing Agent or his designee.

If this bid/proposal for goods or services is accepted by the County of Loudoun, Virginia, the undersigned agrees that the requirements of the Code of Virginia Section 2.2-4311.2 have been met.

Please complete the following by checking the appropriate line that applies and providing the requested information.

PLEASE NOTE: The SCC number is NOT your federal ID number or business license number.

A. _____ Bidder/offeror is a Virginia business entity organized and authorized to transact business in Virginia by the SCC and such bidder's/offeror's Identification Number issued to it by the SCC is _____.

B. _____ Bidder/offeror is an out-of-state (foreign) business entity that is authorized to transact business in Virginia by the SCC and such bidder's/offeror's Identification Number issued to it by the SCC is _____.

C. _____ Bidder/offeror does not have an Identification Number issued to it by the SCC and such bidder/offeror is not required to be authorized to transact business in Virginia by the SCC for the following reason(s):

Please attach additional sheets of paper if you need to explain why such bidder/offeror is not required to be authorized to transact business in Virginia.

Legal Name of Company (as listed on W-9)

Legal Name of Bidder/Offeror

Date

Authorized Signature

Print or Type Name and Title

HOW DID YOU HEAR ABOUT THIS REQUEST FOR PROPOSAL?

RFQ 338784

Please take the time to mark the appropriate line and return with your proposal.

<input type="checkbox"/> Associated Builders & Contractors	<input type="checkbox"/> Loudoun Times Mirror
<input type="checkbox"/> Bid Net	<input type="checkbox"/> Our Web Site
<input type="checkbox"/> Builder's Exchange of Virginia	<input type="checkbox"/> NIGP
<input type="checkbox"/> Email notification from Loudoun County	<input type="checkbox"/> The Plan Room
<input type="checkbox"/> Dodge Reports	<input type="checkbox"/> Reed Construction Data
<input type="checkbox"/>	<input type="checkbox"/> Tempos Del Mundo
<input type="checkbox"/> India This Week	<input type="checkbox"/> Valley Construction News
<input type="checkbox"/> LS Caldwell & Associates	<input type="checkbox"/> Virginia Business Opportunities
<input type="checkbox"/> Loudoun Co Small Business Development Center	<input type="checkbox"/> VA Dept. of Minority Business Enterprises
<input type="checkbox"/> Loudoun Co Chamber of Commerce	<input type="checkbox"/> RAPID

Other _____

SERVICE RESPONSE CARD

RFQ 338784

Date of Service: _____

How did we do?

Please let us know how we did in serving you. We'd like to know if we are serving you at an acceptable level.

How would you rate the way your request for this document was handled?

Excellent Good Average Fair Poor

Did you have contact with Procurement staff?

How would you rate the manner in which you were treated by the Procurement staff?

Excellent Good Average Fair Poor

How would you rate the overall response to your request?

Excellent Good Average Fair Poor

COMMENTS: _____

Thank you for your response!

We can better assess our service to *you* through feedback from *you*.

Your Name: _____

Address: _____

Phone: _____(day) _____ evening

**Please return completed form to: Assistant Purchasing Agent • Procurement •
PO Box 7000 • Leesburg, VA 20177**



SECTION B – APPENDIX

BUDGET NARRATIVE

SECTION – OUTLINE

- Project Budget Narrative
- Budget Narrative Template
- Authorization to request funding from the Fund from governing body or chief executive of the local government
 - Detailed budget and narrative for all costs

(Kimley-Horn Scope of Services to develop a Bull Run Watershed Management Plan)



Project Budget Narrative



Project Budget Narrative

A detailed budget narrative is included below and contains the required information outlined in the 2023 Funding Manual for the Virginia Community Flood Preparedness Fund.

Estimated total project cost: The total identified project cost to complete with Bull Run Watershed Management Plan is \$495,651.75.

Amount of funds requested from the Fund: The total amount of grant assistance sought from the Fund is \$247,825.87. A detailed breakdown of how this funding is proposed to be allocated is shown in this Appendix as an attached Scope of Services.

Amount of funds available: The amount of funds available through this project's funding source is 50% of the total estimated project cost of \$495,651.75. Attached in this Appendix is the following documentation:

- Loudoun County Grant Application Summary Form for the Bull Run Watershed Management Plan
- Loudoun County Approved 2024 Budget Documentation Showing Source of Funds

Authorization to request for funding: Included in this Appendix is the Loudoun County internal Grant Application form that is signed by the County Budget Analyst, County Grants Coordinator, and County administration which authorizes the request for funding for this project.



Budget Narrative Template

Appendix B: Budget Narrative Template

<p>Applicant Name: Loudoun County Department of General Services Community Flood Preparedness Fund & Resilient Virginia Revolving Loan Fund Detailed Budget Narrative Period of Performance: January 1, 2024 through December 31, 2024 Submission Date: November 10, 2024</p>									
Grand Total State Funding Request									\$247,825.88
Grand Total Local Share of Project									\$247,825.88
Federal Funding (if applicable)									\$
Project Grand Total									\$495,651.75
Locality Cost Match									% 50
Breakout By Cost Type	Personnel	Fringe	Travel	Equipment	Supplies	Contracts	Indirect Costs	Other Costs	Total
Federal Share (if applicable)									
Local Share						247,825.88			247,825.88
State Share						247,825.87			247,825.87
Pre-Award/Startup									
Maintenance									
Total	\$	\$	\$	\$	\$	\$495,651.75	\$	\$	\$495,651.75



**Authorization to request funding
from the Fund from governing body
or chief executive of the local
government.**

Grant Application Summary Form

Bull Run Watershed Management Plan

Basic Information

Name of grant: Community Flood Preparedness Fund Grant (CFPF) Dept. name: General Services

Dept. Head signature Ernest N. Brown

Digitally signed by Ernest N. Brown
Date: 2023.10.06 16:58:17 -04'00'

Date 06OCT2023

Name of grant program manager/staff contact: Dennis Cumbie Ext. 8699

Amount of grant funding \$250,000 Grant application due by: 11/12/2023

Grantor: VA DCR State Federal

Grant Type: New Continuation

Local match required?: yes no Type and amount of local match: \$250,000 cash in-kind

Describe the authorized uses of funds: (Salary & benefits, Supplies, Contractual Services Travel, Other)
Development of a Watershed Management plan for the Bull Run Watershed.

Local match funds available in existing department appropriations: yes, index code
106421 (C00003) and 106420 (N02002)

Does this grant involve the receipt or purchase of equipment? yes no

If so, briefly describe: _____

Grant time period: 1/01/2024 to 01/01/26

Are there any provisions to renew beyond this time period? yes no

If yes, what are they and how will they be funded? The grant period can be extended if approved by DCR..

Are there any special conditions or provisions related to "maintenance of effort" (conditions or provisions that require the County to maintain this program after grantor funding is no longer available)? yes no

If yes, what are they? The watershed management plan will be a living document and can be updated as changes in the watershed occur or better data becomes available in the future.

Are there any other special conditions or provisions? yes no

If yes, what are they? _____

of FTE funded through the grant: 0 Preliminary job classifications: _____

Grant Program Information

Brief narrative of program to be provided using grant funds: This grant and matching funds will go toward the development of a Watershed Management Plan for the Bull Run Watershed. The Plan will be used by DGS to identify local TMDL projects and to implement the watershed management item in the Environment and Energy Work Plan. This effort would build upon a successful citizen and Environmental Commission led effort to expand watershed management planning in the County and includes a significant public outreach component.

Is this grant an expansion of an existing program, if so what index codes are associated? No If this is a new grant, identify the program code/ user code where the new index codes will be setup. _____

How does this program fit in the context of your department's management plan? By helping to achieve required nutrient reductions within the MS4 Permit. Meeting the goals of the Environmental Commission as represented in the new Watershed Management Plan item in the Environment and Energy Work Plan approved by the Board of Supervisors on September 5, 2023.

Is this (or a similar) program provided by any other County or school agency? _____yes ____No ____no

Impact on and Need for Resources

How will the grant program manager's workload be affected by this grant? This will be one additional project to track. However, implementation of the grant will be done by General Services staff.

What staff in other departments will be needed to implement or support this program?

Have you contacted those departments to discuss this grant? _____yes ____NA ____no

Is your existing office space sufficient to accommodate the new staff? _____yes ____no

Will additional office space be needed? _____yes ____x ____no

If yes, how much office space? _____

Will you need any reconfiguration of existing office space? _____yes ____x ____no

Will any new or additional systems furniture be needed: _____yes ____X ____no

Will a County vehicle be needed: _____yes ____x ____no If yes, how often? _____

What new or additional office equipment or furniture is needed? _____none ____x

How many new telephones and/or phone lines are needed? _____none ____x

What additional computer hardware or software will be needed? _____none ____x

Will the hardware or software be supplied through the grant? _____yes ____x ____no

If yes, will the hardware/software be updated/replaced (using grant funds) as needed or required? ____yes ____no

Will any reconfiguration of existing computer hardware be needed? _____yes ____x ____no

Will any of the following be needed: Mainframe access? _____yes ____X ____no


E-mail? _____yes ____x ____no

Voicemail? _____yes ____x ____no

Do not write in this space

Budget Analyst Recommendation: approve disapprove

Budget Analyst Comments: Confirmed no concerns from Stormwater Capital Budget Analyst (Chris Hetland).

Budget Analyst Signature: _____ Date: October 19, 2023

Grants Analyst Recommendation: approve disapprove X

Grants Analyst Comments: _____

Grants Analyst Signature: Barb Lawrence Date: 10/20/23

County Administrator Decision: approve disapprove

County Administrator Signature: Elaine Crawford Digitally signed by Elaine Crawford Date: 2023.10.23 15:07:49 -04'00' Date: 10/23/23



General Services

Transit and Commuter Services

Provides a complement of administrative oversight and operations for the County’s public transit services provided through a contractor. Transit services include: local fixed route transit service including connections to Metrorail Stations, paratransit service, and Commuter bus service to the greater Washington, D.C. area. Represents the County at regional organizations with an interest in transit services and funding, along with serving as the county liaison to the Washington Metropolitan Area Transit Authority for mass transit services. Manages grant funded programs for transit operations and capital investments. This program was moved from the Department of Transportation and Capital Infrastructure (DTCI) mid-year FY 2023.

**REMAINING \$50,000
WILL COME FROM
THIS FUND**

Budget Analysis

Department Financial and FTE Summary¹

	FY 2021 Actual	FY 2022 Actual	FY 2023 Adopted	FY 2024 Adopted	FY 2025 Projected
Expenditures					
Personnel	\$15,160,852	\$16,888,732	\$20,098,469	\$22,416,329	\$23,088,819
Operating and Maintenance	38,145,170	31,795,331	47,070,395	78,633,966	79,420,306
Capital Outlay	383,964	538,109	674,550	1,036,055	0
Other Uses of Funds	9,359,981	9,121,535	6,515,868	6,430,282	6,430,282
Total – Expenditures	\$63,049,967	\$58,343,708	\$74,359,282	\$108,516,632	\$108,939,406
Revenues					
Fines and Forfeitures	\$1,797	\$3,749	\$600	\$600	\$600
Use of Money and Property	756,773	343,085	703,216	582,147	582,147
Charges for Services	12,022,801	11,457,736	11,786,070	15,445,487	15,445,487
Miscellaneous Revenue	11,557	97,002	11,200	523,032	523,032
Recovered Costs	58,520	0	0	330,655	330,655
Intergovernmental – Commonwealth	65,394	83,446	60,000	5,285,610	5,285,610
Intergovernmental – Federal	898,773	0	0	103,012	103,012
Total – Revenues	\$13,815,615	\$11,985,018	\$12,561,086	\$22,270,543	\$22,270,543
Local Tax Funding	\$49,234,351	\$46,358,690	\$61,798,196	\$86,246,089	\$86,668,863
FTE	142.53	158.53	175.05	184.05	184.05
Central Services FTE²	3.53	3.53	4.30	4.30	4.30

¹ Sums may not equal due to rounding.

² Central Services positions only included for illustrative purposes; these positions are budgeted in the Central Services Fund, the cost of which are distributed across department operating budgets.

**APPROVED
BUDGET TOTAL**



Summary of Adopted Resource Requests

Department	Request Name	Dept Priority	Local Tax Funding	FTE
General Services	Composting	Board Priority	105,100	0.00
General Services	Internal Support Services	1	187,555	2.00
General Services	Environmental Work Plan and Energy Strategy	Board Priority	1,080,783	1.00
Housing and Community Development	Administrative Assistant/Customer Support	Board Priority	100,867	1.00
Housing and Community Development	Housing Program Specialist	Board Priority	116,693	1.00
General Services	Glass Recycling Expansion - Maintenance Helper	Board Priority	202,773	1.00
Building and Development	Human Resources/Payroll Liaison	1	89,242	1.00
Planning and Zoning	Business Analyst	1	147,959	1.00
County Administration	Equity and Inclusion Specialist	1	126,656	1.00
Commonwealth's Attorney	Executive Assistant	1	107,648	1.00
Total Prioritized Resource Requests			\$14,978,734	82.00
Total Resource Requests			\$20,788,062	127.00



**PROPOSED
BUDGET MATCHES
APPROVED
BUDGET. ITEMIZED
ON THIS SHEET.**

Resource Requests by Fund

Board of Supervisors Priority: Environmental Work Plan and Energy Strategy (DGS) Increase Option #15

Personnel:	O&M:	Capital:	Reallocation:	Revenue:	LTF:	FT pos.	PT pos.	FTE:
\$119,927	\$740,856	\$220,000	\$0	\$0	\$1,080,783		0	1.00

Details	Overview
<p>Service Level: Enhanced Service Level Request</p> <p>Mandates: Not mandated, but necessary for compliance with federal, state, or local laws</p> <p>PM Highlight: None</p> <p>Program: Environmental and Energy Work Plan - Environmental Activities Division</p> <p>Positions: 1 Energy Program Manager</p> <p>Theme: Board Priority</p> <p>One-time LTF: \$694,156</p> <p>Recurring LTF: \$386,627</p>	<ul style="list-style-type: none"> • As part of the County's Environmental Commission Work Plan,¹ the itemized projects are requested to meet the FY 2024 projected work plan: - Energy Equity Projects – \$100,000 - Implement Watershed Management Projects – \$50,000 - Environmental Information Hub Development – \$50,000 - Zero Emissions Vehicles (ZEVs) – \$200,000 - Green Bank – \$75,000 <li style="border: 1px solid red; padding: 2px;">- New Watershed Management Plan (WMP) – \$200,000 - Tree Canopy Baseline Analysis – \$50,000 - Wildlife Crossings – \$50,000 - Environmental Justice Needs Assessment – \$40,000 - Environmental Commission Public Engagement – \$10,000 • In order to implement the Board's Energy Strategy and to oversee the long-term planning for the Strategy, this request includes an energy program manager (approximately \$200,000 of LTF to include personnel, vehicle, and other O&M). • Existing staff would be responsible for the Environmental Work Plan. • Performance measures are dependent on this position being approved by the Board of Supervisors. • If the resource request is not funded, action on the Environmental Work Plan and the County Energy Strategy (and therefore the Board's 2020-2023 Strategic Environmental Initiatives) will be limited to what can be accomplished within existing resources.

**\$200,000
ALLOCATED
FOR NEW
WATERSHED
MANAGEMENT
PLAN**

Board of Supervisors Priority: Glass Recycling – Maintenance Helper (DGS) Increase Option #18

Personnel:	O&M:	Capital:	Reallocation:	Revenue:	LTF:	FT pos.	PT pos.	FTE:
\$65,265	\$66,453	\$71,055	\$0	\$0	\$202,773	1	0	1.00

Details	Overview
<p>Service Level: Enhanced Service Level Request</p> <p>Mandates: Not mandated, but necessary for compliance with federal, state, or local laws</p> <p>PM Highlight: None</p> <p>Program: Waste Management Division</p> <p>Positions: 1 Maintenance Worker</p> <p>Theme: Board</p> <p>One-time LTF: \$111,531</p> <p>Recurring LTF: \$91,242</p>	<ul style="list-style-type: none"> • On July 19, 2022, the Board of Supervisors directed staff to propose expanding the Glass Recycling Program beyond the existing County-operated recycling drop off centers in the FY 2024 budget process and directed the County Administrator to include a proposal for a glass only recycling site in the 20147 zip code.² • The ratio of staff resources needed for the recycling drop off center and Glass Recycling Collection programs is one employee per five collection sites in order to achieve sufficient upkeep, maintenance, and general cleanliness. • If this position is not funded, the additional glass only recycling site will not move forward as there will not be enough staff to maintain and provide upkeep.

¹ July 27, 2022, Board of Supervisors Environmental Summit, Item 2, Environment and Energy Work Plan

² July 19, 2022, Business Meeting, Item 7, Feasibility Study of County Operated Glass Recycling in Ashburn



Detailed budget and Narrative for All Costs

**(Kimley-Horn Scope of Services to develop a Bull Run
Watershed Management Plan)**



November 2nd, 2023

Chris Stone, CFM, PG
Stormwater Chief
801 Sycolin Road, SE
Suite 300
Leesburg, VA 20175

Re: Professional Services for the Bull Run Watershed Management Plan Development

Dear Chris:

Kimley-Horn and Associates, Inc. (“Kimley-Horn” or “Consultant”) is pleased to submit task order proposal to Loudoun County (“Client”) for the development of a Watershed Master Plan for the Bull Run Watershed. These services will be performed underneath contract RFQ 338784B-C – Year 3, Engineering Services for the Loudoun County Stormwater Management Program, executed by Loudoun County and Kimley-Horn on May 1st, 2021.

TASK 100 – DATA COLLECTION AND EXISTING CONDITIONS

Kimley-Horn will compile the best publicly available data for use in the development of the IFM within the Bull Run Watershed.

Data sources will consist of:

- Loudoun County Publicly Available Geospatial Data
- Homeland Infrastructure Foundation-Level Data (HIFLD)
- Loudoun County LiDAR Data
- Multi-Resolution Land Characteristics Consortium (MRLC) Land Cover Data
- NRCS Web Soils Survey
- Virginia Geographic Information Network (VGIN) Data Hub
- Conserve VA
- Federal Emergency Management Agency (FEMA) Resilience Analysis and Planning Tool (RAPT)
- EPA Environmental Justice Screening Tool (EJ Screen)
- Virginia Flood Risk Information System (VFRIS)

Existing Features Basemap Development

Kimley-Horn will generate a GIS Basemap consisting of environmental, flood risk, infrastructure and land use features from the data sources outlined in this proposal. The available data will be used for the tasks within this proposal to assist in the planning, assessment and prioritization of potential resiliency projects, and validation of predicted flood extents. This task assumes that up to five (5) GIS figures will be developed as supporting documentation in the WMP based on this data. Figures may consist of the following:

- Existing Environmental Features Map
- Existing Flood Risk Map
- Existing Stormwater Infrastructure Map

- Resiliency Planning Considerations Map (Conserve VA, RAPT, EJ Screen, VFRIS)
- Existing Zoning / Land Use Map

Stormwater Pond Plan Review and Feature Identification

Kimley-Horn will identify up to twenty-five (25) stormwater ponds within the Bull Run watershed of Loudoun County for incorporation into the IFM. Kimley-Horn will initially sort all existing ponds based on total drainage area and impervious acres to perform a rapid assessment of facilities which have the potential to manage the largest peak flows during the 100-YR design storm. A review of existing BMP type, and whether it is currently reported as a BMP, will be included as part of this assessment. Kimley-Horn will also review previously provided plan data within the Bull Run watershed to determine additional data needs for these facilities. A list of these facilities will be provided to the County, identifying which facilities are in need of data in order to generate stormwater models, and which facilities are recommended for inclusion in the IFM. The intent of this exercise is to model facilities which both have the potential to reduce peak flood flows downstream and may provide opportunities for the County to earn POC reductions to apply to their Chesapeake Bay and Bull Run TMDLs.

Acceptable data sources include:

- Loudoun County Approved Design Plans
- Loudoun County Approved As-Builts
- Loudoun County Bathymetric Surveys

Kimley-Horn assumes that up to ten (10) stormwater ponds will need stage-storage curves. For these facilities, contours from the County provided data sources will be traced in Bluebeam (or equivalent PDF software) and a stage storage curve will be derived. Kimley-Horn will then identify the open channels within Bull Run for incorporation into the IFM. Open channels will be based on:

- Modeled streams within the Bull Run Watershed where the County can provide the effective HEC-RAS model for
- Unmodeled streams which has been digitized by the EPA as part of their impairment assessment

Stream centerlines which are anticipated to be modeled have been provided in Attachment A.

Once the open channels that meet the criteria above have been identified, Kimley-Horn will review County documented in-line (with respect to the stream) storm drainage culverts in order to establish a fully connected open channel network. For systems where in-line stream culvert data is not documented, Kimley-Horn will prepare a data request to the County for this information. If the County does not have access to this data, and coordination with VDOT is required, it is assumed that Kimley-Horn will provide the County with the location of the culvert(s) and the specific data being requested, but the County will lead efforts in requesting this information from VDOT.

Kimley-Horn will then identify and compile known gage data throughout the County (sourced from the County or USGS) in an effort to validate flows generated as part of the IFM. Based on a preliminary review of USGS gage data, it does not appear that there are any existing gages within the Bull Run Watershed of the County, or immediately downstream in Fairfax County; therefore, any gage data will be based on existing gages operated by the County or other external agencies.

Emergency Management Division Coordination

Kimley-Horn will review the RAPT tool, data from HIFLD and the County to identify and document locations of critical infrastructure throughout the Bull Run Watershed. Once this preliminary review is complete, Kimley-Horn will setup a meeting with the Loudoun County Office of Emergency Management to discuss and identify known flooding locations throughout the Bull Run Watershed, along with any additional locations of critical infrastructure. If photo documentation of flooding exists, Kimley-Horn will request these records at this time.

Acceptable flood risk will be defined based on standard level of service requirements in accordance with the FSM and VDOT Drainage Manual. Examples of critical infrastructure may consist of hospitals, schools, substations, public safety locations, and emergency access routes.

Kimley-Horn will digitize these flood and infrastructure locations in ArcGIS and will leverage this data as part of model validation during Task 200.

Water Quantity and Quality Data Collaboration Efforts

Kimley-Horn will download and compile water quality data from the EPA 303d list using resources such as EPA My Water Way. Kimley-Horn will also request available data on the under development TMDL for Sand Branch from the County.

Kimley-Horn will reach out to the following organizations in an effort to collaborate on water quality and quantity data for the purposes of the Bull Run WMP:

- Northern Virginia Regional Commission (NVRC)
- Occoquan Watershed Monitoring Laboratory
- Loudoun Wildlife Conservancy

Kimley-Horn will request available data on the Occoquan Watershed Model from NVRC, including input parameters, pollutant loads, and data sources. This data, along with information compiled from the County, the Occoquan Watershed Monitoring Laboratory, and the Loudoun Wildlife Conservancy will be leveraged to compare quantifiable water quality data within Loudoun County's Bull Run Watershed against estimated loads and improve the accuracy of the water quality model developed as part of Task 300.

TASK 200 – EXISTING HYDROLOGY DEVELOPMENT

Using the County's latest available LiDAR data, Kimley-Horn will delineate the drainage areas for the open channels throughout Bull Run leveraging PCSWMM's watershed delineation tool; delineated subbasins will be compared against Loudoun County mapped outfall drainage areas and digitized stormwater infrastructure to correct any poorly represented watershed boundaries. Subbasin delineations will be developed for open channels with a minimum drainage area of 100 acres. Subbasins will then be developed at intervals no greater than every 2,000 feet; where large flow changes are anticipated due to confluences or new inflows, additional subbasins will be delineated.

Kimley-Horn will then develop the SWMM Hydrology for these drainage basins as outlined in the EPA SWMM Volume 1 Hydrology Manual. This task will include the development of the following attributes:

Percent Impervious

Kimley-Horn will estimate the percent impervious based on the County's latest impervious data. This data will be a composite of impervious features compiled from the following GIS data:

- Loudoun Road Casings
- Loudoun Buildings
- Loudoun Park and Ride Lots
- Miscellaneous Cultural Polygons
- Large water bodies (Ponds, Lakes, etc.)

Both artificial turf fields and sidewalks and trails will be further evaluated for incorporation into the impervious database. Sidewalks and trails data are only digitized as polylines by the County, therefore a buffer will be applied to this feature class to assume constant 4' widths where present. Artificial turf fields may be considered impervious on a case by case basis.

The latest Loudoun County aerial imagery will be compared against these data sets to identify any missing impervious areas. These areas will be communicated to the County, and a request for digitization of these areas will be placed with the County for accurate modeling.

This analysis will assume the following:

- Existing rooftop downspouts shall be assumed to be disconnected and flow over pervious areas.
- Driveways drain directly to the street and will be considered hydraulically connected impervious area.

Subcatchment Length and Width

Kimley-Horn will develop time of concentration flow paths for each Subbasin to estimate overland flow lengths. Kimley-Horn will estimate the sub catchment width by dividing the area of the basin by the average maximum length of overland flow.

Overland Flow Slope

Kimley-Horn will initially estimate the overland flow slope of the sub catchment as the change in elevation divided by the length of overland flow. Kimley-Horn will also estimate the average watershed slope using the slope along this line.

Mannings Coefficient

Kimley-Horn will apply unique impervious and pervious mannings coefficients to each sub catchment surface type to represent the resistance that the overland flow will encounter as it is conveyed through the subcatchment. Mannings coefficients will be based on Table G-1 of Volume II Hydraulics of the EPA SWMM User Manual. A list of appropriate mannings coefficients for various land covers will be provided to the County for review and input.

Depression Storage

Impervious depression storage will be estimated using a typical value of 0.10 and initial pervious depression storage will be represented using a typical value of 0.20.

Infiltration Method

The default infiltration method will be the modified Green Ampt method. Hydraulic conductivity will be estimated using NRCS soil classifications, suction head will be calculated as outlined in Volume 1 of the EPA SWMM Reference Manual, and initial deficit will be derived from the soil type and Table 4-8 of Volume 1 of the EPA SWMM Reference Manual.

Loudoun County Regression Equation

Kimley-Horn will also generate peak flows for each Subbasin based on the Loudoun County Regression Equation in accordance with the FEMA Region III Hydrologic Analysis of Loudoun County, Virginia, 2013 report. Subbasins which do not meet the following limitations of the regression equations will have their flows estimated based on the PCSWMM Hydrology methodology:

- Drainage Areas = 0.28 to 332 square miles
- Impervious Area = 0 to 41.1 percent
- Channel Slope = .001 to .04 foot/foot
- D Soil = 0 to 70.67%

The generated flows from the Loudoun County Regression Equation will be used to assist in the remapping of the flood overlay districts within Bull Run Watershed of Loudoun County.

Water Quality Modeling Setup

Kimley-Horn will setup water quality loading factors to develop Phosphorus, Nitrogen and Total Suspended Sediment (TSS) loads from individual sub catchments based on regulated and unregulated areas. The land use data developed as part of this task will be associated with loading rates consistent with the Potomac River Basin as outlined in the Guidance Memo No. 20-2003 – Chesapeake Bay TMDL Special Condition, dated February 2021. Kimley-Horn will compare these loads against those generated in the Occoquan Watershed Model; if these loads differ, Kimley-Horn will develop two (2) alternative loading scenarios, to allow the County to estimate load opportunities for complying with the following TMDLs:

- Chesapeake Bay TMDL Action Plan
- Bull Run TMDL Action Plan

Water quality loads will be used to assess watershed improvements as part of Task 600 to identify opportunities which both provide flood resiliency and water quality improvements.

TASK 300 – PCSWMM MODEL DEVELOPMENT***Hydraulic Routing Setup***

Kimley-Horn will import the existing County HEC-RAS model into PCSWMM as the basis for the Bull Run watershed model. Unmapped open channels which were identified as part of Task 100 will be imported from GIS, along with any connecting storm infrastructure (i.e culverts, bridges) to develop the link-node layout within the Loudoun County Bull Run watershed.

A Digital Terrain Model (DTM) will be used as the basis for all topographical data. Kimley-Horn will review the culvert, road and bridge data imported from HEC-RAS against this DEM to ensure accuracy. Kimley-Horn will also request plan data for all culvert, road and bridge crossings within the model from the County and/or VDOT to validate the accuracy of modeled capacities at all critical infrastructure locations. Where plan data references the NGVD29 datum, the FEMA Flood Insurance Study Report will be used to convert the datum based on geographic location.

Kimley-Horn will develop transect cross-sections at intervals of no less than three-hundred (300) feet, or at locations where there are significant changes to the floodplain or channel geometry. Transects will span beyond the five-hundred year floodplain limits to provide opportunity for future rainfall modeling with more intense storm events.

Kimley-Horn will populate the following information into the PCSWMM model for analyzing surface runoff:

- Boundary data – input rainfall time series based on the NOAA C curve (1, 2, 10, 25, 50, 100, 500)
- Subcatchment Data
- Node (manhole, inlet, outlet, storage node, weir)
 - Type (junction, outlet or basin)
 - Horizontal & Vertical Information
 - Depth
- Link (Conduit)
 - Upstream and Downstream Nodes
 - Shape and dimensions
 - Material
 - Roughness
 - Upstream and Downstream inverts
- Tailwater Conditions

After the base hydraulics model is built, Kimley-Horn will develop the following PCSWMM scenarios to evaluate the system's capacity under various design storm events:

- 1-YR 24-HR
- 2-YR 24-HR
- 10-YR 24-HR
- 25-YR 24-HR
- 50-YR 24-HR
- 100-YR 24-HR
- 500-YR 24-HR

Pond Model Integration

Kimley-Horn will review the DTM generated at each pond for incorporation into the model and generate stage-storage curves using the standard PCSWMM work-flow for generating pond-storage curves from contour polylines. Generated stage-storage curves will be compared against those documented in the approved plans reviewed as part of Task 100. Where storage capacity is within a reasonable range (+/- 10%) of the design plans, Kimley-Horn will modify the impoundment as part of the 2D model with its corresponding stage – discharge curve. In cases where the calculated storage capacity is greater than a

10% deviation from the approved design plans, it will be assumed that the facility has silted in and cannot be modeled as a physical impoundment within the DTM. In cases where this occurs, the DTM will be manually edited to “fill” in the impoundment and eliminate the topographic representation of the pond. In its place, a storage node and outfall device will be built into the model to route pond performance and storage capacity. It is assumed that this DTM editing process will only need to be performed for in-line stormwater facilities; all other instances where the DTM varies will be addressed through routing subcatchments directly to the storage-nodes. It is assumed that all ponds are in functional condition for the purpose of this model.

Kimley-Horn will generate a list of ponds which appear to be silted in or inadequate to the County for further consideration as part of its maintenance program.

Hydraulic Boundary Conditions

Kimley-Horn will route the flows using the dynamic wave routing method through a 1D/2D SWMM model (PCSWMM) for these design storm events to understand existing flood risk and location where existing transportation infrastructure does not meet the intended level of service (LOS); level of service requirements will be based on Table 6-1 from the VDOT Drainage Manual.

Tailwater conditions will be based on normal depth for all design storms where no additional data is available. In instances where the 100-YR and 500-YR water surface elevations are documented as part of FEMA studies or approved floodplain studies, these known water surface elevations shall be used.

Model calibration will involve a review of generated flood depths and flows against gage station records, confirmation of modeled flooding against known flooding in documented areas, and efforts by NOAA as part of their flood inundation mapping initiative (if completed in Loudoun at the time of this effort).

TASK 500 – EXISTING CONDITION RESILIENCY ASSESSMENT

Flood Risk Assessment

Kimley-Horn shall identify flood risk along the identified open channels, and at road crossings, within the study limits of the Bull Run Watershed within Loudoun County. Flood risk shall be illustrated with flood depth rasters and GIS figures for County review and documentation in the WMP as part of Task 1000. Kimley-Horn will also provide digital deliverables of the rasters to the County for potential use in ArcGIS online interactive maps.

The following flood risks will be reviewed:

- Locations where existing roadway infrastructure does not meet the intended level of service as defined in Task 300
- All buildings that fall within the modeled 100-YR floodplain
- Critical infrastructure identified as part of Task 100

Locations which are identified as at risk for flooding will be documented at opportunities for flood resiliency projects to be considered as part of Task 600. Kimley-Horn will generate a GIS map identifying these locations and include this as an Appendix in the WMP developed as part of Task 900.

Pond Capacity Assessment

Kimley-Horn will review the performance of the existing stormwater ponds integrated into the model to assess facilities where excess, or inadequate, capacity may exist. Locations where existing stormwater ponds do not currently convey the 100-YR 24-HR design storm without overtopping will be documents for further review by the County. Similarly, in locations where existing ponds have excess capacity, these stormwater facilities will be flagged for further consideration for retrofits during Task 800.

Pollutant Load Assessment

Kimley-Horn will summarize pollutant loads generated in subbasins through the Bull Run watersheds. Attribute data associated with these loads will be exported from PCSWMM into ArcGIS for development into GIS figures for the WMP. Two separate heat maps will be generated for illustrating this parameter: (1) a heat map illustrating maximum pollutant loads throughout the watershed and (2) a normalized heat map illustrating maximum pollutant loads / acre to identify critical locations within the watershed which experience atypically high pollutant loads.

Pollutant load assessments will be imposed against impaired streams to identify critical management areas for future BMPs.

Stream Stability Assessment

Kimley-Horn will leverage PCSWMM in-stream erosion potential tools to estimate the following parameters along open channels:

- Cumulative Erosion Index (Velocity)
- Cumulative Effective Work Index (Shear Stress)

It is assumed that these estimates will be leveraged as indices for potential erosion along open channels. The accuracy of the available topographic data will significantly impact the accuracy of the measurements collected. Kimley-Horn will use the best available data to identify reaches within the watershed which may be experiencing unstable flow conditions, indicating the presence of bed and/or bank erosion. Kimley-Horn will flag reaches for consideration in feasibility assessments as part of Task 800.

Assumptions:

TASK 600 – BMP PRIORITIZATION ASSESSMENT

Kimley-Horn will develop a table summarizing approved BMPs as outlined in the BMP Clearinghouse and Guidance Memo No. 20-2003 within Virginia for potential to be implemented throughout the Bull Run Watershed. Co-benefits for BMPs will be identified which document additional environmental considerations associated with their implementation.

Co-benefits are anticipated to consist of:

- Habitat and Biodiversity
- Stream Health
- Fish Habitat
- Tree Canopy

- Climate Resiliency
- Flood Risk Mitigation
- Removal of Bacteria
- Groundwater Recharge / Infiltration Capacity
- Nutrient Uptake / Pollutant Removal

Kimley-Horn will develop tabular summaries of the above co-benefits for review by the County and public. The co-benefits summary tables will be leveraged by the County and the public to help identify and guide preferred BMPs for resiliency and water quality enhancements to the watershed. The reviewed BMPs will be prioritized based on their effectiveness in specific applications and ranked based on preference for incorporation into future land development opportunities.

Kimley-Horn will then meet with the County to develop an evaluation matrix rubric which considers key considerations for prioritizing projects; this effort will include both identification of key criteria, and appropriate weights for developing a prioritization matrix for project selection. This effort will aide in identifying key site criteria for consideration as part of Task 700 for evaluating project feasibility.

TASK 700 – NATURE-BASED SOLUTIONS (NBS) FEASIBILITY ASSESSMENTS

Based on the existing conditions assessment performed as part of Task 500, and the prioritized BMP opportunities outlined in Task 600, Kimley-Horn will perform a desktop-based opportunity assessment for project implementation opportunities.

The following project types will be prioritized for identification at the County-wide level for potential implementation (note that the order of this list is not indicative of the likelihood of implementation):

- Regional Ponds Retrofits and Pond Infrastructure Upgrades
- Stream Restoration Practices in Conjunction with Floodplain Improvement Projects
- Land Conversion
- Floodwall Implementation Projects
- Land Acquisition Techniques
- Restoration of Floodplains
- Nature-based Approaches Aimed at Increased Resilience

Kimley-Horn will identify up to twenty (20) BMP (structural and non-structural) opportunities and up to ten (10) stream restoration opportunities for consideration. Project locations will be primarily focused on the following types of parcels:

- County-Owned Lots
- HOA Owned Common Lots
- Flood-prone Areas on Privately Owned Lots

Kimley-Horn will conduct an opportunities and constraints analysis for each potential project to determine its feasibility. The feasibility assessment will consider:

- Constraints (utilities, access, easement, ownership)
- Resiliency Potential

- Crediting Potential
- Topographic Assessments for Upstream and Downstream flow conveyance
- Preliminary Facility Footprint and Configuration

Each opportunity and constraints assessment will be performed in ArcGIS and documented with a retrofit assessment figure including a short narrative and an outline of potential project opportunities and constraints. Kimley-Horn will submit these projects to the County for consideration and initial review, and further identification of additional limitations or constraints.

The identified projects will be scored using the prioritization matrix developed under Task 600 and the top fifteen (15) projects will be selected for site visits and further refinement. Site visits will be performed to collect site photos, identify additional site constraints, and refine preliminary concept layouts to validate feasibility. Photo collection will be done using GPS grade data collection tools to ultimately develop a photo-location map for opportunities reviewed in-field. For stream restoration opportunities, site visits will also include full BANCS assessments to assess real time erosion potential. It is assumed up to five (5) prioritized projects will be stream restorations; if additional stream restoration opportunities are determined to move forward, Kimley-Horn will coordinate with the County to request additional funds for the rapid BANCS assessment of these assets.

The BANCS Assessment consists of the following studies:

- Bank Erosion Hazard Index (BEHI)
- Near Bank Stress (NBS)

Bank Erosion Hazard Index

The BEHI Method for assessing stream bank erosion potential assigns point values to characteristics of stream bank condition. These scores will be used to inventory stream bank condition over large areas and prioritize stream restoration efforts. Kimley-Horn will utilize a Trimble R1 submeter GPS along with Arc Collector to collect information efficiently and accurately for each of the stream parameters shown in Table 1 and Figure 1.

Table 1: BEHI Parameters

Bank length	Length of bank consisting of similar BEHI characteristics
Bank height	Height from toe of bank to top of bank
Bankfull height	Height from toe of bank to bankfull
Rooting depth	Depth of roots from top of study bank down
Root density	Percentage of study bank with roots
Bank angle	Angle of the bank
Bank surface protection	Percent vegetation/roots protecting study bank
Bank materials	Material consistency (Silt, Sand, Clay, Boulder, gravel)
Bank material stratification	Bank materials layered in study bank

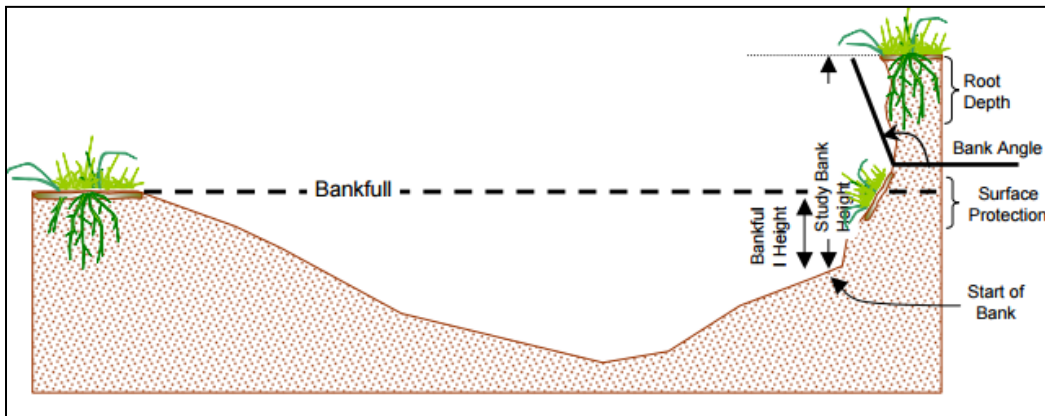


Figure 1: Bank Erosion Hazard Index (BEHI) Data Collection Graphic

Kimley-Horn will record the results on the BEHI Worksheet 3-11 (Rosgen). An erodibility rating will be assigned for each study bank corresponding with those shown in Table 2.

Table 2: BEHI Score and Rating Table

Total BEHI Score	Erodibility Rating
5-9.5	Very Low
10-19.5	Low
20-29.5	Moderate
30-39.5	High
40-45	Very High
46-50	Extreme

Near Bank Stress (NBS) Assessments

Kimley-Horn will also perform NBS assessments in the same general location as the BEHI assessments. The NBS is a protocol for estimating energy distribution in the near-bank region (1/3 of channel cross-section) associated with the bank being evaluated. Kimley-Horn will utilize NBS methods 2 and 5 for determining each study bank’s NBS rating.

Method 2 utilizes a ratio between an outer bend’s Radius of Curvature and the Bankfull Width. For each NBS assessment the following parameters will be collected and/or calculated to develop NBS scores:

- Radius of Curvature - the distance measured from the outside of the bankfull channel to the intersection point of two lines that perpendicularly bisect the tangent lines of each curve departure point
- Bankfull Width – The surface width of the stream measured at the bankfull stage

The resulting ratio corresponds to the NBS erodibility rating shown in Table 3.

Table 3: NBS Method 2 Ratio vs Rating Table

Near Bank Stress (NBS) Ratings	Ratio
Very Low	>3.00
Low	2.21 - 3.00
Moderate	2.01 - 2.21
High	1.81 - 2.00
Very High	1.50 - 1.80
Extreme	<1.50

Kimley-Horn will utilize NBS Method 5 for study banks which are not outer bends. Method 5 is a ratio between the Near Bank Max Depth and the Near Bank Mean Depth.

- Near Bank Max Depth – The maximum depth from a stream’s invert to the bankfull stage in the stream’s near bank region (2/3 of channel cross-section)
- Near Bank Mean Depth – The average of the depth measurements from a stream’s invert to the bankfull stage in the stream’s near bank region (1/3 of channel cross section).

The resulting ratio corresponds to the NBS erodibility rating shown in Table 4.

Table 4: NBS Method 5 Ratio vs Rating Table

Near Bank Stress (NBS) Ratings	Ratio
Very Low	<1.00
Low	1.00 - 1.50
Moderate	1.51 - 1.80
High	1.81 - 2.50
Very High	2.51 - 3.00
Extreme	>3.00

The above-listed parameters will be collected using a Trimble R1 submeter GPS and Arc Collector to collect information efficiently and accurately for each parameter. Kimley-Horn will record information on Worksheet 3-12 (Rosgen) - Estimating Near Bank Stress.

Soil Sampling & Nutrient Concentration Analysis

Kimley-Horn will collect up to ten (10) soil samples from the stream banks using a 4” soil sampling auger and performed in general accordance with the *Bulk Density and Soil Nutrient Concentration Methods Guidance* outlined in Chesapeake Stormwater Network (CNS) publication *A Unified Guide to Crediting Stream and Floodplain Restoration Practices in the Chesapeake Bay Watershed*. Soil samples will be spaced 200’ to 500’ apart. Kimley-Horn will collect samples from each soil horizon found in the stream bank (O, A, B, C, etc.), create a composite sample, and store in a ziploc bag for shipping to the laboratory. Kimley-Horn will photo document the stream bank where the soil sample was collected, and GPS locate each sample location using a Trimble R1 submeter GPS and Arc Collector. Soil samples will be sent to the

Waypoint Analytics to determine Bulk Density and Nitrogen (TN) and Phosphorous (TP) nutrient concentrations.

Predicted Stream Bank Erosion & Stream Restoration POC Load Reduction Credit Estimates

After completing the BEHI and NBS field assessments, Kimley-Horn will utilize the Spreadsheet Tool for Erosion Rate Estimates (Appendix A. Bank Erosion Summary Table w-BEHI and NBS – with TMDL Phase 6 revisions) as outlined in publication “*A Unified Guide to Crediting Stream and Floodplain Restoration Practices in the Chesapeake Bay Watershed.*” Kimley-Horn will also utilize the Colorado streambank erosion prediction curve and the BEHI and NBS erodibility ratings associated with that curve to predict the streambank erosion for each study bank and the total streambank erosion for the assessment reach. The Colorado curve and erodibility ratings are already built into the Spreadsheet Tool for Erosion Rate Estimates. Virginia DEQ utilized the Spreadsheet Tool for Erosion Rate Estimates for SLAF in 2023 (Attachment A). The total bank erosion calculations will be summarized using a variation of the Bank Summary worksheet from Spreadsheet Tool for Erosion Rate Estimates to show the total predicted streambank erosion in tons/year/foot. Kimley-Horn will estimate the potential POC load reduction credits associated with restoring the stream as described in “*A Unified Guide for Crediting Stream and Floodplain Restoration Projects in the Chesapeake Bay Watershed.*”

Kimley-Horn will prepare a PDF graphic showing the following items:

- Map showing BEHI and NBS ratings along stream banks
- Map showing BEHI and NBS data collection locations
- Appendix A. Bank Erosion Summary
- Nutrient sampling locations

TASK 800 – RESILIENCY MODELING SCENARIOS

Kimley-Horn will develop a proposed conditions PCSWMM model which considers the following development scenarios:

- Scenario A: Present-Day Land Cover with NBS Integration
- Scenario B: Comprehensive Plan Scenario without NBS Integration
- Scenario C: Comprehensive Plan Scenario with NBS Integration

Scenario A

The existing conditions model developed as part of Task 400 will be modified to incorporate the fifteen (15) projects identified as part of Task 700. It is assumed that all improvements will be built within a single model, with improvements being implemented systemically from upstream to downstream within the Watershed. This scenario will not consider comprehensive land cover conditions.

No modeling will be performed for stream restoration opportunities at this time. It is assumed any improvements from stream restoration opportunities will be further evaluated during concept planning or design for those individual projects.

Scenario B

The existing conditions model developed as part of Task 400 will be modified to consider comprehensive plan land cover throughout the watershed. Kimley-Horn will review the County's comprehensive plan and develop a conversion table to assign land cover changes to the watershed which reflect the comprehensive plan's buildout conditions. The table will be submitted to the County for review and updated based on feedback to more accurately assign open space/forested area, managed turf and impervious percentages. As part of the final WMP, a table will be developed summarizing assumed land cover percentages for each development type. Kimley-Horn will model the increase in flood inundation extents and update the water quality pollutant loads as a result of these changes to land cover. Actual infrastructure improvements, such as roads, will not be captured in the model.

Scenario C

The comprehensive buildout model developed as part of Scenario B will be modified to incorporate the fifteen (15) projects identified as part of Task 700 to assess how these improvements will be impacted by proposed land use changes. For stormwater management facilities, alternative configurations to meet larger runoff quantities will be modeled to understand facility footprints under ultimate buildout conditions.

For each of these scenarios, a summary table will be generated outlining the following parameters resulting from these improvements (where applicable):

- Runoff reduction volume
- Runoff storage volume
- Impact to critical infrastructure
- Nutrient credit reductions

For Scenarios B and C, recommendations will be quantified and discussed in the WMP which outline:

- Recommended treatment mechanisms and requirements to avoid reductions in watershed water quality
- Total storage volumes required to limit flood extents to present-day conditions

Note that comprehensive plan scenarios will only be ran for the 100-YR and 500-YR design storms. It is assumed that development standards for stormwater management will mitigate design storms up to the 10-YR, and improve conditions for events between the 10-YR and 100-YR.

TASK 900 – PROJECT COSTS, FUNDING AND PRIORITIZATION

Based on the results of Tasks 700 and 800, Kimley-Horn will develop Engineer's Estimates of Probable Construction Costs (EOPCC) for the fifteen (15) projects identified for consideration. EOPCCs will be based on concept level planning from modeling iterations. Costs may not be representative of actual construction costs based on ultimate design.

Kimley-Horn will review potential grant funding opportunities and identify sources such as CFPF, the Stormwater Local Assistance Fund and the County's Capital Improvement Plan (CIP) budget. Kimley-Horn will also research and evaluate other local, state and federal grant opportunities which may be suitable for project implementation and summarize these in the WMP for future consideration.

The prioritization matrix will be further refined to include considerations such as resiliency impact, cost and funding opportunity. The projects will then be ranked based on the weightings considered as part of Task 600 as part of the final evaluation.

Kimley-Horn will review available funding opportunities, along with the County's budget, to develop a new five (5) and ten (10) year CIP for the Bull Run Watershed. This project implementation schedule will be drafted such that it will be representative of past efforts by the County (i.e. estimated capacity of the County and consultants to design, manage and construct these projects will be assumed to be similar to those in the past).

TASK 1000 – WATERSHED MANAGEMENT PLAN DEVELOPMENT

Kimley-Horn will review previously published County WMP, and Fairfax County's Bull Run and Cub Run WMPs, as reference points for the layout, feel and content of this deliverable. Using these documents in conjunction with the information generated from this scope of work, Kimley-Horn will prepare a draft WMP outline that best represents the intent and purpose the following EPA Nine Elements to Watershed Management.

1. Identify causes of impairment and pollutant sources that need to be controlled in order to achieve load reductions
2. Estimate load reductions expected from management measures
3. Describe nonpoint source management measures that will need to be implemented to achieve load reductions from Step 2, and describe critical areas in which those measures will be needed to implement this plan
4. Estimate the amounts of technical and financial assistance needed, associated costs, and funding sources
5. Implement an information and education component to enhance public understanding of the projects, with ongoing collaboration throughout the process
6. Develop a schedule for implementation of the nonpoint source management measures identified herein
7. Describe interim measurable milestones for determining whether nonpoint source management measures or other controls are being implemented
8. Develop criteria for evaluating the effectiveness of projects
9. Establish a monitoring plan for long-term project evaluation

Kimley-Horn will then meet with the County to solicit feedback on the draft outline with the intent of finalizing an outline that effectively communicates the information generated from this scope of work consistent with the EPA Nine Elements to Watershed Management while also incorporating successful elements from previously published County WMP and identifying those elements that may need additional care from the previously published County WMP.

After completing the outline in conjunction with the County's input, Kimley-Horn will prepare the WMP that effectively summarizes the analytics and methodologies leveraged as part of this scope of work. The final WMP will serve as a framework for the County to guide project implementation throughout the Bull Run Watershed and a criteria for developing and maintaining a living model to proactively plan for future development and infrastructure projects. Where existing efforts do not meet those outlined in the EPA's Nine Steps, narratives will be provided which detail future opportunities to enhance this document.

As part of this WMP, documentation of existing County requirements for the design of stormwater management facilities associated with development in the watershed through VSMP requirements will be reviewed. Kimley-Horn will summarize the anticipated changes to the Virginia Runoff Reduction Management Spreadsheet (VRRM) as a result of Virginia Tech's latest efforts to update the methodology as part of version 4. A summary of the untreated pollutant of concerns within the watershed based on version 3.0 and version 4.0 will be developed to inform the County's policy on regulating private development within this actively developing watershed.

TASK 1100 – PUBLIC INVOLVEMENT

Public involvement is anticipated to be an ongoing process throughout the development of this WMP. Public meetings and coordination are anticipated at the following milestones:

Meeting #1 - Initial Public Meeting

At the conclusion of Task 100, Kimley-Horn and the County will host a public meeting to showcase existing conditions [based on publicly available data] in the Bull Run Watershed. This presentation will educate the public on the overall approach of this project, the anticipated outcomes, and an overview of additional opportunities for community feedback. The presentation will highlight the concept behind nature-based solutions and resiliency projects, and outline examples of public-private partnerships that the County has implemented successfully in the past. The known flooding location map generated as part of Task 100 with the Loudoun County Office of Emergency Management will be shared with the public and feedback will be requested to identify any additional areas with known instances of recurring flooding.

Meeting #2 – Feasibility Assessments Update

After the initial feasibility assessment is performed in Task 600, Kimley-Horn and the County will host a public meeting to provide an update to the community on the efforts completed to date. Initial modeling results will be shared with residents to provide a forum for public-driven validation of the model results. Feedback will be solicited on preferred BMPs and on the feasibility assessments. Stakeholders and representatives of private HOAs where opportunities have been identified will be asked to weigh in to further gauge the potential for actual implementing these projects.

Meeting #3 – Draft WMP Presentation

At the conclusion of Task 900, Kimley-Horn and the County will host a public meeting to present to the community the results of the proposed draft WMP for the Bull Run Watershed. The meeting will educate residents on all efforts performed to date, actionable outcomes and next steps. It is anticipated the document will be open to public comment with feedback solicited for incorporation into the Final WMP.

TASK 1200 – MEETINGS AND COORDINATION

This task includes the anticipated project meetings and coordination with the County and various stakeholders, and routine project management activities including but not limited to internal staffing, setting milestone schedules, and preparing monthly invoices.

Internal County coordination shall consist of the following departments:

- Project Meetings with DGS

- The Environmental Commission
- Building and Development Floodplain Department,
- The Department of Transportation and Capital Infrastructure,
- Loudoun County GIS Staff,
- Department of Finance and Procurement (Grants Coordinator)

Also included in this task is routine project management activities including but not limited to internal staffing, setting milestone schedules, and preparing invoices.

Kimley-Horn also anticipates coordination with the following external agencies:

- NVRC
- Occoquan Watershed Monitoring Lab
- Loudoun Wildlife Conservancy
- Fairfax County

The following table summarizes assumed effort with these agencies and organizations:

Entity	Hours
Project Meetings	40 [Includes time for regular project meetings on efforts and general coordination on overall progress]
The Environmental Commission	10 (Includes attendance at up to 3 committee meetings in person and miscellaneous coordination)
Building and Development Floodplain Department,	20 [Includes up to 2 virtual meetings and 2 in-person meetings with the Floodplain Group, and miscellaneous coordination]
The Department of Transportation and Capital Infrastructure,	10 [Includes up to 2 virtual meetings to discuss the overall approach and effort being performed, and data request needs]
Loudoun County GIS Staff,	10 [Includes up to 2 meetings to discuss data visualization and formatting, and coordination on sharing of data, and miscellaneous coordination]
Department of Finance and Procurement (Grants Coordinator)	4 [Includes up to 2 meetings on additional grant research opportunities]
NVRC	8 [Includes up to 2 meetings on the overall approach of the existing Occoquan Model and integration opportunities, as well as miscellaneous coordination]
Occoquan Watershed Monitoring Lab	4 [Includes up to 1 virtual meeting on data needs and requests]
Loudoun Wildlife Conservancy	6 [Includes up to 2 meetings on data requests and existing monitoring efforts]
Fairfax County	8 [Includes up to 2 virtual meetings on data requests, existing modeling efforts, and WMP lessons learned]
Total Hours	120

All meetings dedicated to public outreach are included in Task 1100. Should additional meetings and coordination be required beyond those stated above, Kimley-Horn will prepare an Amendment outlining the additional scope and fee for these meetings and coordination.

Schedule:

Upon receipt of formal notice-to-proceed, Kimley-Horn will develop a project schedule with the County to complete the requested work by no later than December 31st, 2025.

Deliverables:

Assumptions:

- It is assumed that the County will perform plan research for missing pond or storm sewer culvert data. This analysis assumes existing research from the Bull Run watershed will contain 1/3 of the 25 facilities.
- It is assumed that existing Stormwater GIS data for connecting culverts is accurate. If field validation is required, a separate task order for surveying services will be submitted for County review.
- It is assumed that the County will provide access to all existing water quality data and will provide points of contacts for stakeholder organizations.
- No FEMA submissions will be performed as part of this effort.
- All ponds which will be modeled will rely on previously digitized/delineated drainage areas within the County's database. Kimley-Horn will only perform a brief review of the drainage areas to ensure existing delineations remain appropriate.
- Loudoun County will provide a high resolution DTM for the Bull Run Watershed after post-processing of the latest LiDAR data. Kimley-Horn will not generate this file.
- Kimley-Horn will not generate ArcGIS online interactive maps as part of this proposal.
- Existing ponds will not be assessed for dam breach analyses or hazard classification.
- Ponds will not be reviewed for conformance with dam safety standards. Probably maximum flood events will not be evaluated as part of this analysis.
- It is assumed that the County will coordinate property entry with any non-County owned landowners with potential project implementation opportunities. If access is not granted, the feasibility assessment will be restricted to a desktop review.
- Rapid BANCS assessments shall not be a substitute for a full BANCS analysis.
- All project crediting will be performed in accordance with Guidance Memo No. 20-2003, and "Recommendations of the Expert Panel to Define Removal Rates for Urban Stormwater Retrofit Projects", as appropriate.
- The EOPCC will be based upon our understanding of local costs, historical bid averages, and similar project experience. Kimley-Horn does not control the cost of labor, materials, equipment or services furnished by others, methods of determining prices, or competitive bidding or market conditions; therefore any opinions rendered as to costs, including but not limited to opinions as to the costs of construction and materials, shall be made on the basis of our experience and represent our judgment as an experienced and qualified professional, familiar with the industry. Kimley-Horn cannot and does not guarantee that proposals, bids, or actual costs will not vary from its opinions of cost.

- The County will make the arrangements for the meeting locations included in Task 1100 and coordinate with any facility owner. The County will be responsible for any and all fees associated with the location.
- The County will provide notice to the public in advance of all public outreach activities.
- The WMP is not intended to act as a Zoning Ordinance update or Facilities Standards Manual update. Any recommendations that result from this report will be reviewed by the County and only considered for future efforts outside of this proposal.
- All models prepared for the County will be the property of the County. Kimley-Horn will not be responsible for modifications made to the model after completion of this task order.
- All modeling efforts will comply with those outlined in FEMA’s Guidance for Flood Risk Analysis and Mapping Guidance Documents.
- Any permits, permit application fees, review fees, or bonds required will prepared by others.
- This proposal and the accompanying cost estimate are valid for a period of 60 days and will expire if not accepted within that timeframe.

Exclusions:

Services that are not currently anticipated as part of this project and are therefore outside the scope of this task order proposal include the following:

- FEMA Coordination
- Design Phase Services
- Construction Phase Services
- Environmental Permitting
- All other services not explicitly stated in this scope of work

Fee and Expenses

Kimley-Horn will perform the following services as specifically requested by the County under this Scope of Services on a lump sum basis fee not to exceed \$495,651.75.

Task 100	County-Wide Data Collection And Existing Conditions	\$29,332.49
Task 200	Existing Hydrology Development	\$75,517.34
Task 300	PCSWMM Model Development	\$60,397.06
Task 400	Existing Condition Resiliency Assessment	\$33,248.00
Task 500	BMP Prioritization Assessment	\$13,887.48
Task 600	Nature-Based Solutions Feasibility Assessments	\$84,540.46
Task 700	Resiliency Modeling Scenarios	\$54,210.87
Task 800	Project Costs, Funding And Prioritization	\$35,865.96
Task 900	Watershed Management Plan Development	\$42,398.56
Task 1000	Public Involvement	\$31,425.93
Task 1100	Meetings And Coordination	\$34,827.60

Kimley-Horn will utilize the rate schedule as provided for in the County contract RFQ 338784B-C, Year 3. A detailed cost estimate (Attachment B) is provided with this proposal.

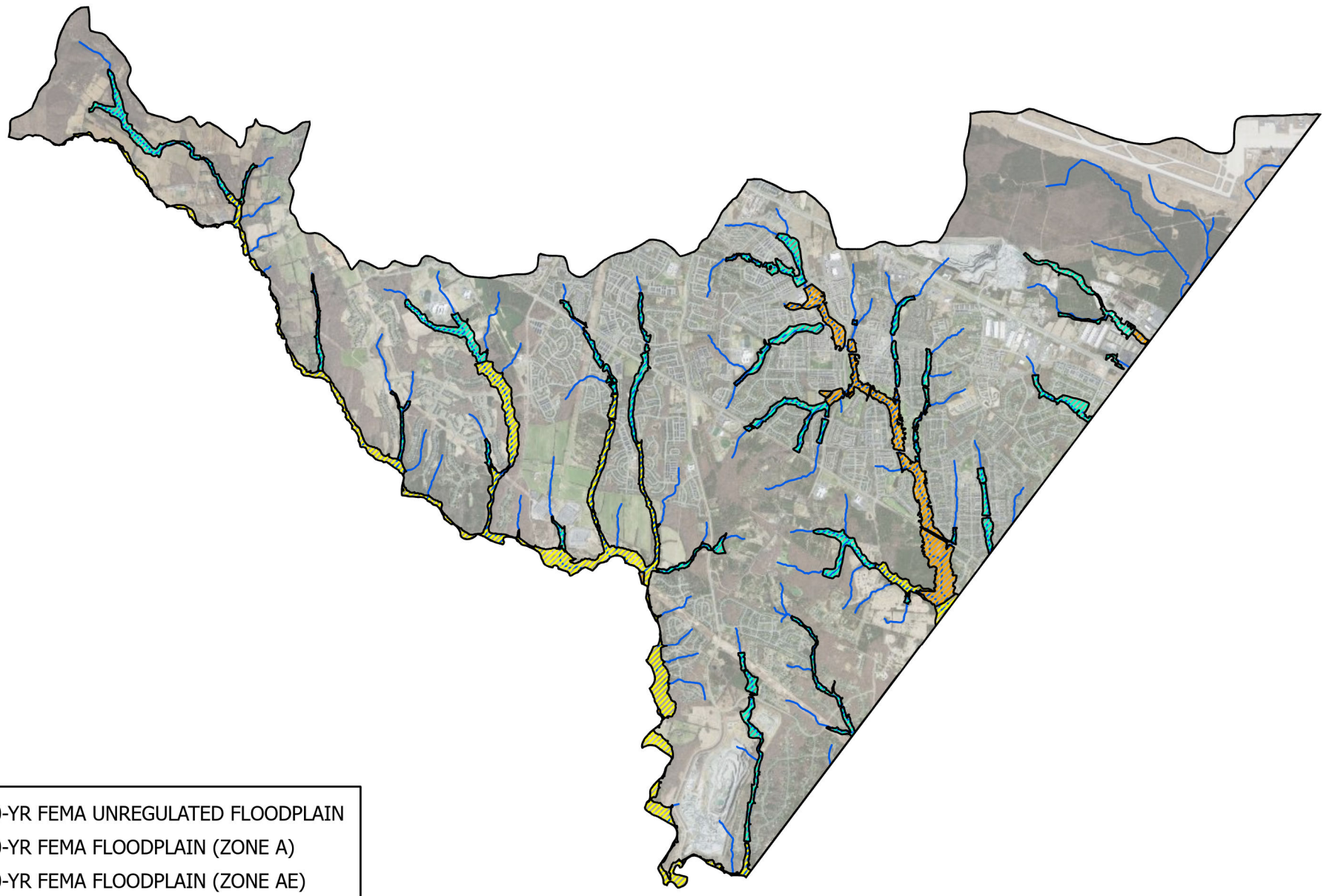
Closure





To proceed with the services, please have an authorized person sign this proposal below and return to us. Fees and times stated in this proposal are valid for thirty (30) days after the date of this letter.

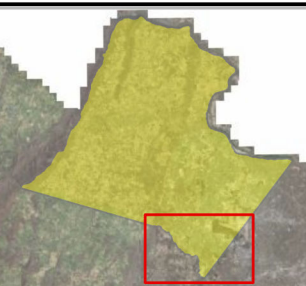
We appreciate the opportunity to provide these services. Please contact me if you have any questions.

Sincerely,

KIMLEY-HORN AND ASSOCIATES, INC.



-  100-YR FEMA UNREGULATED FLOODPLAIN
-  100-YR FEMA FLOODPLAIN (ZONE A)
-  100-YR FEMA FLOODPLAIN (ZONE AE)
-  STREAM CENTERLINE



BULL RUN WATERSHED IMPAIRED STREAMS AND FLOODPLAINS

Loudoun County
VIRGINIA



0 1.25 Miles

Aerial Data Source: VDOT Spatial Intelligence Group, Virginia Geographic Information Network (VGIN)

Coordinate System: NAD 1983 StatePlane Virginia North FIPS 4501 Feet

RFQ 338784-C
Engineering Services for the Loudoun County Stormwater Management Program

BULL RUN WATERSHED MANAGEMENT PLAN
11/3/2023

TASK	TASK DESCRIPTION	Principal	Sr Project Manager	Project Manager	Sr Engineer	Engineer III	Engineer II	Sr Landscape Architect	Landscape Architect	Sr Environmental Scientist	Environmental Scientist	GIS Programmer	Analyst II	Analyst I	Administrative	Total Hours	Labor Total	Total Miles For Each Task	Mileage Cost	KH Expenses	Sub Expenses	Sub Markup	Expense Total (Includes 10% Sub Markup)	Total Fee
		\$275.81	\$243.36	\$216.32	\$194.69	\$173.06	\$151.42	\$194.69	\$151.42	\$194.69	\$151.42	\$173.06	\$124.38	\$113.57	\$86.53				\$0.63			10%		
100	COUNTY-WIDE DATA COLLECTION AND EXISTING CONDITIONS	0	0	6	12	28.5	0	0	0	0	32	0	128	0	0	206.5	\$29,332.49		\$0.00			\$0.00	\$0.00	\$29,332.49
200	EXISTING HYDROLOGY DEVELOPMENT	0	0	32	66	164	0	0	0	0	138	0	52	0	0	452	\$75,517.34		\$0.00			\$0.00	\$0.00	\$75,517.34
300	PCSWMM MODEL DEVELOPMENT	0	0	36	66	170	0	0	0	0	42	0	32	0	0	346	\$60,397.06		\$0.00			\$0.00	\$0.00	\$60,397.06
400	EXISTING CONDITION RESILIENCY ASSESSMENT	0	0	18	0	54	0	0	0	0	50	0	100	0	0	222	\$33,248.00		\$0.00			\$0.00	\$0.00	\$33,248.00
500	BMP PRIORITIZATION ASSESSMENT	0	0	0	20	0	0	0	0	0	20	0	56	0	0	96	\$13,887.48		\$0.00			\$0.00	\$0.00	\$13,887.48
600	NATURE-BASED SOLUTIONS (NBS) FEASIBILITY ASSESSMENTS	30	0	20	110	63	0	0	0	0	122	0	168	0	0	513	\$84,288.46	400	\$252.00			\$0.00	\$252.00	\$84,540.46
700	RESILIENCY MODELING SCENARIOS	0	0	8	54	242.5	0	0	0	0	0	0	0	0	0	304.5	\$54,210.87		\$0.00			\$0.00	\$0.00	\$54,210.87
800	PROJECT COSTS, FUNDING AND PRIORITIZATION	0	0	8	40	84	0	0	0	0	78	0	0	0	0	210	\$35,865.96		\$0.00			\$0.00	\$0.00	\$35,865.96
900	WATERSHED MANAGEMENT PLAN DEVELOPMENT	0	0	8	40	60	0	0	0	0	60	0	80	0	40	288	\$42,398.56		\$0.00			\$0.00	\$0.00	\$42,398.56
1000	PUBLIC INVOLVEMENT	9	0	9	24	36	0	0	72	0	0	0	0	0	60	210	\$31,425.93		\$0.00			\$0.00	\$0.00	\$31,425.93
1100	MEETINGS AND COORDINATION	40	0	80	0	20	0	0	0	0	20	0	0	0	0	160	\$34,827.60		\$0.00			\$0.00	\$0.00	\$34,827.60
Total		79	0	225	432	922	0	0	72	0	562	0	616	0	100	3008	\$495,399.75	400	\$252.00	\$0.00	\$0.00	\$0.00	\$252.00	\$495,651.75

*Year 3 rates per executed contract amendment #2 dated 4/4/2022. Valid thru 4/30/2024



SECTION C - APPENDIX

CHECKLIST REQUIREMENTS

SECTION OUTLINE

- Appendix C – Completed Checklist from 2023 Funding Manual for the Virginia Community Flood Preparedness Fund
 - Detailed Map(s) of Project Area
 - FIRMette of the Project Area(s)
 - Historic Flood Damage Data / Images
- Copy of the Loudoun County Floodplain Ordinance
- Link to a Copy of the Current Comprehensive Plan (Loudoun County 2019 Comprehensive Plan)
 - Social Vulnerability Index Score(s) for the Project Areas



Appendix C

Completed Checklist from 2023 Funding Manual for the Virginia Community Flood Preparedness Fund

Appendix C: Checklist All Categories

(Benefit-cost analysis must be included if the proposed Project is over \$2 million.)

Virginia Department of Conservation and Recreation

Community Flood Preparedness Fund Grant Program

Detailed map of the project area(s) (Projects/Studies)

Included in Section C Appendix. See Exhibit 1.

FIRMette of the project area(s) (Projects/Studies)

Included in Section C Appendix. See Exhibit 2.

Historic flood damage data and/or images (Projects/Studies)

Included in Section C Appendix. See Exhibit 3.

A link to or a copy of the current floodplain ordinance

Included in Section C Appendix. See Exhibit 4.

Non-Fund financed maintenance and management plan for project extending a minimum of 10 years from project close

Not Applicable for this Project

A link to or a copy of the current comprehensive plan

Included in Section C Appendix. See Exhibit 5.

Social vulnerability index score(s) for the project area from VFRIS SVI Layer

Included in Section C Appendix. See Exhibit 6.

If applicant is not a town, city, or county, letters of support from affected localities

Not Applicable for this Project

Letter of support from impacted stakeholders

Not Applicable for this Project

Budget Narrative

Included in Section B Appendix

Supporting Documentation, including the Benefit-Cost Analysis tool/narrative (for projects over \$2 million)

Not Applicable for this Project

Authorization to request funding from the Fund from governing body or chief executive of the local government

Included in Section B Appendix

~~NA~~ Signed pledge agreement from each contributing organization

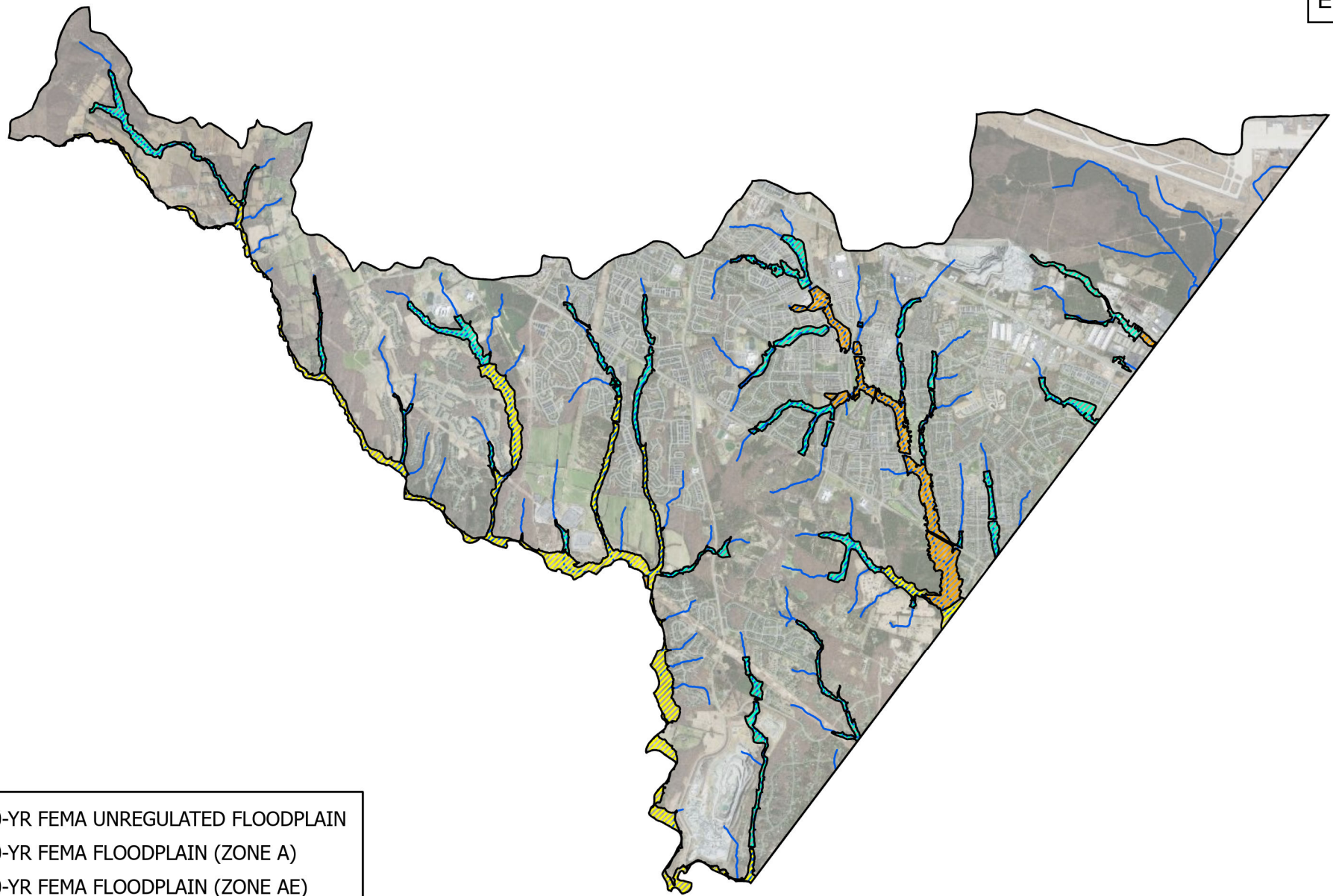
Not Applicable for this Project

Detailed budget and narrative for all costs

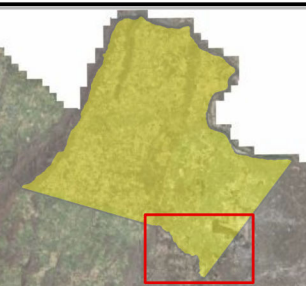
Included in Section B Appendix



Detailed Map(s) of Project Area



- 100-YR FEMA UNREGULATED FLOODPLAIN
- 100-YR FEMA FLOODPLAIN (ZONE A)
- 100-YR FEMA FLOODPLAIN (ZONE AE)
- STREAM CENTERLINE



BULL RUN WATERSHED IMPAIRED STREAMS AND FLOODPLAINS

Loudoun County
VIRGINIA



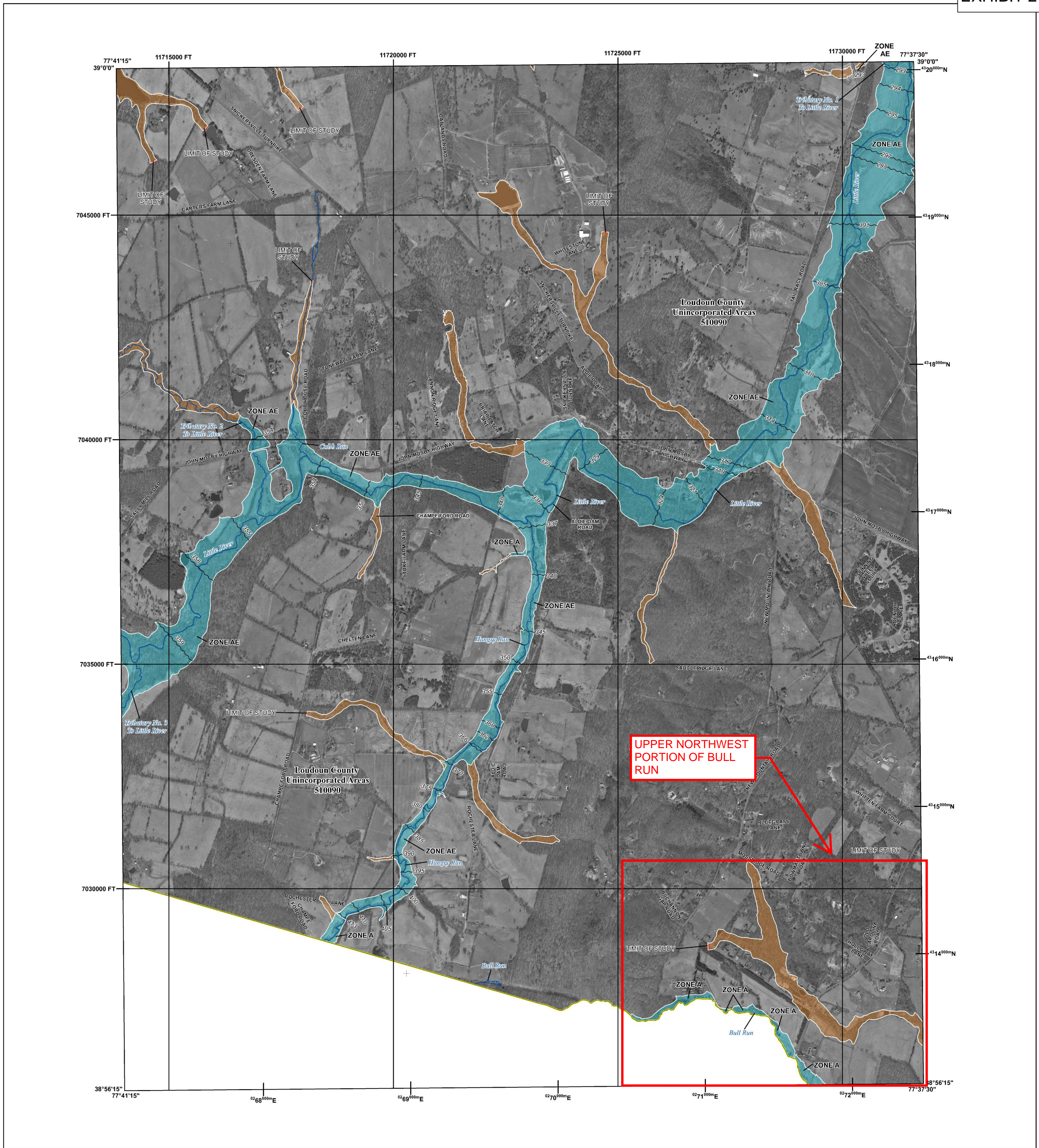
0 1.25 Miles

Aerial Data Source:VDOT Spatial Intelligence Group, Virginia Geographic Information Network (VGIN)

Coordinate System: NAD 1983 StatePlane Virginia North FIPS 4501 Feet



FIRMette of the Project Area(s)



FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR ZONE DESCRIPTIONS AND INDEX MAP
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT [HTTP://MSC.FEMA.GOV](http://msc.fema.gov)

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone A, V, A99
		With BFE or Depth Zone AE, AQ, 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
OTHER AREAS		Areas of Minimal Flood Hazard Zone X
		Area of Undetermined Flood Hazard Zone D
GENERAL STRUCTURES		Channel, Culvert, or Storm Sewer
		Accredited or Provisionally Accredited Levee, Dike, or Floodwall
		Non-accredited Levee, Dike, or Floodwall
		Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)
		Coastal Transect
		Profile Baseline
		Hydrographic Feature
		Base Flood Elevation Line (BFE)
OTHER FEATURES		Limit of Study
		Jurisdiction Boundary

NOTES TO USERS

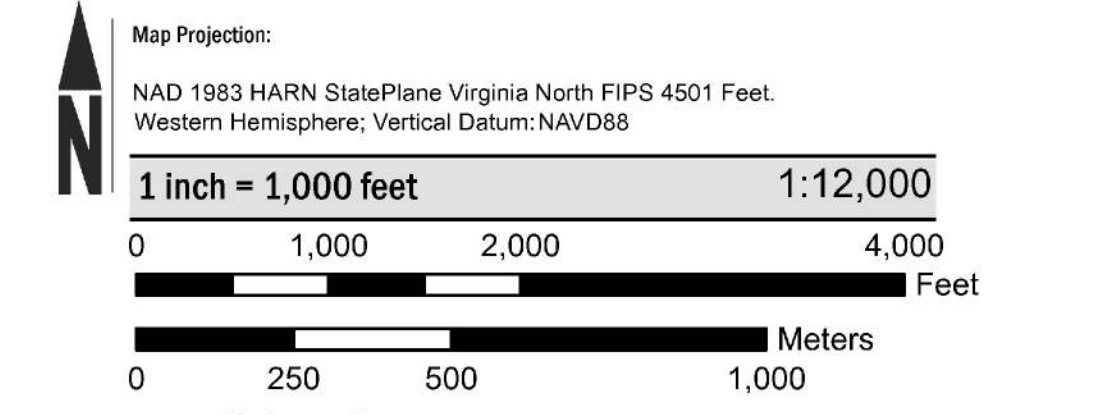
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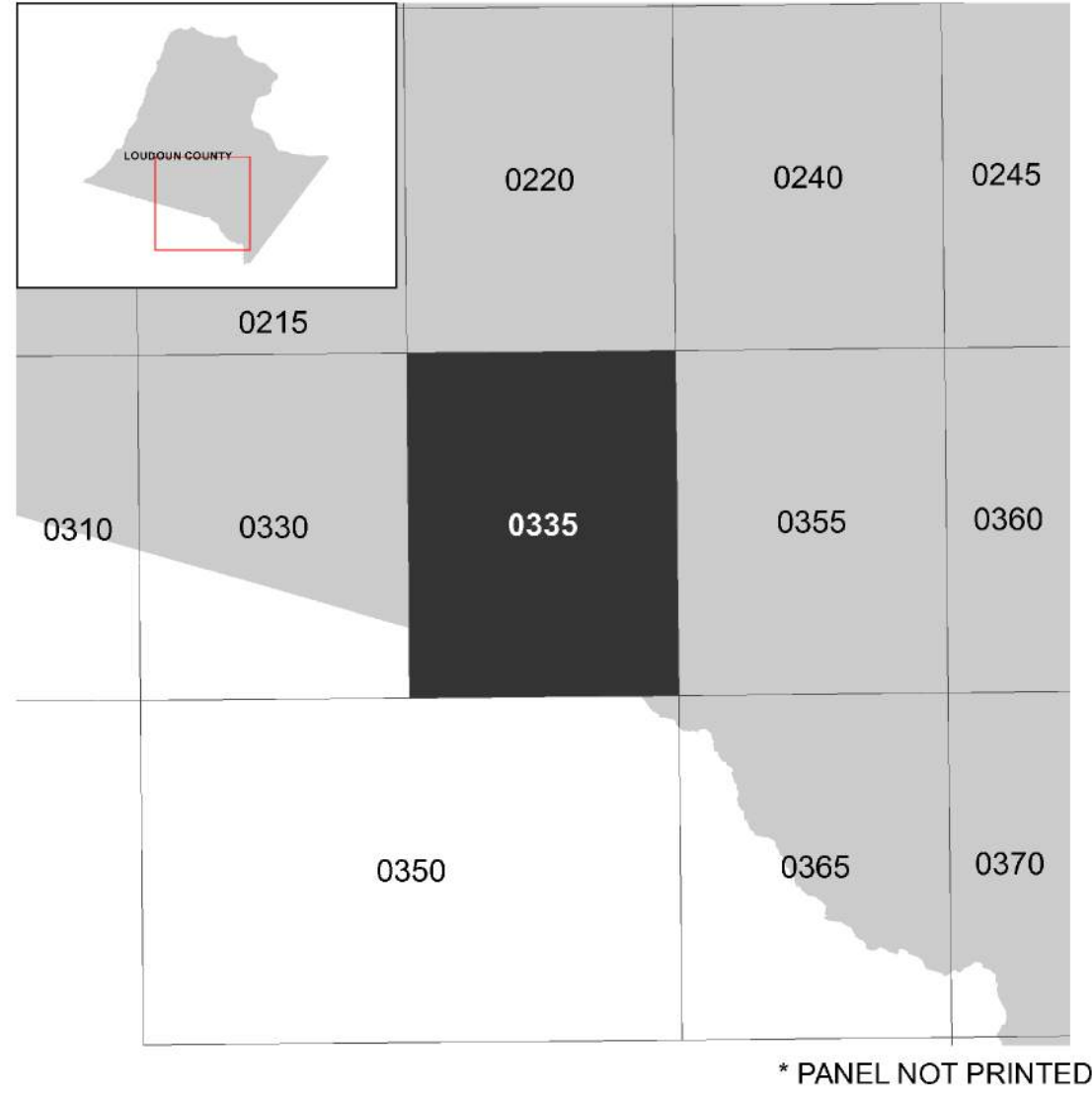
For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction. To determine if flood insurance is available in the community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

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SCALE



PANEL LOCATOR



National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

LOUDOUN COUNTY, VIRGINIA
 And Incorporated Areas

PANEL 335 OF 2982

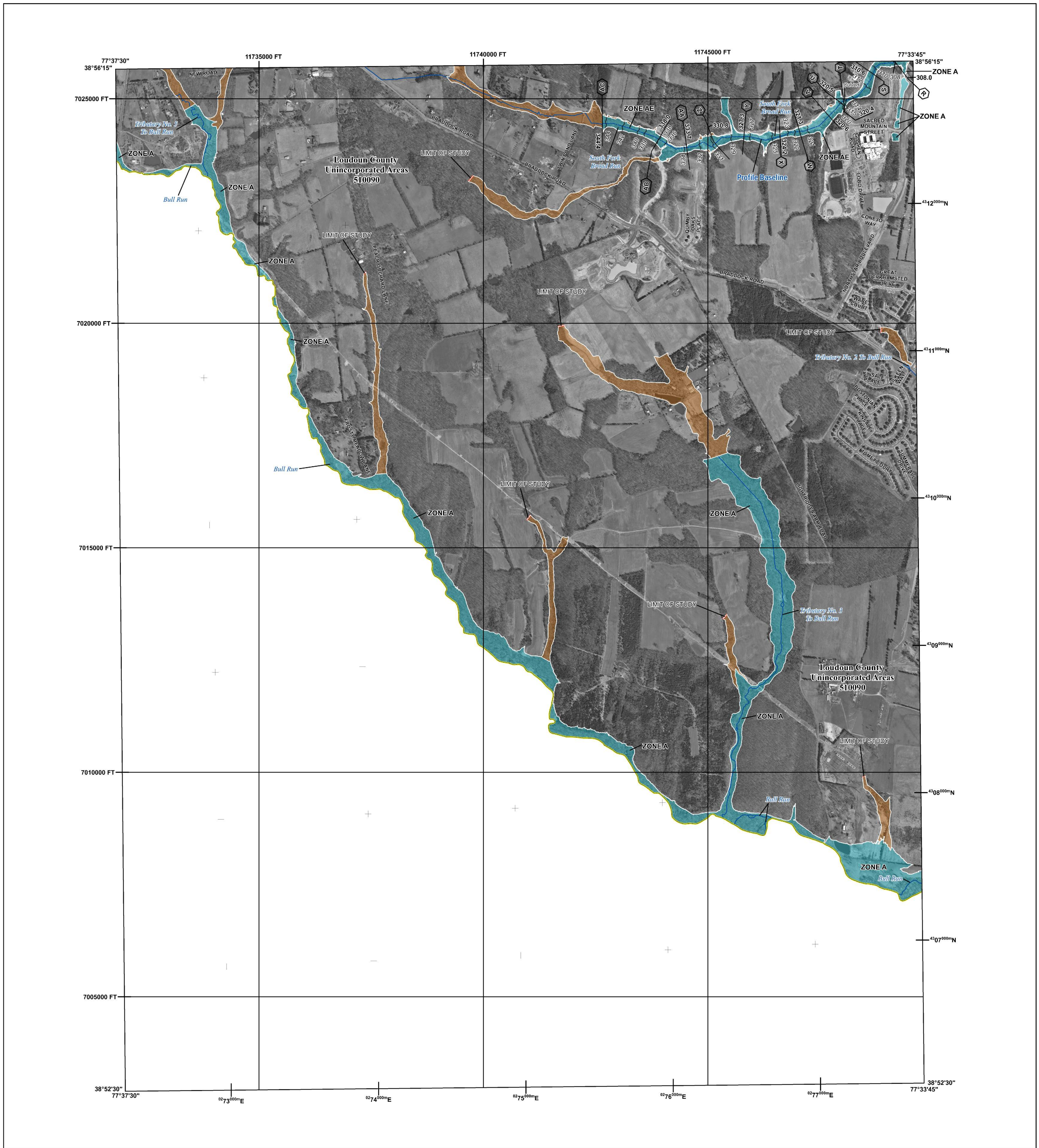
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COMMUNITY	NUMBER	PANEL	SUFFIX
LOUDOUN COUNTY	510090	0335	E

VERSION NUMBER
2.3.3.2

MAP NUMBER
51107C0335E

MAP REVISED
FEBRUARY 17, 2017



FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR ZONE DESCRIPTIONS AND INDEX MAP
 THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING
 DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT
[HTTP://MSC.FEMA.GOV](http://MSC.FEMA.GOV)

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
OTHER AREAS		Areas of Minimal Flood Hazard Zone X
		Area of Undetermined Flood Hazard Zone D
GENERAL STRUCTURES		Channel, Culvert, or Storm Sewer
		Accredited or Provisionally Accredited Levee, Dike, or Floodwall
		Non-accredited Levee, Dike, or Floodwall
OTHER FEATURES		18.2 Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)
		17.5 Coastal Transect
		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary

NOTES TO USERS

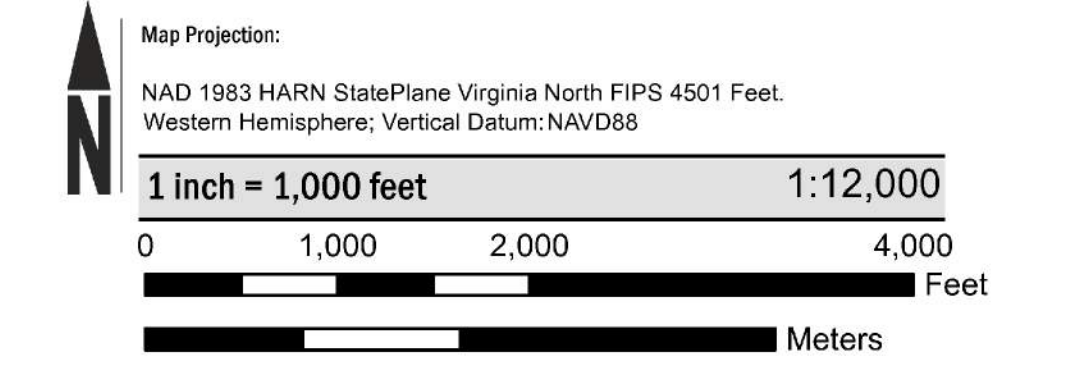
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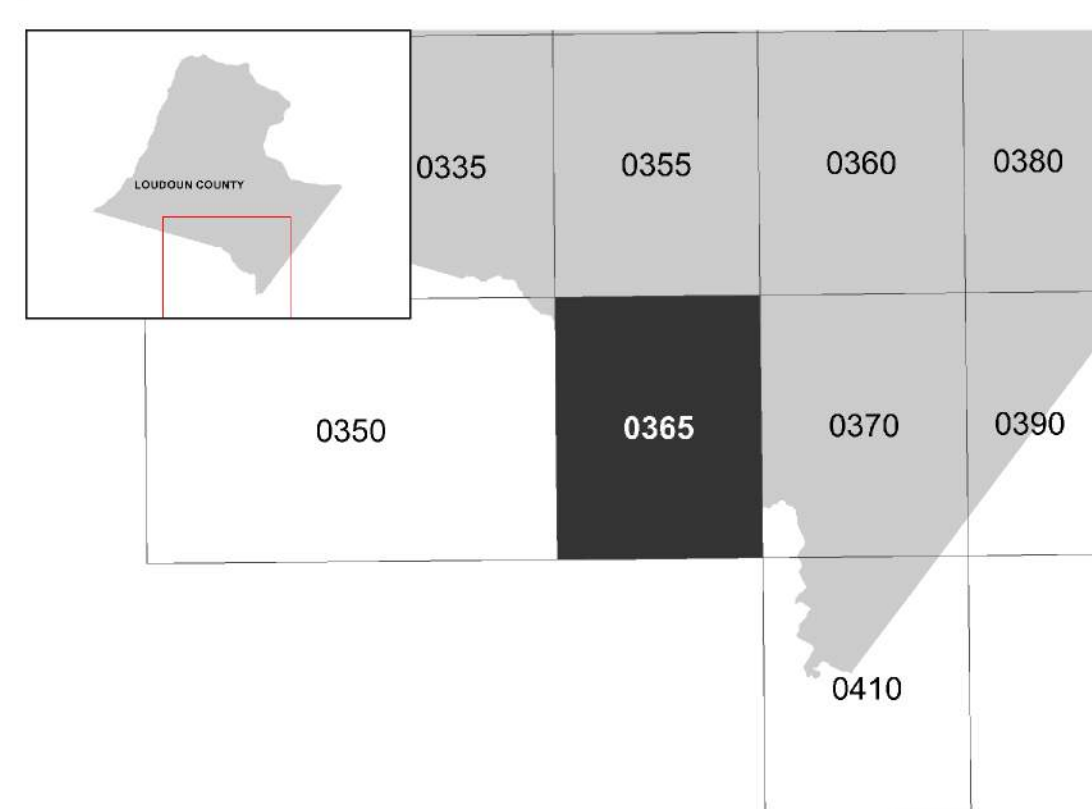
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SCALE



PANEL LOCATOR



* PANEL NOT PRINTED

National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM
 FLOOD INSURANCE RATE MAP

LOUDOUN COUNTY, VIRGINIA
 And Incorporated Areas

PANEL 365 OF 2982

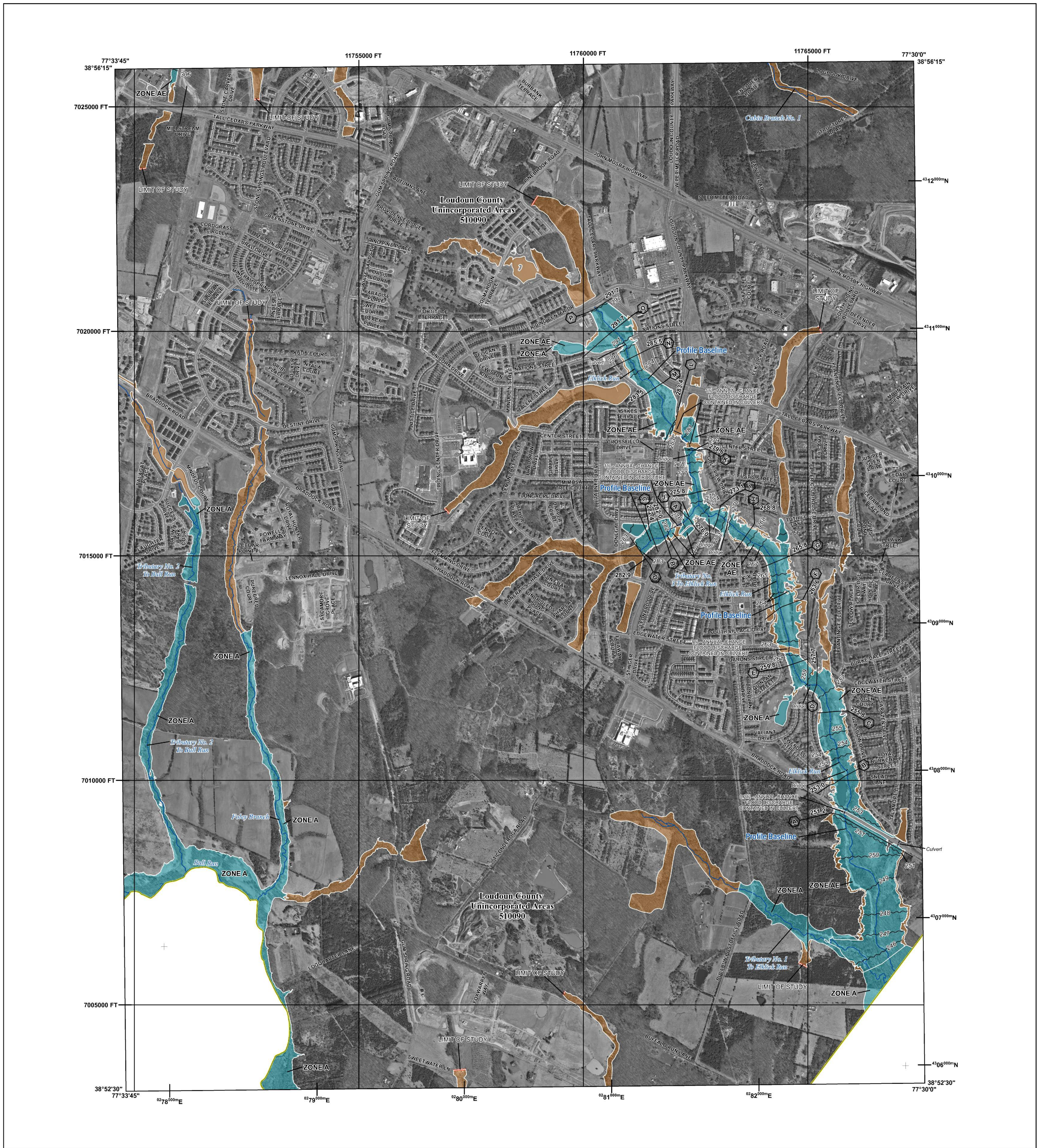
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COMMUNITY	NUMBER	PANEL	SUFFIX
LOUDOUN COUNTY	510090	0365	E

VERSION NUMBER
2.3.3.2

MAP NUMBER
51107C0365E

MAP REVISED
FEBRUARY 17, 2017



FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR ZONE DESCRIPTIONS AND INDEX MAP
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SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone A, V, A99
		With BFE or Depth Zone AE, AG, 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
OTHER AREAS		Areas of Minimal Flood Hazard Zone X
		Area of Undetermined Flood Hazard Zone D
GENERAL STRUCTURES		Channel, Culvert, or Storm Sewer
		Accredited or Provisionally Accredited Levee, Dike, or Floodwall
		Non-accredited Levee, Dike, or Floodwall
OTHER FEATURES		Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)
		Coastal Transect
		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary

NOTES TO USERS

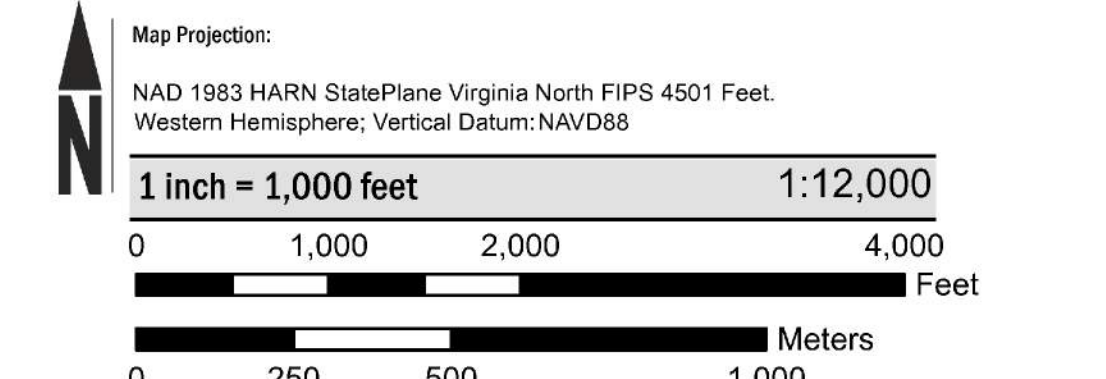
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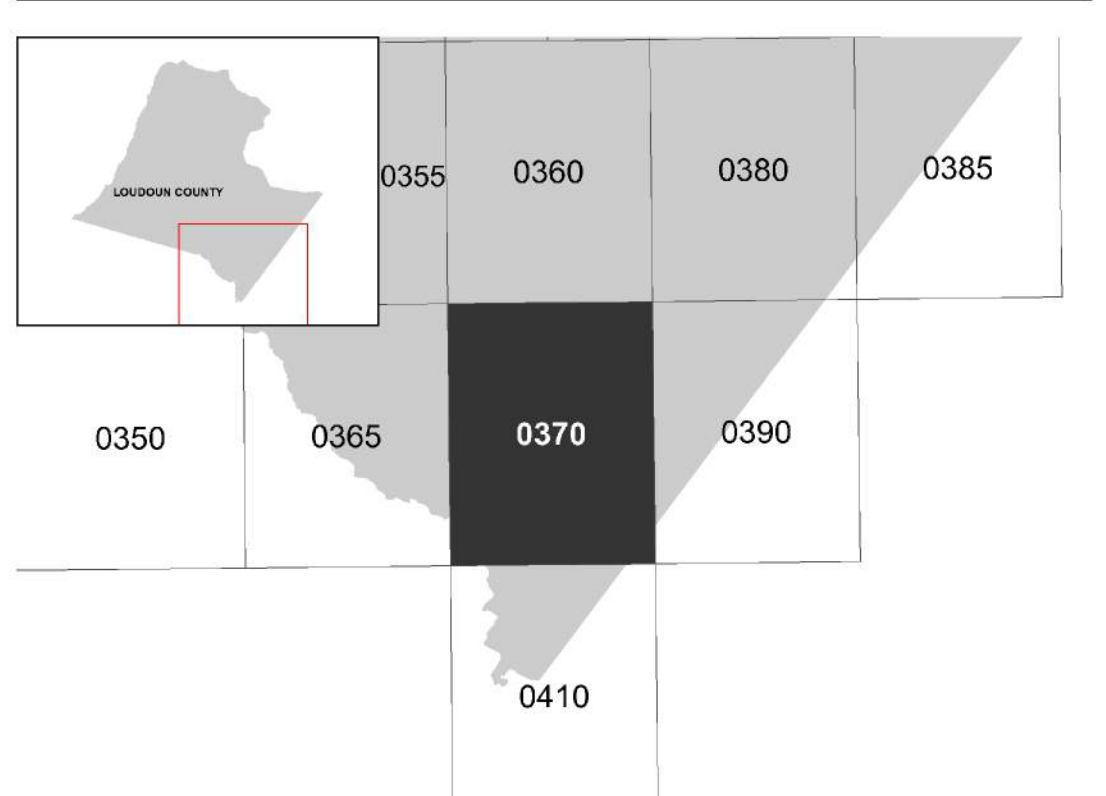
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SCALE



PANEL LOCATOR



National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

LOUDOUN COUNTY, VIRGINIA
 And Incorporated Areas

PANEL 370 OF 2982

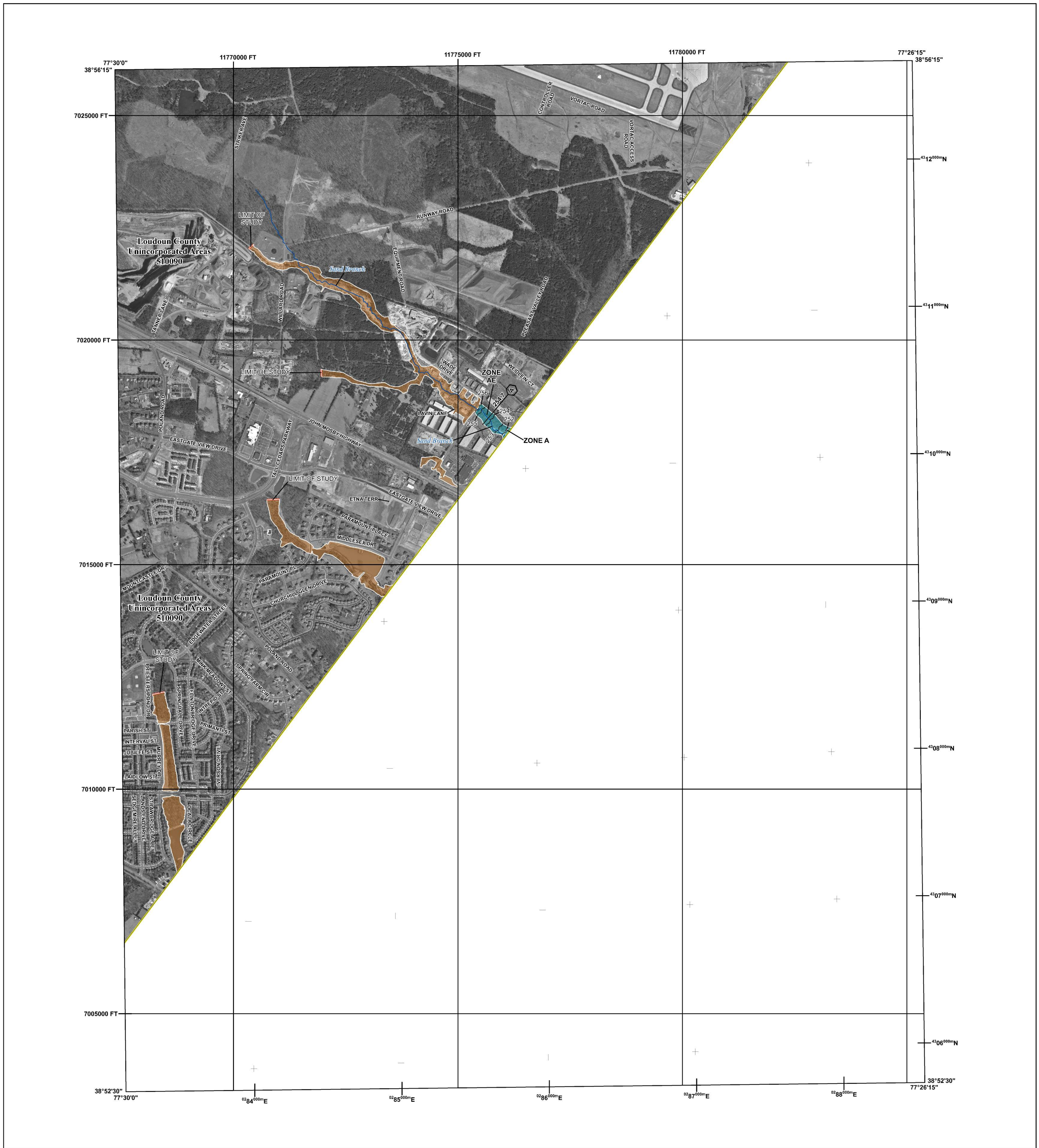
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 LOUDOUN COUNTY 510090 0370 E

VERSION NUMBER
2.3.3.2

MAP NUMBER
51107C0370E

MAP REVISED
FEBRUARY 17, 2017

* PANEL NOT PRINTED



FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR ZONE DESCRIPTIONS AND INDEX MAP
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SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone A, V, A99
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		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
OTHER AREAS		Areas of Minimal Flood Hazard Zone X
		Area of Undetermined Flood Hazard Zone D
GENERAL STRUCTURES		Channel, Culvert, or Storm Sewer Accredited or Provisionally Accredited Levee, Dike, or Floodwall
		Non-accredited Levee, Dike, or Floodwall
		Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)
		Coastal Transect
		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
OTHER FEATURES		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary

NOTES TO USERS

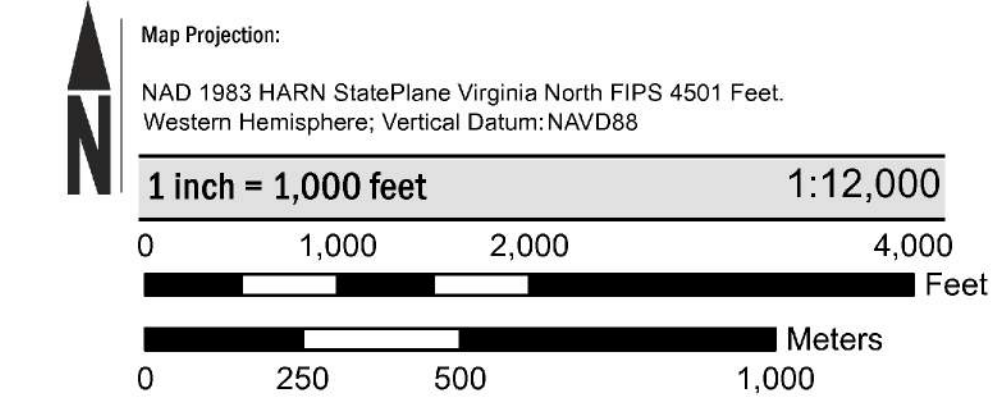
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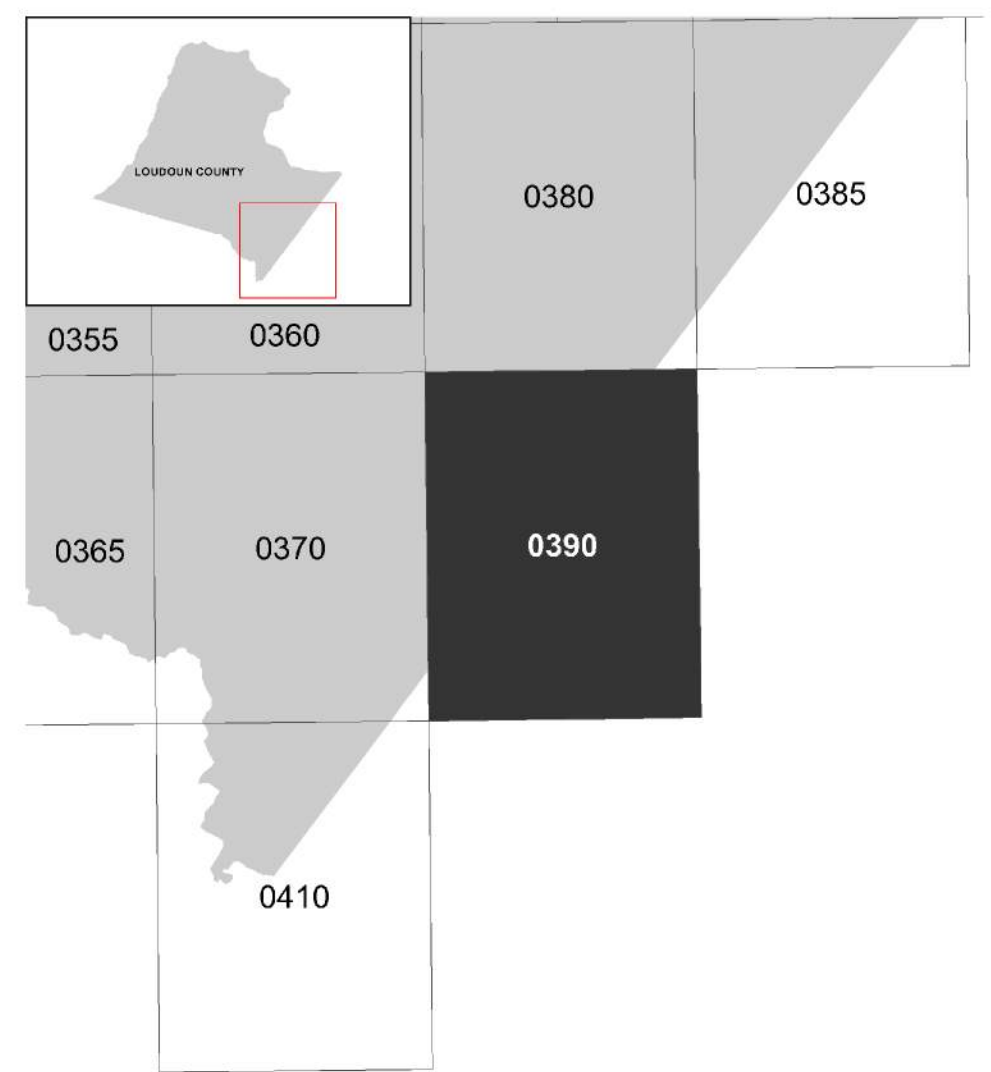
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SCALE



PANEL LOCATOR



* PANEL NOT PRINTED

National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM
 FLOOD INSURANCE RATE MAP

LOUDOUN COUNTY, VIRGINIA
 And Incorporated Areas

PANEL 390 OF 2982

FEMA

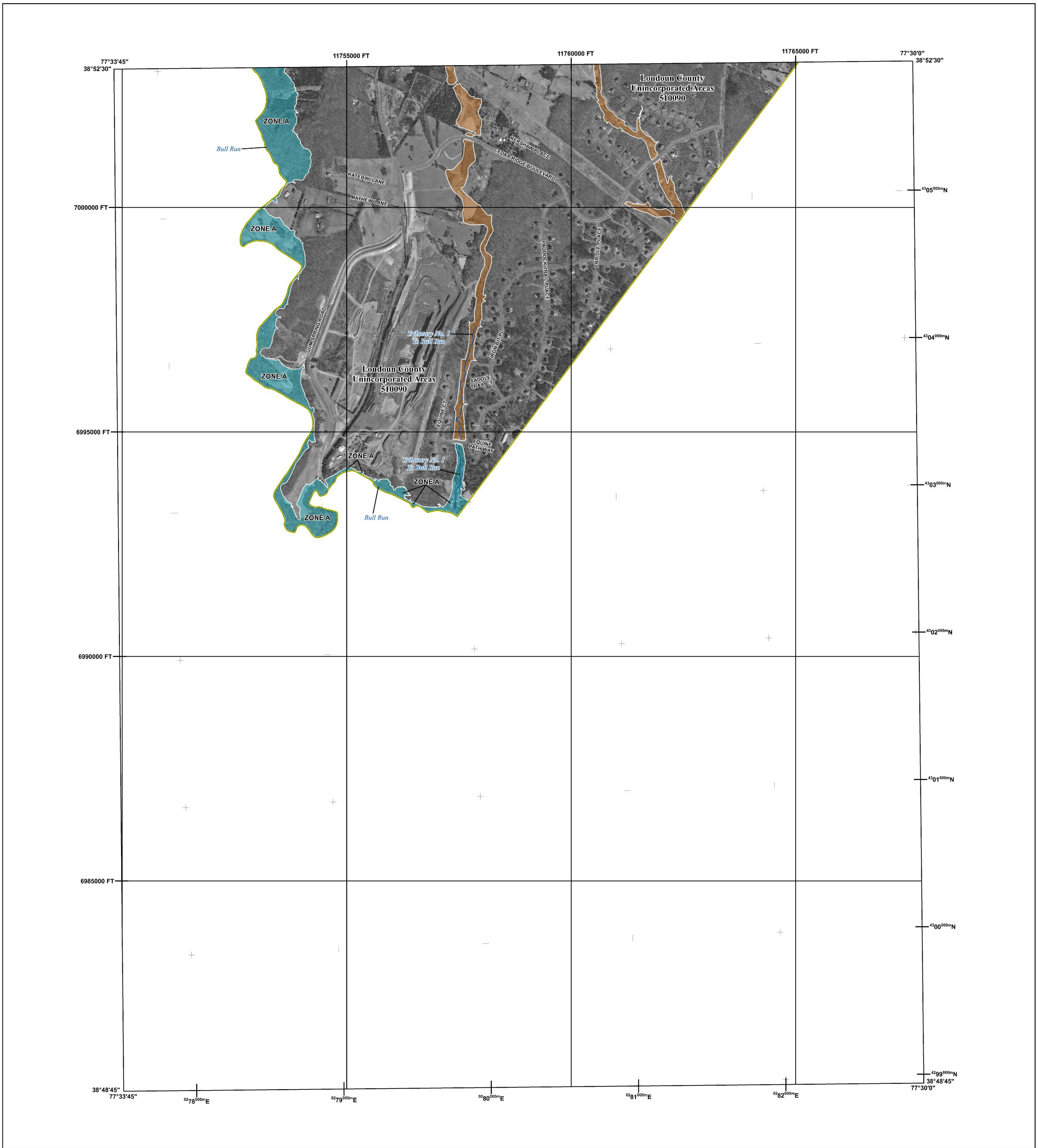
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LOUDOUN COUNTY	510090	0390	E

VERSION NUMBER
2.3.3.2

MAP NUMBER
51107C0390E

MAP REVISED
FEBRUARY 17, 2017



FLOOD HAZARD INFORMATION

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		Future Conditions 1% Annual Chance Flood Hazard Zone X
		Area with Reduced Flood Risk due to Levee See Notes. Zone X
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		Area of Undetermined Flood Hazard Zone D
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		Accredited or Provisionally Accredited Levee, Dike, or Floodwall
		Non-accredited Levee, Dike, or Floodwall
		Cross Sections with 1% Annual Chance Water Surface Elevation (BFE) 18.2 17.5
		Coastal Transect
		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
		Base Flood Elevation Line (BFE) 513
OTHER FEATURES		Limit of Study
		Jurisdiction Boundary

NOTES TO USERS

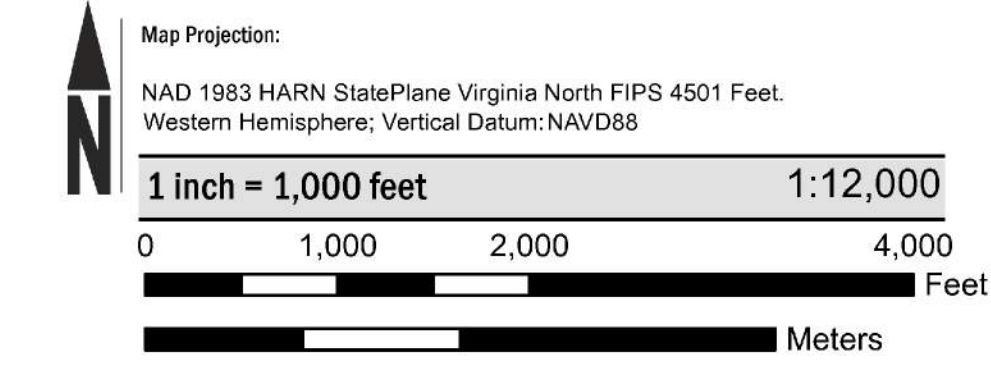
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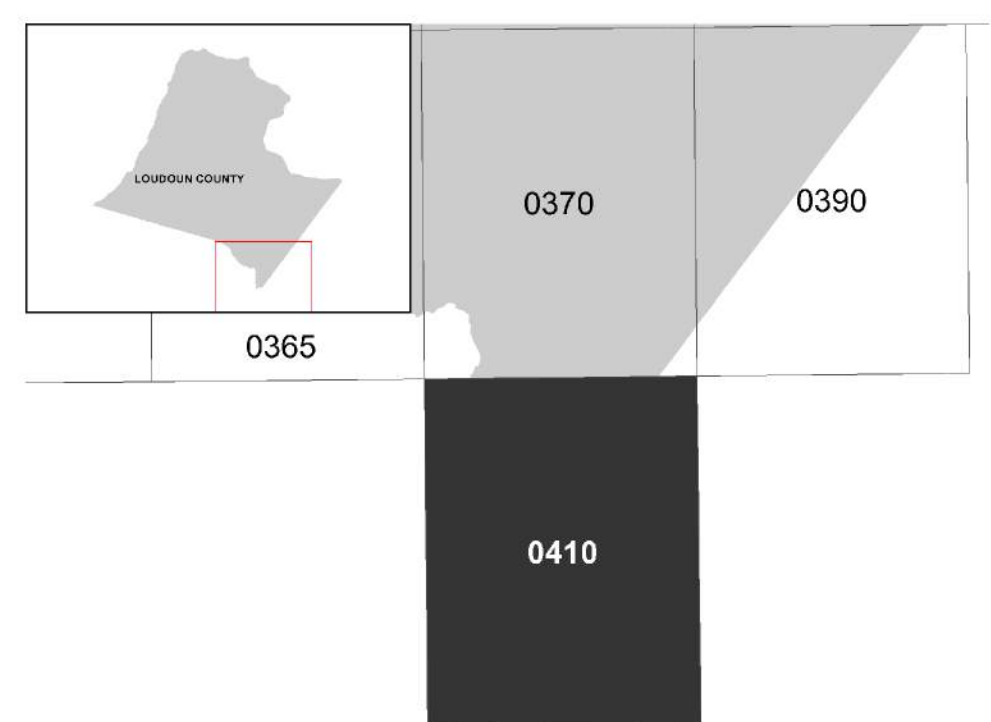
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SCALE



PANEL LOCATOR



* PANEL NOT PRINTED

National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM
 FLOOD INSURANCE RATE MAP

LOUDOUN COUNTY, VIRGINIA
 And Incorporated Areas

PANEL 410 OF 2982

Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
LOUDOUN COUNTY	510090	0410	E

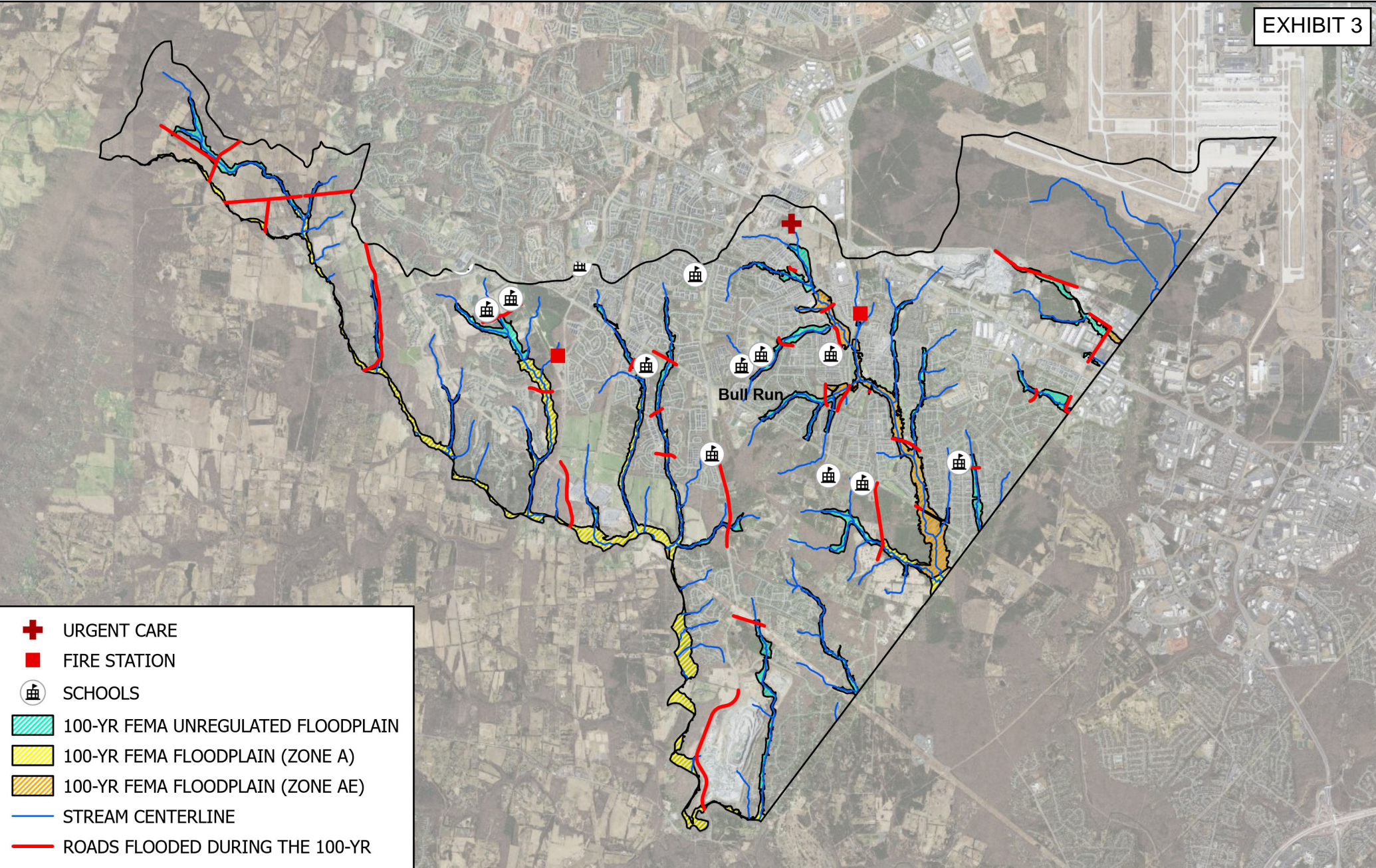
VERSION NUMBER
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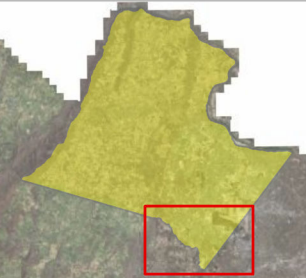
MAP REVISED
FEBRUARY 17, 2017



Historic Flood Damage Data / Images



- + URGENT CARE
- FIRE STATION
- ⚓ SCHOOLS
- 100-YR FEMA UNREGULATED FLOODPLAIN
- 100-YR FEMA FLOODPLAIN (ZONE A)
- 100-YR FEMA FLOODPLAIN (ZONE AE)
- STREAM CENTERLINE
- ROADS FLOODED DURING THE 100-YR



BULL RUN WATERSHED AT RISK CRITICAL INFRASTRUCTURE

Loudoun County
VIRGINIA



0 1.25 Miles

Aerial Data Source:VDOT Spatial Intelligence Group, Virginia Geographic Information Network (VGIN)

Coordinate System: NAD 1983 StatePlane Virginia North FIPS 4501 Feet



Loudoun County – Bull Run Watershed Management Plan
Community Flood Preparedness Fund (CFPF)
Grant Application Package – Section C - Appendix

Copy of the Loudoun County Floodplain Ordinance

Section 4-1500**FOD - Floodplain Overlay District****4-1501**

Purpose and Intent. The purpose of these provisions is to conserve the natural state of watercourses and watersheds and 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, 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 areas susceptible to flooding to be protected and/or flood-proofed against flooding and flood damage; and ; (4) preventing individuals from using land and erecting structures which are unsuited for intended purposes because of flood hazards. These provisions shall apply to all privately and publicly owned lands within the jurisdiction of the County of Loudoun and identified as being located within the Floodplain Overlay District (FOD). Only those uses set forth in Section 4-1505 and 4-1506 shall be permitted or special exception uses within the FOD, and land so encumbered may be used in a manner permitted in the underlying zoning district only if and to the extent such use is also permitted in the FOD.

The degree of flood protection sought by Section 4-1500 is considered reasonable for regulatory purposes and is based on acceptable engineering methods of study, but does not imply total flood protection. Larger floods may occur on rare occasions. Flood heights may be increased by man-made or natural causes, such as ice jams and bridge openings restricted by debris. Section 4-1500 does not imply that property outside the FOD or land uses permitted within the FOD will be free from flooding or flood damages. Section 4-1500 shall not create liability on the part of Loudoun County or any officer or employee thereof for any flood damages that result from reliance on Section 4-1500 or any administrative decision lawfully made thereunder.

4-1502

Authority. Authority for these provisions includes:

- (A) Flood Damage Reduction Act, Va. Code Sections 10.1-600 et seq.
- (B) Va. Code Sections 15.2-2200 through 15.2-2329 (Planning, Subdivision of Land and Zoning).
- (C) Soil Conservation Districts Law, Va. Code Sections 10.1-500 et seq.
- (D) Erosion and Sediment Control Law, Va. Code Section 62.1-44.15:51 et seq.
- (E) Potomac River Basin Compact, Va. Code Section 28.2-1001.
- (F) National Flood Insurance Act of 1968, 42 U.S.C. 4001 et seq., as amended by the National Flood Insurance Reform Act of 1994 and the Flood Insurance Reform Act of 2004.

(G) Code of Federal Regulations, Title 44, Section 59.1-70.9

4-1503

Definitions. The words and phrases defined in this subsection shall have the following meanings when used in Section 4-1500.

- (A) **Alteration.** A development action which will change the cross section of the floodplain and will increase either the erosive velocity or height of floodwaters either on-site or off-site. Alterations include, but are not limited to, land disturbing activities.
- (B) **Base Flood.** The flood having a one percent (1%) chance of being equaled or exceeded in any given year. Also known as the 100-year flood.
- (C) **Base flood elevation.** The water surface elevations of the base flood. The water surface elevation of the base flood is calculated based on the datum specified on Loudoun County's Flood Insurance Rate Map.
- (D) **Basement.** That portion of a building having its floor below ground level on all sides.
- (E) **Conditional Letter of Map Revision (CLOMR).** A formal review and written comment from FEMA on a proposed project that would, upon construction, cause an increase in base flood elevation. Upon completion of the construction of such project, a Letter of Map Revision (LOMR) issued by FEMA, determining that the increase was warranted, shall be required.
- (F) **Cross section.** Shape and dimensions of a channel and valley of the floodplain perpendicular to the line of flow.
- (G) **Development.** Any man-made change to improved or unimproved real estate, including, but not limited to, buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations, or storage of equipment or materials.
- (H) **Elevated building.** A non-basement building built to have the lowest floor elevated above the ground level by means of solid foundation perimeter walls, pilings, or columns (posts and piers).
- (I) **Flood or Flooding.**
 - (1) A general or temporary condition of partial or complete inundation of normally dry land areas from:
 - (a) the overflow of inland 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 subsidence 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 a flash flood, or by some similarly unusual and unforeseeable event which results in flooding as defined in paragraph 1(a) of this definition.
- (J) **Flood Insurance Rate Map (FIRM).** The official map of Loudoun County on which the Federal Emergency Management Agency (FEMA) has delineated areas in the floodplain subject to inundation of the base flood and the risk premium zones based on the technical data in the Flood Insurance Study. The FIRM that has been made available digitally is called the Digital Flood Insurance Rate Map (DFIRM).
- (K) **Flood Insurance Study (FIS).** A report by FEMA that examines, evaluates and determines flood hazards and, if appropriate, corresponding water surface elevations, or an examination, evaluation and determination of mudflow and/or flood-related erosion hazards.
- (L) **Floodplain.** Any land area susceptible to being inundated by water from the base flood and having a drainage area greater than one hundred (100) acres. For purposes of regulation under this Ordinance, a distinction is made between the Major Floodplain and Minor Floodplain. Major floodplain shall correspond to Zones AE and A as shown on the FIRM, as may be subsequently revised or amended by FEMA, and is considered to be the Special Flood Hazard Area by FEMA. All watersheds draining greater than 640 acres shall be considered Major Floodplain. Minor Floodplain shall correspond to watersheds of 640 acres or less that are not designated as Zone AE or A.
- (M) **Floodproofing.** 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.
- (N) **Floodway.** The channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without any cumulative increase the base flood elevation. Floodways are included within, and regulated as, FOD (Major Floodplain). Floodways are not shown on the FIRM but are included within the Special Flood Hazard Area designated on the FIRM, which is regulated as FOD (Major Floodplain).
- (O) **Freeboard.** A factor of safety expressed in feet above a flood level for purposes of floodplain management. "Freeboard" compensates for the many unknown factors that contribute to flood heights greater than the

height calculated for Base Flood, such as wave action, bridge openings, and the hydrological effect of urbanization in the watershed.

- (P) **Historic structure.** 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 the Virginia Landmarks Register; or,
 - (4) Individually listed on the Loudoun County Register of Heritage Resources.
- (Q) **Lowest floor.** 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 Code of Federal Regulations 44CFR §60.3.
- (R) **Manufactured Home.** A structure constructed and subject to federal regulation, 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 utilities. The term "manufactured home" also includes recreational vehicles placed on a site for greater than 180 consecutive days whether connected to utilities or not.
- (S) **New construction.** Structures for which the start of construction commenced on or after January 5, 1978. All such structures shall comply with the Loudoun County regulations in effect at the time of construction. Any improvement(s) to a structure shall comply with the Loudoun County regulations in effect at the time of construction of the improvement(s).
- (T) **Recreational Vehicle.** A vehicle which is
- (1) built on a single chassis;
 - (2) 400 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; and

- (4) designed primarily not for use as a permanent dwelling but as temporary living quarters for recreational camping, travel, or seasonal use.
- (U) **Road, Crossing of the Floodplain or Road Crossing.** Any public road, private road or driveway traversing a floodplain generally perpendicular to the flow of the drainageway.
- (V) **Special Flood Hazard Area (SFHA).** The land in the floodplain subject to a one (1%) percent or greater chance of being flooded in any given year. This area corresponds to where the National Flood Insurance Program's (NFIP's) floodplain management regulations must be enforced and includes Zones A, AO, AH, A1-30, AE, A99, AR, AR/A1-30, AR/AE, AR/AO, AR/AH, AR/A, VO, V1-30, VE, and V as shown on the FIRM.
- (W) **Start of construction.** Means the date the building permit was issued, provided the actual start of construction, repair, reconstruction, rehabilitation, addition, placement, substantial improvement 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 and/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 the construction means the first alteration of any wall, ceiling, floor, or other structural part of a building, whether or not that alteration affects the external dimensions of the building.
- (X) **Stormwater Management Improvements.** Surface or subsurface drainage improvements, storm sewers, detention and retention ponds and other such improvements as required by the Facilities Standards Manual (FSM), the Loudoun County Stormwater Management Ordinance, Chapter 1096 of the Codified Ordinances of Loudoun County, or the Loudoun County Erosion and Sediment Control Ordinance and Plan, Chapter 1220 of the Codified Ordinances of Loudoun County.
- (Y) **Stream Corridor.** Includes the stream and extends in cross section from the channel's bankfull level towards the upland (perpendicular to the direction of streamflow) to a point on the landscape where channel-related surface and/or soil moisture no longer influence the plant community.
- (Z) **Stream Restoration.** Converting an unstable, altered, or degraded stream corridor, including adjacent riparian area and flood-prone areas, to its natural stable condition considering recent and future watershed conditions.

- (AA) **Structure.** An assembly of materials forming a construction for occupancy or use including, among others, buildings, stadiums, gospel and circus tents, platforms, stagings, observation towers, telecommunications towers, radio and TV broadcasting towers, water tanks, trestles, piers, open sheds, coal bins, shelters, walls, power line towers, pipelines, railroad tracks, manufactured homes, and gas or liquid storage tanks that are principally above ground.
- (BB) **Substantial damage.** Damage of any origin sustained by a structure whereby the cost of restoring the structure to its before damaged condition would equal or exceed fifty percent (50%) of the market value of the structure before the damage occurred.
- (CC) **Substantial improvement.** Any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds fifty percent (50%) of the market value of the structure before the start of construction of the improvement. This term includes structures which have incurred flood related damages on two (2) occasions in which the cost of the repair on the average equaled or exceeded twenty-five percent (25%) of the market value of the structure at the time of each such flood event or 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 assure safe living conditions, or
 - (2) Any altering, repair or rehabilitation of a historic structure, provided that the altering, repair or rehabilitation will not preclude the structure's continued designation as a historic structure. Historic structures undergoing altering, repair or rehabilitation that would constitute a substantial improvement as defined above, must comply with all requirements of Section 4-1500 that do not preclude the structure's continued designation as a historic structure. Documentation that a specific requirement of Section 4-1500 will cause removal of the structure from the National Register of Historic Places or the Virginia Landmarks Register must be obtained from the Secretary of the Interior or the State Historic Preservation Officer. Any exemption from the requirements of Section 4-1500 will be the minimum necessary to preserve the historic character and design of the structure.
- (DD) **Utility Lines in the Floodplain.** Storm sewers, sanitary sewers, water lines and similar lines running generally parallel and perpendicular to the flow of the drainageway; and other public utility lines traversing a floodplain generally perpendicular to the flow of the drainageway.
- (EE) **Violation.** The failure of a structure or other development to be fully compliant with this Section 4-1500. A structure or other development

without a FEMA approved Elevation Certificate, other certifications, or other evidence of compliance required in this Section 4-1500 shall be presumed to be in violation until such time as that documentation is provided.

- (FF) **Watercourse.** 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 damage resulting from flooding may occur.

4-1504 Administration.

- (A) **Designation of Floodplain Administrator.** The Zoning Administrator, or his/her designee, shall administer and implement these regulations and is referred to herein as the Floodplain Administrator.
- (B) **Duties and Responsibilities of the Floodplain Administrator.** The Floodplain Administrator shall:
 - (1) Review all applications for development located within the FOD.
 - (2) Interpret FOD boundaries in accordance with Section 6-407 and provide available base flood elevation and flood hazard information.
 - (3) Review applications for development to determine whether proposed activities will be reasonably safe from flooding and meet the requirements of Section 4-1500.
 - (4) Review applications for reconstruction, rehabilitation, addition or other improvement of a structure to determine whether such proposed activities constitute substantial improvements.
 - (5) Review applications for development to determine whether all necessary permits have been obtained from the Federal, State or local agencies from which prior or concurrent approval is required; in particular, permits from state agencies for any construction, reconstruction, repair, or altering of a dam, reservoir, or waterway obstruction (including bridges, culverts, structures), any altering of a watercourse, or any change of the course, current, or cross section of a stream or body of water, including any change to the 100-year frequency floodplain of free-flowing non-tidal waters of the State.
 - (6) Verify that applicants proposing to alter a watercourse have notified affected adjacent towns, cities, county or state government, the Department of Conservation and Recreation (Division of Dam Safety and Floodplain Management), and other appropriate agencies (Virginia Department of Environmental Quality, United States Army Corps of Engineers) and have submitted copies of such notifications to FEMA.

- (7) Inspect or cause to be inspected, buildings, structures, and other development for which permits have been issued to determine compliance with Section 4-1500 or to determine if non-compliance has occurred or violations have been committed.
- (8) Review submitted FEMA Elevation Certificate applications and require incomplete or deficient applications to be corrected.
- (9) Submit to FEMA, or require applicants to submit to FEMA, data and information necessary to maintain FIRMs, including Floodplain Studies and Floodplain Alterations approved in accordance with the FSM, within six (6) months after such data and information becomes available if the analyses indicate changes in base flood elevations.
- (10) Maintain and permanently retain records that are necessary for the administration of the FOD, including:
 - (a) Flood Insurance Studies, Flood Insurance Rate Maps (including historic studies and maps and current effective studies and maps), and Letters of Map Change; and
 - (b) Documentation supporting approval or denial of development permits, Elevation Certificates, documentation of the elevation (in relation to the datum on the FIRM) to which structures have been floodproofed, other required design certifications, variations pursuant to Section 4-1511, and records of enforcement actions taken to correct violations of these regulations.
- (11) Enforce the provisions of these regulations, investigate violations, issue notices of violations or stop work orders, and require permit holders to take corrective action.
- (12) Advise the Board of Supervisors regarding the intent of these regulations and, for each application for a variation pursuant to Section 4-1511, prepare a staff report and recommendation.
- (13) Administer the requirements related to proposed work on existing buildings:
 - (a) Make determinations as to whether buildings and structures that are located in FOD (Major Floodplain only) and that are damaged by any cause have been substantially damaged.
 - (b) Make reasonable efforts to notify owners of substantially damaged structures of the need to obtain a permit to repair, rehabilitate, or reconstruct such damaged structures; and prohibit the non-compliant repair of substantially damaged buildings except for temporary emergency protective

measures necessary to secure a property or stabilize a building or structure to prevent additional damage.

- (14) Undertake, as determined appropriate by the Floodplain Administrator due to the circumstances, other actions which may include but are not limited to: issuing press releases, public service announcements, and other public information materials related to development permit requests and repair of damaged structures; coordinating with other Federal, State, and local agencies to assist with substantial damage determinations; providing owners of damaged structures information related to the proper repair of damaged structures in FOD; and provide property owners with information necessary to file claims for Increased Cost of Compliance coverage under the National Flood Insurance Program (NFIP) flood insurance policies.
 - (15) Notify FEMA when the corporate boundaries of the County have been modified and:
 - (a) Provide a map that clearly delineates the new corporate boundaries or the new area for which the authority to regulate pursuant to Section 4-1500 has either been assumed or relinquished through annexation or otherwise; and
 - (b) For any new area for which the authority to regulate pursuant to this Section 4-1500 has been assumed, prepare necessary amendments to the Zoning Map and appropriate requirements, and submit such amendments to the Board of Supervisors for adoption. A copy of the amended regulations shall be provided to Department of Conservation and Recreation (Division of Dam Safety and Floodplain Management) and FEMA.
 - (16) Upon the request of FEMA, complete and submit information regarding the number of buildings in the FOD (Major Floodplain only), number of approved permits for development in the FOD (Major Floodplain only), number of approved variations pursuant to Section 4-1511. Any variations that are approved shall be noted in the annual or biennial report submitted to FEMA's Federal Insurance Administrator.
 - (17) Serve as a referral agent on all legislative land development applications.
- (C) **Delineation of the FOD.** The original basis for the delineation of the FOD shall be the floodplain as shown on the Flood Insurance Study (FIS) and the Flood Insurance Rate Map (FIRM) for the County of Loudoun prepared by FEMA, Federal Insurance Administration, dated February 17, 2017. The boundaries of the floodplain and FOD may change based on

information submitted in accordance with this Chapter, and/or subsequent revisions or amendments to the FIS and FIRM approved by FEMA.

4-1505

Permitted Uses. The following uses shall be permitted within the FOD provided such uses conform with Section 5-1000. Uses allowed in the underlying district shall be prohibited to the extent such uses are not permitted, or special exception uses in the FOD. Where any uses, structures or improvements will result in development within the FOD, an application for a Floodplain Alteration shall be submitted in accordance with Section 4-1508(B) and the FSM.

- (A) Permitted uses in FOD (Major Floodplain). Such uses shall not cause any increases in base flood elevation of the FOD (Major Floodplain) unless otherwise provided below.
 - (1) Agriculture, horticulture, forestry, and fisheries, not requiring the erection of structures, except that incidental structures shall be permitted in accordance with this Section. An increase in base flood elevation may be permitted provided a CLOMR is obtained from FEMA prior to approval of the requisite Floodplain Alteration application for such use.
 - (2) Passive and Active Recreation Uses, except swimming pools, provided that the area of impervious surfaces within the FOD (Major Floodplain) does not exceed three percent (3%) of the area of FOD (Major Floodplain) located within the subject parcel and the boundary of the FOD (Major Floodplain) does not change.
 - (3) Stormwater management improvements as follows:
 - (a) Rooftop disconnection. Associated soil amendments shall be located outside of areas of existing tree cover and shall not require the clearing of existing tree cover.
 - (b) Sheet flow to conservation area.
 - (c) Sheet flow to vegetated filter and associated soil amendments located outside of areas of existing tree cover and not requiring the clearing of existing tree cover.
 - (d) Grass channel and associated soil amendments.
 - (e) Soil amendments located outside of areas of existing tree cover and not requiring the clearing of existing tree cover.
 - (f) Other stormwater management improvements provided that such improvements shall only serve permitted or approved special exception uses in the FOD, and shall only serve those portions of such uses that are located within the FOD.
 - (4) Utility lines in the floodplain and road crossings. An increase in base flood elevation on site may be permitted provided a CLOMR is

obtained from FEMA prior to approval of the requisite Floodplain Alteration application for such use. Road crossings shall be designed and constructed in accordance with the standards and regulations of the Virginia Department of Transportation (VDOT) and/or the FSM, whichever shall apply.

- (5) Public roads shown on the Comprehensive Plan or included in a Capital Improvement Program project. An increase in base flood elevation may be permitted provided a CLOMR is obtained from FEMA prior to approval of the requisite Floodplain Alteration application for such use.
- (6) Public roads, private roads, and driveways.
- (7) Repair, reconstruction or improvement of existing residences, so long as the footprint of the existing residence is not increased within the FOD and provided that such repair, reconstruction or improvement, whether located within or outside of the FOD, is not a substantial improvement. If such repair, reconstruction or improvement is a substantial improvement then conformance with Section 4-1509 shall be required.
- (8) Parking areas accessory to permitted or approved special exception uses in the FOD. All such parking areas shall be equipped with best management practices in accordance with Chapter 5 of the FSM and Chapter 1096 of the Codified Ordinances.
- (9) Incidental structures, not exceeding 840 square feet of floor area, associated with permitted or approved special exception uses in the FOD, and temporary structures associated with Special Events in the FOD. Incidental structures include storage sheds, maintenance sheds, backstops, bath houses and locker rooms. Provided, however, bulk storage of gasoline, chemicals, fuels or similar substances are prohibited in the FOD; and further provided that any new construction shall comply with applicable FEMA standards.
- (10) Temporary storage of material or equipment necessary in the construction of permitted or special exception uses in the FOD.
- (11) Alterations of the floodplain associated with any permitted or approved special exception uses in the FOD. Such alterations shall not relocate or alter the natural active channel except for road crossings permitted under Section 4-1505(A)(4) or Section 4-1505(A)(13), to protect existing habitable structures subject to periodic flooding, or for stream restoration permitted under Section 4-1505(A)(16). Applications for alterations of the floodplain shall be in accordance with Section 4-1508(B). To the extent that the boundaries of the FOD change as a result of an approved Floodplain Alteration, any areas no longer within the FOD may be used for any use in the underlying zoning district,

subject to the provisions of the applicable zoning district regulations and conditions of any approved special exception.

- (12) Restoration and rehabilitation of historic structures.
- (13) Road crossings that result in an increase in the base flood elevation off-site provided that:
 - (a) A CLOMR is obtained from FEMA prior to approval of the requisite Floodplain Alteration application for such use.
 - (b) The road crossing shall be a feature shown on the Comprehensive Plan or included in a Capital Improvements Program project.
 - (c) The road crossing shall be designed and constructed in accordance with the standards and regulations of the Virginia Department of Transportation and/or the FSM, whichever shall apply.
 - (d) The resulting increase in the base flood elevation shall not affect existing buildings and structures.
 - (e) Affected off-site property owners may at any time mitigate impacts on their land as a result of an increase in the base flood elevation by:
 - (i) Submitting a Floodplain Alteration to reclaim that portion of their land subject to the increase in base flood elevation as a result of the road crossing, provided there is no increase in the base flood elevation; and/or
 - (ii) Requesting a modification of the building setback or parking setback requirements on specific lots or parcels of land affected by the increase in the base flood elevation by special exception approved by the Board of Supervisors, in accordance with Section 6-1300 and 4-1507 of the Zoning Ordinance.
- (14) Public water utility drinking water supply reservoirs, including, without limitation, reclaimed quarries.
- (15) Maintenance of the design conditions of an approved Floodplain Alteration.
- (16) Stream Restoration designed in accordance with the FSM and approved by the County. An increase in base flood elevation may be permitted provided a CLOMR is obtained from FEMA prior to approval of the requisite Floodplain Alteration application for such use.

- (17) Wetland Mitigation. An increase in base flood elevation may be permitted provided a CLOMR is obtained from FEMA prior to approval of the requisite Floodplain Alteration application for such use.
 - (18) Flood mitigation practices carried out in order to minimize and reduce flood risk in accordance with the Code of Federal Regulations, Title 44, Section 78.1, et seq.
 - (19) Special Events, pursuant to 5-500(C), without land disturbing activity.
- (B) Permitted uses in floodplains in FOD (Minor Floodplain), with or without an increase in base flood elevation:
- (1) Uses allowed under Section 4-1505(A), except that increases in the base flood elevation in the FOD (Minor Floodplain) shall be permitted.
 - (2) Alteration of the floodplain whether or not associated with a permitted or approved special exception use in the FOD. To the extent that the boundaries of the FOD change as a result of the Floodplain Alteration, any areas no longer within the FOD may be used for any use in the underlying zoning district, subject to the provisions of the applicable zoning district regulations and conditions of any approved special exception.
 - (3) Stormwater management improvements whether or not associated with permitted or approved special exception uses in the FOD.
 - (4) Ponds designed by the Natural Resources Conservation Service, a Licensed Professional Engineer, or a Class B Land Surveyor.
 - (5) Basketball or tennis courts, and swimming pools.
 - (6) Parking areas less than 5,000 square feet not otherwise permitted. Such parking areas shall not be subject to 100-year flooding greater than one (1) foot in depth, shall be equipped with best management practices in accordance with Chapter 5 of the FSM and Chapter 1096 of the Codified Ordinances, and shall not result in any change in existing grade.

4-1506

Special Exception Uses. The following uses and structures may be permitted in the FOD (Major Floodplain or Minor Floodplain) by the Board of Supervisors by special exception, subject to Section 6-1300 and Section 4-1507, provided that such uses conform with Section 5-1000 and such uses shall not cause any increase in the base flood elevation of the FOD (Major Floodplain) unless otherwise provided below. Uses allowed in the underlying district shall be prohibited to the extent such uses are not permitted or special exception uses in the FOD. Where any uses, structures or improvements will result in development within the FOD,

an application for a Floodplain Alteration shall be submitted in accordance with Section 4-1508(B) and the FSM.

- (A) Marinas, boat rentals, docks, piers, wharves, water ski jump facilities.
- (B) Special Events, pursuant to 5-500(C), with land disturbing activity.
- (C) Riding stables.
- (D) Structures required for the operation of a public utility not otherwise permitted by this Ordinance.
- (E) Incidental structures, greater than 840 square feet of floor area, associated with permitted or approved special exception uses in the FOD. Incidental structures include storage sheds, maintenance sheds, backstops, bath houses and locker rooms. Provided, however, bulk storage of gasoline, chemicals, fuels or similar substances are prohibited in the FOD; and further provided that any new construction shall comply with applicable FEMA standards.
- (F) Passive and Active Recreation Uses, except swimming pools, provided that the area of impervious surfaces within the FOD (Major Floodplain) does not exceed ten percent (10%) of the area of FOD (Major Floodplain) located within the subject parcel, that cause the boundary of the FOD (Major Floodplain) to change, and/or that cause an increase in base flood elevation. Such increase in base flood elevation may be permitted provided a CLOMR is obtained from FEMA prior to approval of the requisite Floodplain Alteration application for such use.

4-1507

Standards For A Special Exception. In considering applications for a special exception, the Board of Supervisors shall be satisfied that the following standards and those of Section 6-1300 have been met:

- (A) The proposed use will not increase the danger to life and property due to increased flood heights or velocities.
- (B) The proposed use will not increase the danger that materials may be swept downstream to the injury of others.
- (C) The proposed water supply and sanitation systems are designed to prevent disease, contamination, and unsanitary conditions.
- (D) The proposed use or structure shall be located and designed to limit its susceptibility to flood damage, and available alternative locations, not subject to flooding, for the proposed use shall be considered.
- (E) The proposed use is compatible with existing and planned development.
- (F) The proposed use is in harmony with the Comprehensive Plan.

- (G) The expected heights, velocity, duration, rate of rise and sediment transport of the flood waters expected at the site shall not cause significant damage.

4-1508

Floodplain Overlay District Development Procedures.

- (A) **Floodplain Information to be Submitted with Land Development Applications.** All new subdivision proposals and other proposed development greater than fifty (50) lots or five (5) acres, whichever is the lesser, on any parcel of land which includes FOD within its boundaries, shall include with such proposals base flood elevation data in accordance with Chapter 5 of the FSM. The submission of such base flood elevation data shall be considered a request for a cartographic interpretation pursuant to Section 6-407, to interpret the exact location of the boundaries of the FOD based on such data.
- (B) **Floodplain Alteration.** Any proposed development in the FOD shall require approval of a Declaration of No Impact to Floodplain or Floodplain Alteration in accordance with Chapter 5 of the FSM. Any required Floodplain Alteration shall conform with the following:
 - (1) **Procedures for Floodplain Alterations.** Applications for Floodplain Alterations shall be in accordance with Chapters 5 and 8 of the FSM and conform with the following procedures:
 - (a) An approved CLOMR from FEMA shall be provided prior to approval of a Floodplain Alteration that proposes any increase in the base flood elevation within the FOD (Major Floodplain).
 - (b) Floodplain Alterations that would result in changes to the boundaries of the FOD shall be subject to the following:
 - (i) The application for such Floodplain Alteration shall be considered a request for a cartographic interpretation pursuant to Section 6-407 to interpret the exact location of the boundaries of the FOD upon approval of the Floodplain Alteration.
 - (ii) Prior to approval of a Floodplain Alteration that would result in any increase in the base flood elevation off-site or other changes to the boundaries of the FOD off-site, an instrument describing the change in the base flood elevation executed by each affected property owner shall be recorded among the land records of Loudoun County, Virginia.
 - (2) **Engineering and Environmental Criteria for Floodplain Alterations.** All proposed alterations to the floodplain shall meet the following criteria:

- (a) Alterations to the floodplain shall not create erosive water velocity on-site or off-site (where erosive water velocity is based on analysis of the surface material and permissible velocities for specific cross sections affected by the proposed alteration,), and the mean velocity of stream flow at the downstream end of the site after alteration shall be no greater than the mean velocity of the stream flow under existing conditions.
 - (b) Alterations to the floodplain shall be in conformance with Chapter 1220 of the Codified Ordinances of Loudoun County and the Erosion and Sediment Control Law, Va. Code Section 62.1-44.15:51 et seq.
 - (c) The flood carrying capacity within the altered floodplain shall be maintained.
- (C) **Zoning Permit Required.** All development occurring within the FOD (Major Floodplain), including placement of manufactured homes, shall be undertaken only upon the approval of a zoning permit. The following provisions shall apply to all such zoning permits:
- (1) In addition to the requirements of Section 6-1001, the application for such zoning permit shall include the following:
 - (a) Copies of all necessary permits from Federal, State, or local agencies from which prior or concurrent approval is required.
 - (b) The base flood elevation.
 - (c) The elevation of the lowest floor (including basement).
 - (d) For a structure to be flood-proofed (non-residential only), the elevation to which the structure will be flood-proofed.
 - (e) Topographic information showing existing and proposed ground elevations.

4-1509

Floodplain Overlay District Development Standards:

- (A) **General Development Standards.** The following provisions shall apply to development located in the FOD (Major Floodplain):
- (1) **Residential Construction.** New construction or substantial improvement of any residential structure (including manufactured homes) shall have the lowest floor, including basement, elevated to or above (one (1) foot freeboard recommended) the base flood elevation.
 - (2) **Non-Residential Construction.** New construction or substantial improvement of any commercial, industrial, or non-residential building (including manufactured homes) shall have the lowest floor, including basement, elevated to or above the base flood

elevation. Non-residential buildings may be flood-proofed in lieu of being elevated provided that all areas of the building components lower than one (1) foot above the base flood elevation are water tight with walls 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 licensed professional engineer or architect shall certify that the standards of this subsection are satisfied. Such certification, including the base flood elevation to which such structures are floodproofed, shall be retained by Floodplain Administrator.

- (3) All new construction and substantial improvements (including manufactured homes) shall be in accordance with all applicable sections of this Ordinance, the FSM, and Chapter 1410 of the Codified Ordinances, and anchored to prevent flotation, collapse or lateral movement of the structure.
- (4) Newly placed manufactured homes and/or substantial improvements to manufactured homes shall meet all applicable State anchoring requirements for resisting wind forces and 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.
- (5) All new construction and substantial improvements (including manufactured homes) shall be constructed with materials and utility equipment resistant to flood damage.
- (6) All new construction or substantial improvements (including manufactured homes) shall be constructed by methods and practices that minimize flood damage.
- (7) 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.
- (8) New and replacement public and individual water supply systems shall be designed to minimize or eliminate infiltration of flood waters into the system.
- (9) New and replacement public sewer systems shall be designed to minimize or eliminate infiltration of flood waters into the systems and discharges from the systems into flood waters.
- (10) Individual sewage disposal systems shall be located and constructed to avoid impairment to them or contamination from them during flooding.

- (11) Prior to the approval of a Floodplain Alteration for any proposed alteration or relocation of any channel or watercourse, all required permits shall be obtained from the U. S. Army 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 agencies). The applicant shall provide notification of such alteration or relocation to the Department of Conservation and Recreation (Division of Dam Safety and Floodplain Management) and FEMA. If such alteration or relocation results in a change to the floodplain in an adjacent town, city, county, or state, notification shall also be provided by the applicant to such jurisdiction.
 - (12) The flood carrying capacity within an altered or relocated portion of any channel or watercourse shall be maintained. Under no circumstances shall any development adversely affect the water carrying capacity of any channel or watercourse.
- (B) **Space Below the Lowest Floor.** In FOD (Major Floodplain), fully enclosed areas, of new construction or substantially improved structures, which are below the base flood elevation shall meet the following minimum standards:
- (1) Such areas shall not be designed or used for human habitation. Such areas shall only be used for parking of vehicles, building access, or limited storage of maintenance equipment used in connection with the premises. Access to such areas 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) Such areas shall be constructed entirely of flood resistant materials below the base flood elevation.
 - (3) Such areas shall include measures to automatically equalize hydrostatic flood forces on walls by allowing for the entry and exit of floodwaters that are either certified by a licensed professional engineer or architect or that meet the following minimum design criteria:
 - (a) Provide a minimum of two (2) openings on different sides of each enclosed area. Foundation enclosures made of flexible skirting are not considered enclosed areas for regulatory purposes, and, therefore, do not require openings. Masonry or wood underpinning, regardless of structural status, are considered as enclosed areas and require such openings.
 - (b) The total net area of all openings must be at least one (1) square inch for each square foot of enclosed area subject to flooding.

- (c) If a building has more than one (1) enclosed area, each area must have openings to allow floodwaters to automatically enter and exit.
 - (d) The bottom of all required openings to such enclosed areas shall be no higher than one (1) foot above the adjacent grade.
 - (e) Openings shall only be equipped with screens, louvers, or other opening coverings or devices that permit the automatic flow of floodwaters in both directions.
- (C) **Standards for Recreational Vehicles.** The following provisions shall apply to recreational vehicles located within the FOD (Major Floodplain):
- (1) Any recreational vehicles placed on a site shall be fully licensed, on its wheels or jacking system, and attached to the site only by quick disconnect type utilities and security devices, and shall have no permanently attached additions; or
 - (2) Recreational vehicles placed on a site for 180 days or longer shall be deemed to be manufactured homes and shall meet all development standards of Section 4-1509(A) and 4-1509(B).
- (D) **Standards for Subdivision Proposals.** The following provisions shall be required for any subdivision of a parcel that includes FOD (Major Floodplain):
- (1) All subdivision proposals shall be consistent with the need to minimize flood damage.
 - (2) All subdivision proposals that have public utilities and facilities, such as sewer, gas, electrical and water systems, shall have such utilities and facilities located and constructed to minimize flood damage.
 - (3) All subdivision proposals shall have adequate drainage provided to reduce exposure to flood hazards.

4-1510 Density Calculations. For purposes of calculating the permitted floor area and number of residential units in the underlying zoning district, the land area in any portion of the FOD shall be included as part of the land area for such calculations.

4-1511 Variations.

- (A) **Authority.** Pursuant to Code of Federal Regulations 44CFR60.6, the Board of Supervisors may approve a variation of the standards of Sections 4-1509(A), (B), and (C) for any proposed development within the FOD (Major Floodplain) in the instances as set forth below. Requests for approval of a variation of the standards of Sections 4-1509(A), (B), and (C) shall be made in accordance with the procedures for a Minor Special Exception application as set forth in Section 6-1300, except that the issues

for consideration shall be as set forth in Section 4-1511(B). No variation shall be approved for any proposed development within the FOD (Major Floodplain) that will cause any increase in the base flood elevation of the FOD (Major Floodplain).

- (1) New construction and substantial improvements to be erected on a lot of one-half acre or less in size contiguous to and surrounded by lots with existing structures constructed below the base flood elevation provided that such new construction or substantial improvement is protected by methods that minimize flood damages during the base flood and creates no additional threats to public safety.
 - (2) Repair or rehabilitation of historic structures provided that such repair or rehabilitation shall not preclude the structure's continued designation as a historic structure and the variation is the minimum necessary to preserve the historic character and design of the structure.
- (B) **Application for a Variation of the Standards of Sections 4-1509(A), (B), and (C).** Any person owning property, or having a possessory or contract interest in property and the consent of the owner, may file an application for variation of the standards of Sections 4-1509(A), (B), and (C) in regard to such property with the Floodplain Administrator. The application shall contain the following information and such additional information as required by Section 6-403:
- (1) The particular standards of Sections 4-1509(A), (B), and (C) that prevent the proposed construction on, or use of, the property.
 - (2) The existing zoning of the property, including any previously approved modifications, conditions, or proffers.
 - (3) The special conditions, circumstances or characteristics of the land, building or structure that prevent the use of the land in compliance with the standards of Sections 4-1509(A), (B), and (C).
 - (4) The particular hardship that would result if the specified standards of Sections 4-1509(A), (B), and (C) were to be applied to the property.
 - (5) The extent to which it would be necessary to vary the standards of Sections 4-1509(A), (B), and (C) in order to permit the proposed construction on, or use of, the property.
 - (6) An explanation of how the requested variation conforms to each of the applicable standards set out in Section 4-1511(D).
- (C) **Issues for Consideration.** In considering an application for a variation of the standards of Sections 4-1509(A), (B), and (C), the following factors shall be given reasonable consideration:

- (1) The danger to life and property due to increased flood heights or velocities caused by encroachments.
 - (2) The danger that materials may be swept on to other lands or downstream to the injury of others.
 - (3) The proposed water supply and sanitation systems and the ability of these systems to prevent disease, contamination, and unsanitary conditions.
 - (4) The susceptibility of the proposed facility and its contents to flood damage and the effect of such damage on the individual owners.
 - (5) The importance of the services provided by the proposed facility to the community.
 - (6) The requirements of the facility for a waterfront location.
 - (7) The availability of alternative locations not subject to flooding for the proposed use.
 - (8) The compatibility of the proposed use with existing development and development anticipated in the foreseeable future.
 - (9) The relationship of the proposed use to the comprehensive plan and floodplain management program for the area.
 - (10) The safety of access by ordinary and emergency vehicles to the property in time of flood.
 - (11) The expected heights, velocity, duration, rate of rise, and sediment transport of the flood waters expected at the site.
 - (12) The historic nature of a structure.
 - (13) Such other factors which are relevant to the purposes of this ordinance.
- (D) **Decision on Application for Variation of the Standards of Sections 4-1509(A), (B), and (C).** No such variation of the standards of Sections 4-1509(A), (B), and (C) shall be approved by the Board of Supervisors unless all of the following findings are made:
- (1) The applicant has demonstrated good and sufficient cause.
 - (2) Failure to grant the variation of the standards of Sections 4-1509(A), (B), and (C) would result in exceptional hardship to the applicant.
 - (3) Granting of such variation of the standards of Sections 4-1509(A), (B), and (C) will not result in:

- (a) any increase in base flood elevation of the FOD (Major Floodplain);
 - (b) additional threats to public safety;
 - (c) extraordinary public expense;
 - (d) the creation of nuisances;
 - (e) fraud or victimization of the public; or
 - (f) conflicts with other local laws or ordinances.
- (4) The variation of the standards of Sections 4-1509(A), (B), and (C) is the minimum required to provide relief.
- (E) **Notice of Approval.** Upon approval of a variation of the standards of Sections 4-1509(A), (B), and (C), the Floodplain Administrator shall notify the applicant of such approval, in writing, and that development in accordance with the approved variation may increase the risks to life and property and may result in increased premium rates for flood insurance.



**Link to a Copy of the Current
Comprehensive Plan
(Loudoun County 2019 Comprehensive Plan)**



[Link to the Loudoun County 2019 Comprehensive Plan](https://www.loudoun.gov/5221/Board-of-Supervisors-Comprehensive-Plan-)

<https://www.loudoun.gov/5221/Board-of-Supervisors-Comprehensive-Plan->

Home | Departments & Offices | Planning & Zoning | Planning | Loudoun County Comprehensive Plan | Board of Supervisors Comprehensive Plan Review

Board of Supervisors Comprehensive Plan Review

The Board of Supervisors began its review of the 2019 draft Comprehensive Plan after it was certified by the Planning Commission.

- [Loudoun County 2019 Comprehensive Plan, Loudoun 2040 Comprehensive Plan \(Certified Draft, March 13, 2019\) \(PDF\)](#)
- Letter from the Planning Commission to the Board of Supervisors: [Transmittal of Plan \(PDF\)](#)

Note: On April 24, 2019, the Board of Supervisors voted to change the name of the draft Loudoun 2040 Comprehensive Plan to the draft Loudoun County 2019 Comprehensive Plan.

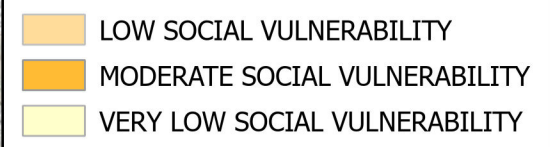
2019 Board of Supervisors Comprehensive Plan Meetings

In addition to the June 20, 2019, business meeting, the Board of Supervisors held two public hearings and eight work sessions on the draft Comprehensive Plan. The dates serve as links to related documents for those meetings.

Date	Meeting Type	Task
April 3, 2019	Work Session	Model Results Presentation
April 24, 2019	Public Hearing	Public Input
April 27, 2019	Public Hearing	Public Input
May 1, 2019	Work Session	Plan Review
May 8, 2019	Work Session	Plan Review
May 20, 2019	Work Session	Plan Review
May 29, 2019	Work Session	Plan Review
June 1, 2019	Work Session	Plan Review
June 5, 2019	Work Session	Plan Review
June 15, 2019	Work Session	Plan Review
June 20, 2019 (The item is posted here as part of the meeting packet. See item #03 and attachments.)	Business Meeting	Adoption of 2019 Comprehensive Plan

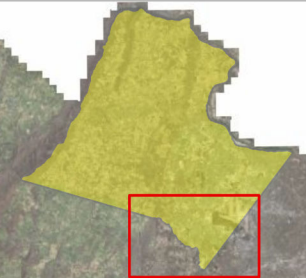
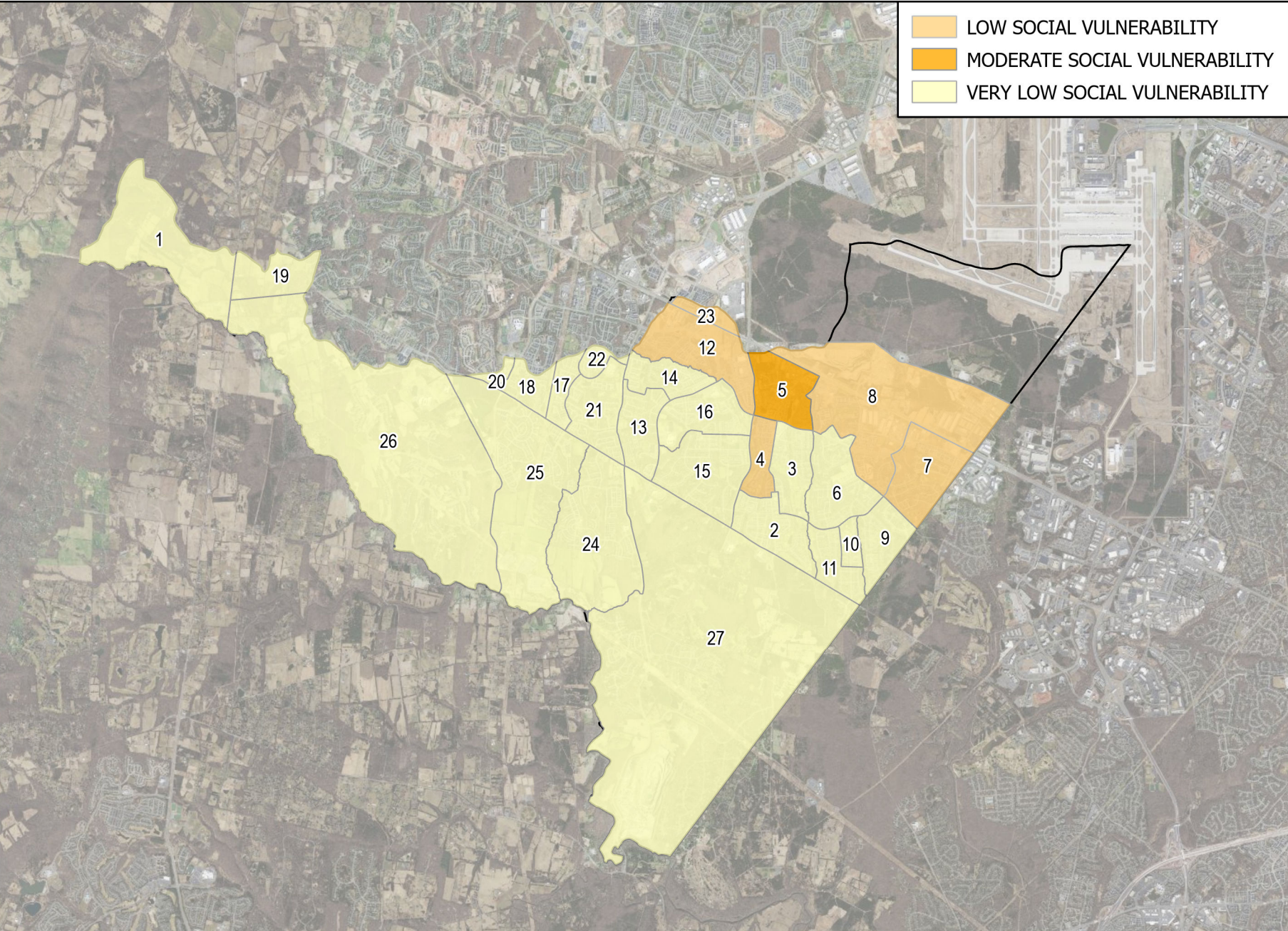


Social Vulnerability Index Score(s) for the Project Areas



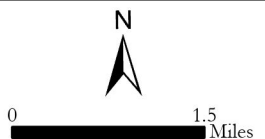
SOCIAL VULNERABILITY SCORE

1.	-1.36
2.	-1.47
3.	-1.09
4.	-0.96
5.	0.63
6.	-1.51
7.	-0.88
8.	-0.06
9.	-1.36
10.	-1.41
11.	-1.81
12.	-0.73
13.	-1.31
14.	-1.45
15.	-1.44
16.	-1.47
17.	-1.38
18.	-1.51
19.	-1.65
20.	-1.51
21.	-1.33
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24.	-1.51
25.	-1.16
26.	-1.30
27.	-1.31



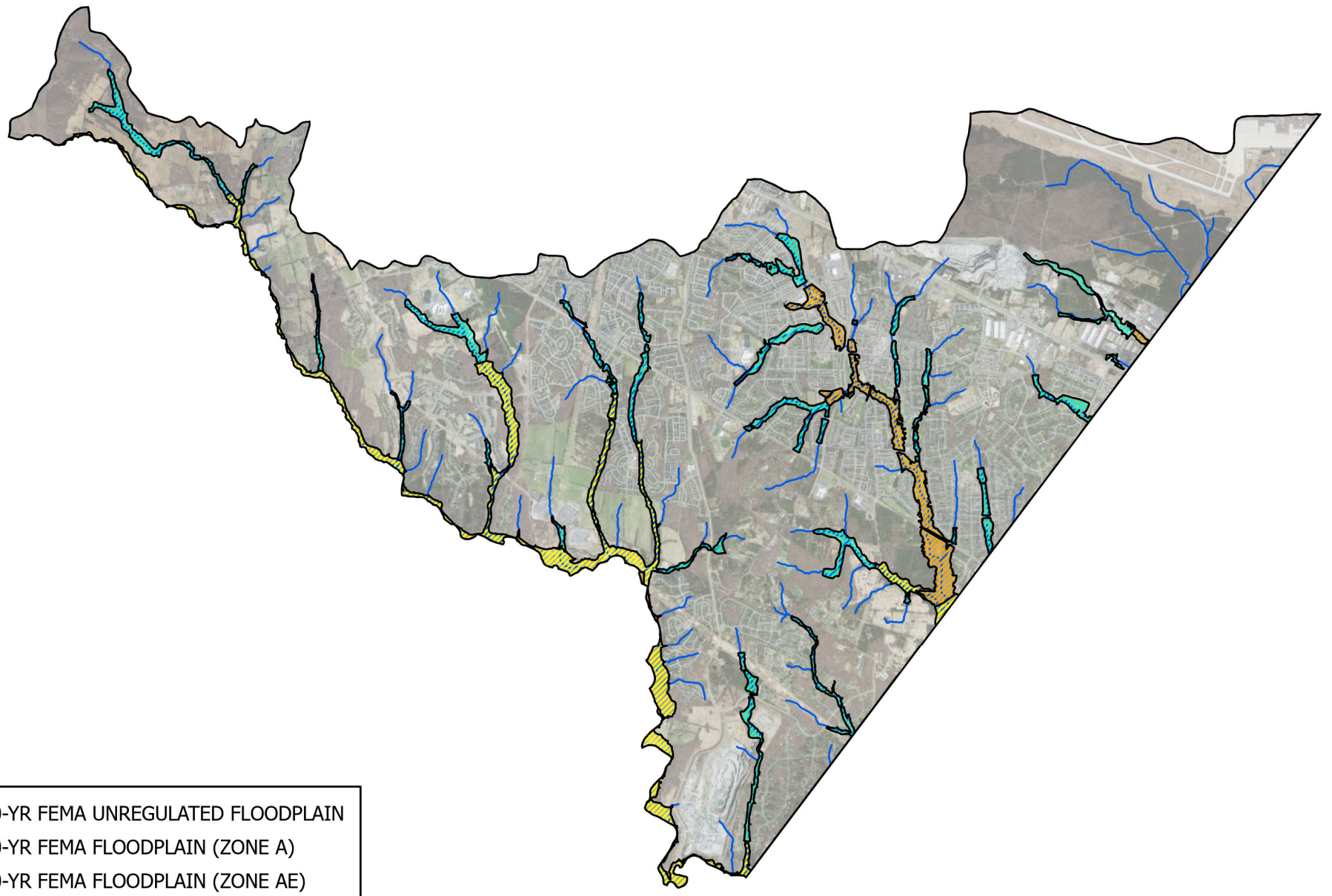
BULL RUN WATERSHED SOCIAL VULNERABILITY INDEX





Loudoun County
VIRGINIA



Aerial Data Source:VDOT Spatial Intelligence Group, Virginia Geographic Information Network (VGIN)

Coordinate System: NAD 1983 StatePlane Virginia North FIPS 4501 Feet



-  100-YR FEMA UNREGULATED FLOODPLAIN
-  100-YR FEMA FLOODPLAIN (ZONE A)
-  100-YR FEMA FLOODPLAIN (ZONE AE)
-  STREAM CENTERLINE

BULL RUN WATERSHED IMPAIRED STREAMS AND FLOODPLAINS

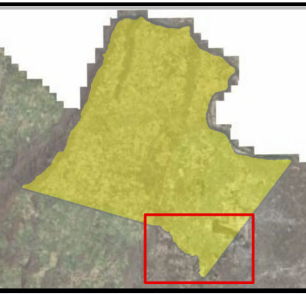
Loudoun County
VIRGINIA

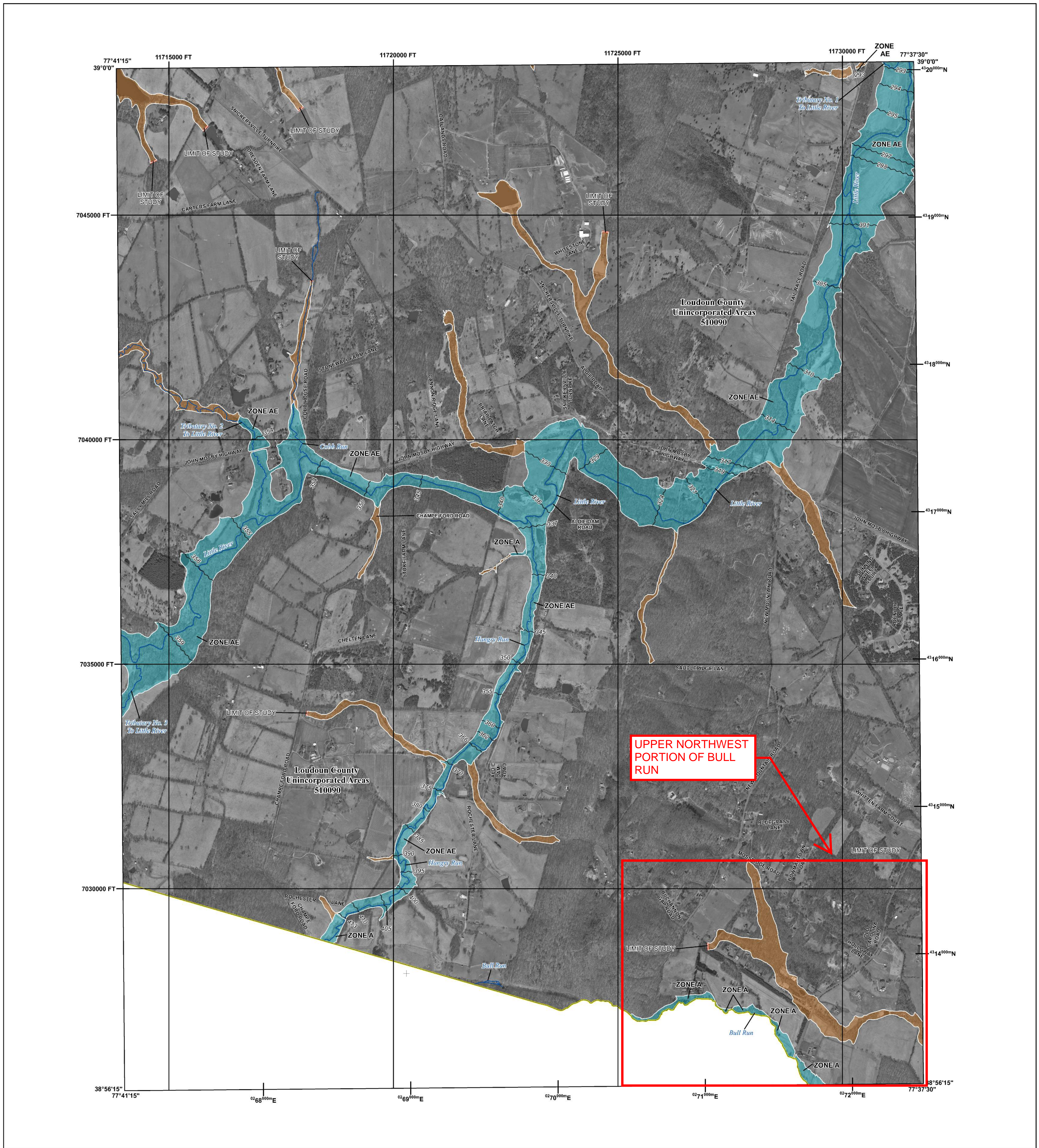


0 1.25 Miles

Aerial Data Source:VDOT Spatial Intelligence Group, Virginia Geographic Information Network (VGIN)

Coordinate System: NAD 1983 StatePlane Virginia North FIPS 4501 Feet





FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR ZONE DESCRIPTIONS AND INDEX MAP
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT [HTTP://MSC.FEMA.GOV](http://msc.fema.gov)

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone A, V, A99
		With BFE or Depth Zone AE, AQ, 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
OTHER AREAS		NO SCREEN Areas of Minimal Flood Hazard Zone X
		Area of Undetermined Flood Hazard Zone D
GENERAL STRUCTURES		Channel, Culvert, or Storm Sewer
		Accredited or Provisionally Accredited Levee, Dike, or Floodwall
		Non-accredited Levee, Dike, or Floodwall
		Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)
		Coastal Transect
		Profile Baseline
		Hydrographic Feature
		Base Flood Elevation Line (BFE)
OTHER FEATURES		Limit of Study
		Jurisdiction Boundary

NOTES TO USERS

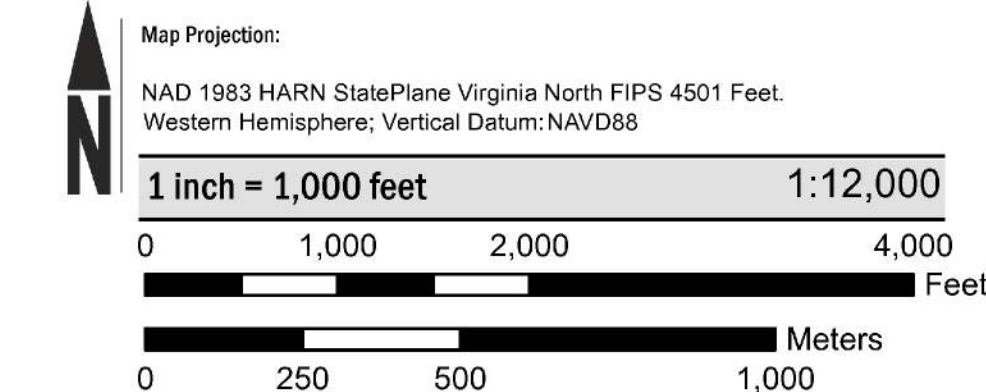
For information and questions about this map, available products associated with this FIRM including historic versions of this FIRM, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-6277) or visit the FEMA Map Service Center website at <http://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 Map Service Center website or by calling the FEMA Map Information eXchange.

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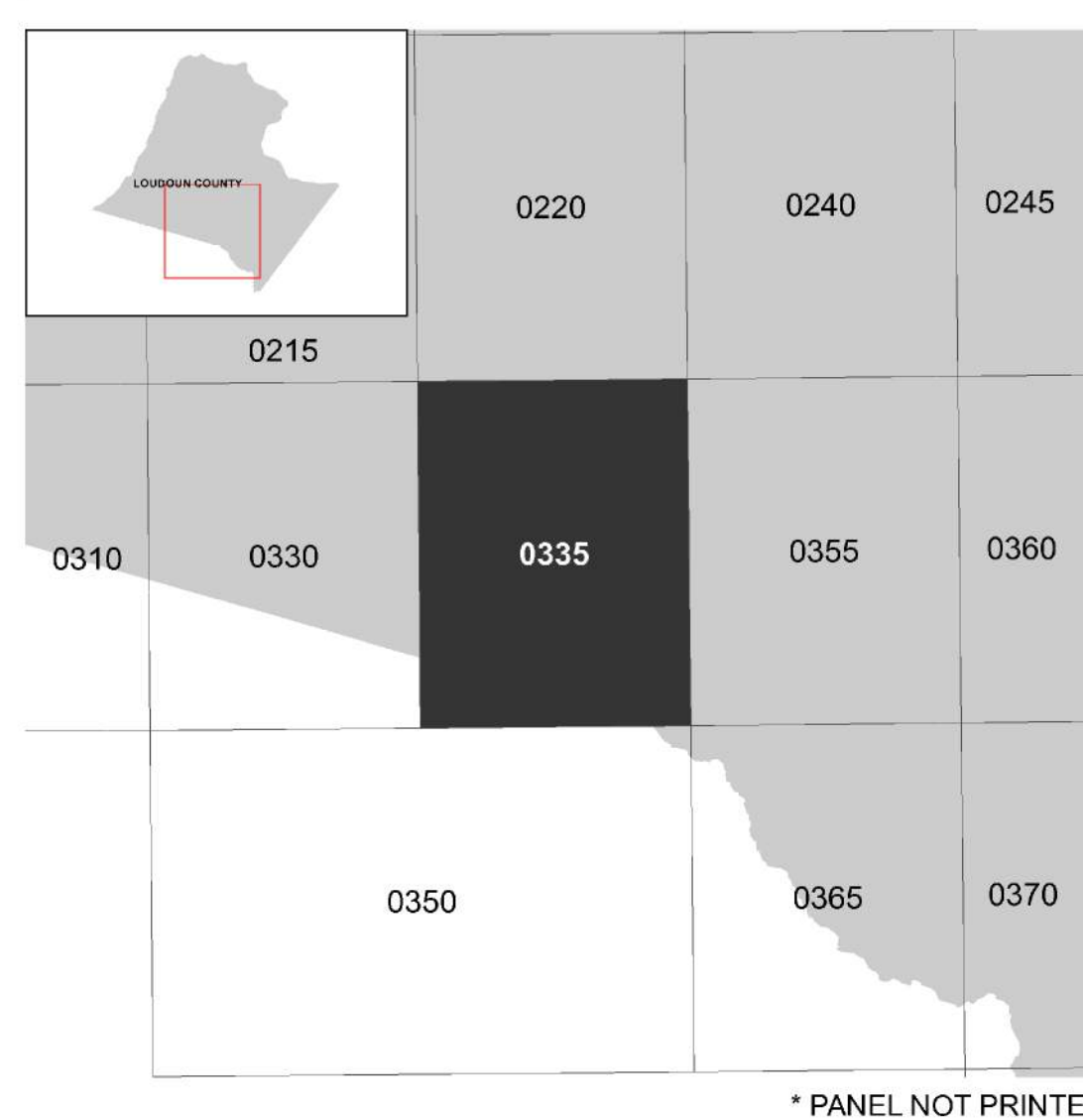
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SCALE



PANEL LOCATOR



National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

LOUDOUN COUNTY, VIRGINIA
 And Incorporated Areas

PANEL 335 OF 2982

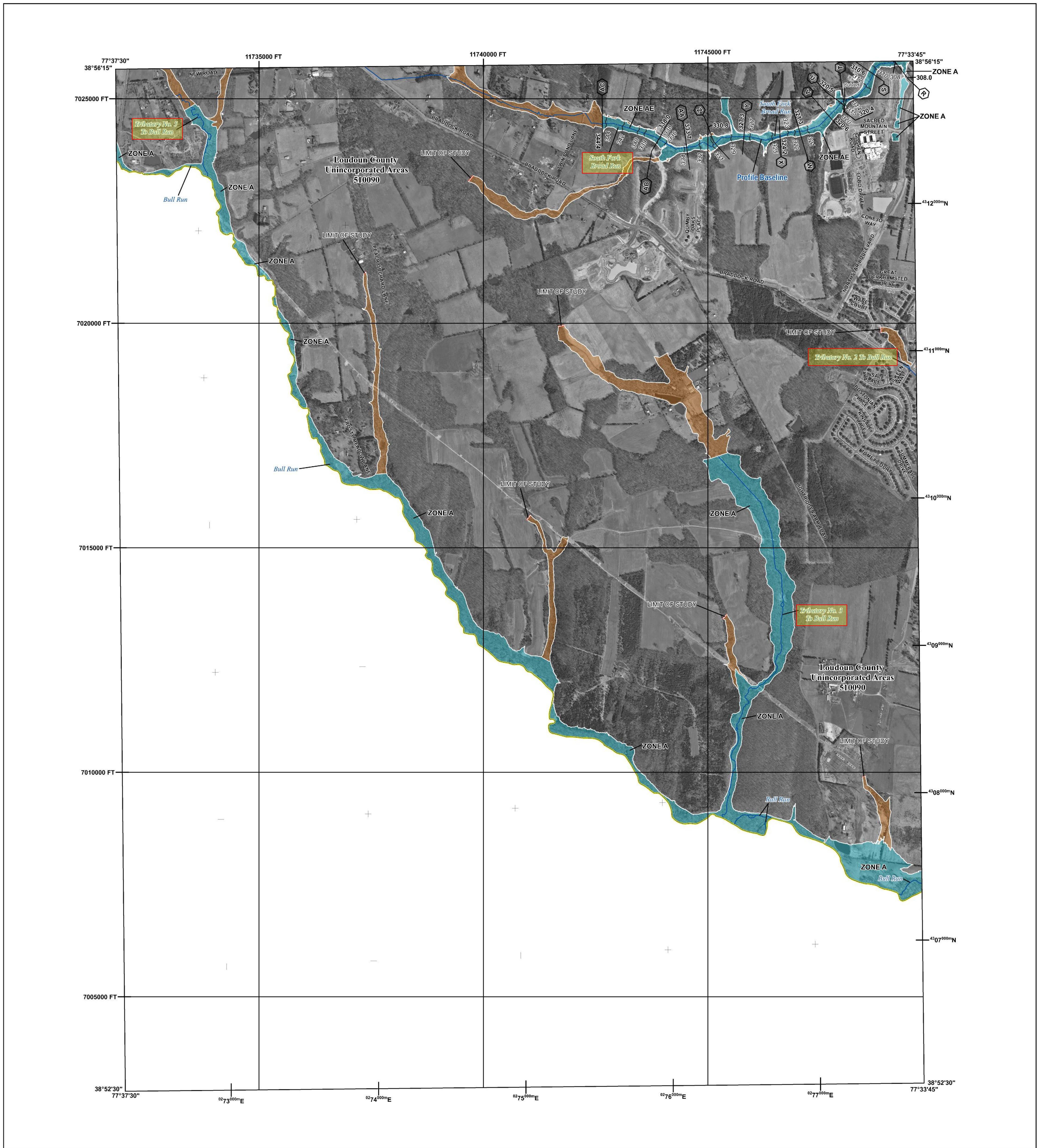
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COMMUNITY	NUMBER	PANEL	SUFFIX
LOUDOUN COUNTY	51090	0335	E

VERSION NUMBER
2.3.3.2

MAP NUMBER
51107C0335E

MAP REVISED
FEBRUARY 17, 2017



FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR ZONE DESCRIPTIONS AND INDEX MAP
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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
OTHER AREAS	Areas of Minimal Flood Hazard Zone X
	Area of Undetermined Flood Hazard Zone D
GENERAL STRUCTURES	Channel, Culvert, or Storm Sewer
	Accredited or Provisionally Accredited Levee, Dike, or Floodwall
	Non-accredited Levee, Dike, or Floodwall
OTHER FEATURES	Cross Sections with 1% Annual Chance Water Surface Elevation (BFE) 18.2, 17.5
	Coastal Transect
	Coastal Transect Baseline
	Profile Baseline
	Hydrographic Feature
	Base Flood Elevation Line (BFE)
	Limit of Study
	Jurisdiction Boundary

NOTES TO USERS

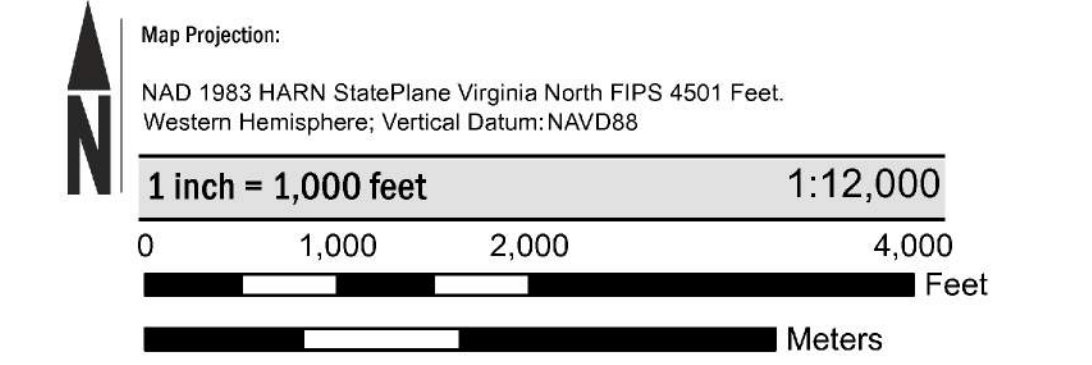
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SCALE



PANEL LOCATOR



* PANEL NOT PRINTED

National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

LOUDOUN COUNTY, VIRGINIA
 And Incorporated Areas

PANEL 365 OF 2982

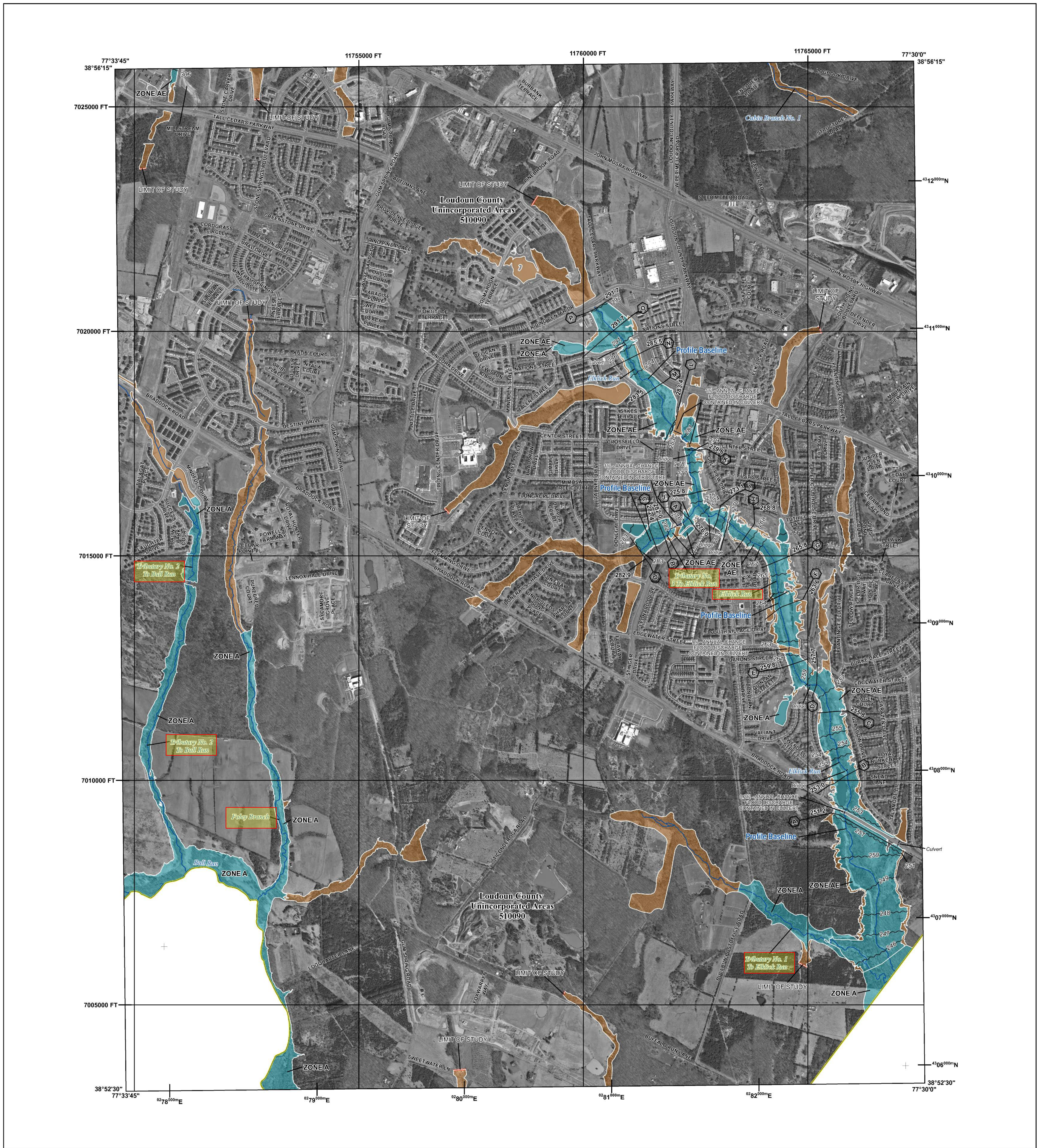
Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
LOUDOUN COUNTY	510090	0365	E

VERSION NUMBER
2.3.3.2

MAP NUMBER
51107C0365E

MAP REVISED
FEBRUARY 17, 2017



FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR ZONE DESCRIPTIONS AND INDEX MAP
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		Profile Baseline
		Hydrographic Feature
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary

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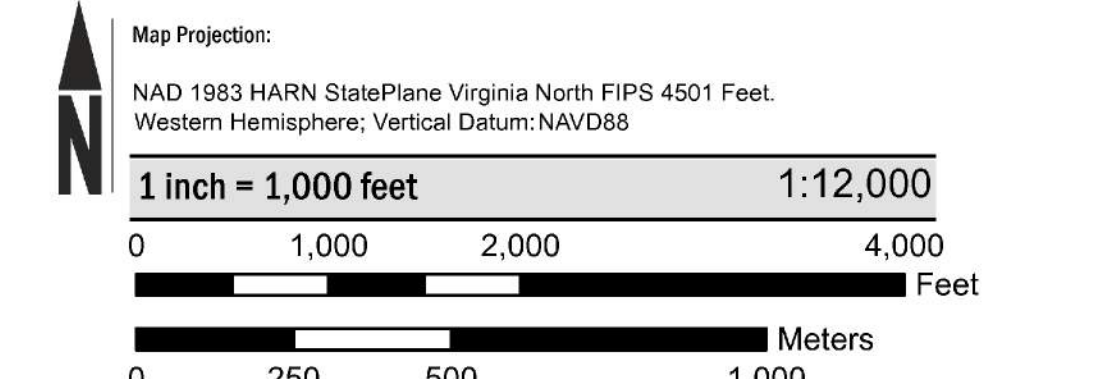
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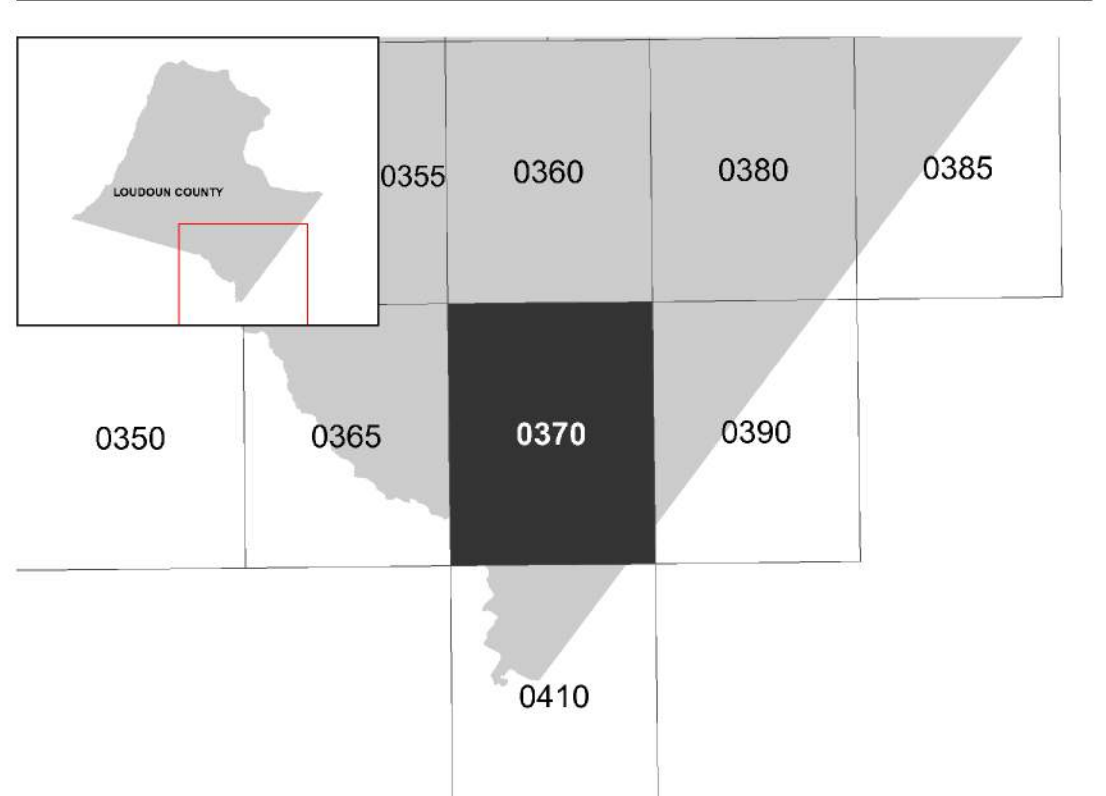
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SCALE



PANEL LOCATOR



National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

LOUDOUN COUNTY, VIRGINIA
 And Incorporated Areas

PANEL 370 OF 2982

Panel Contains:

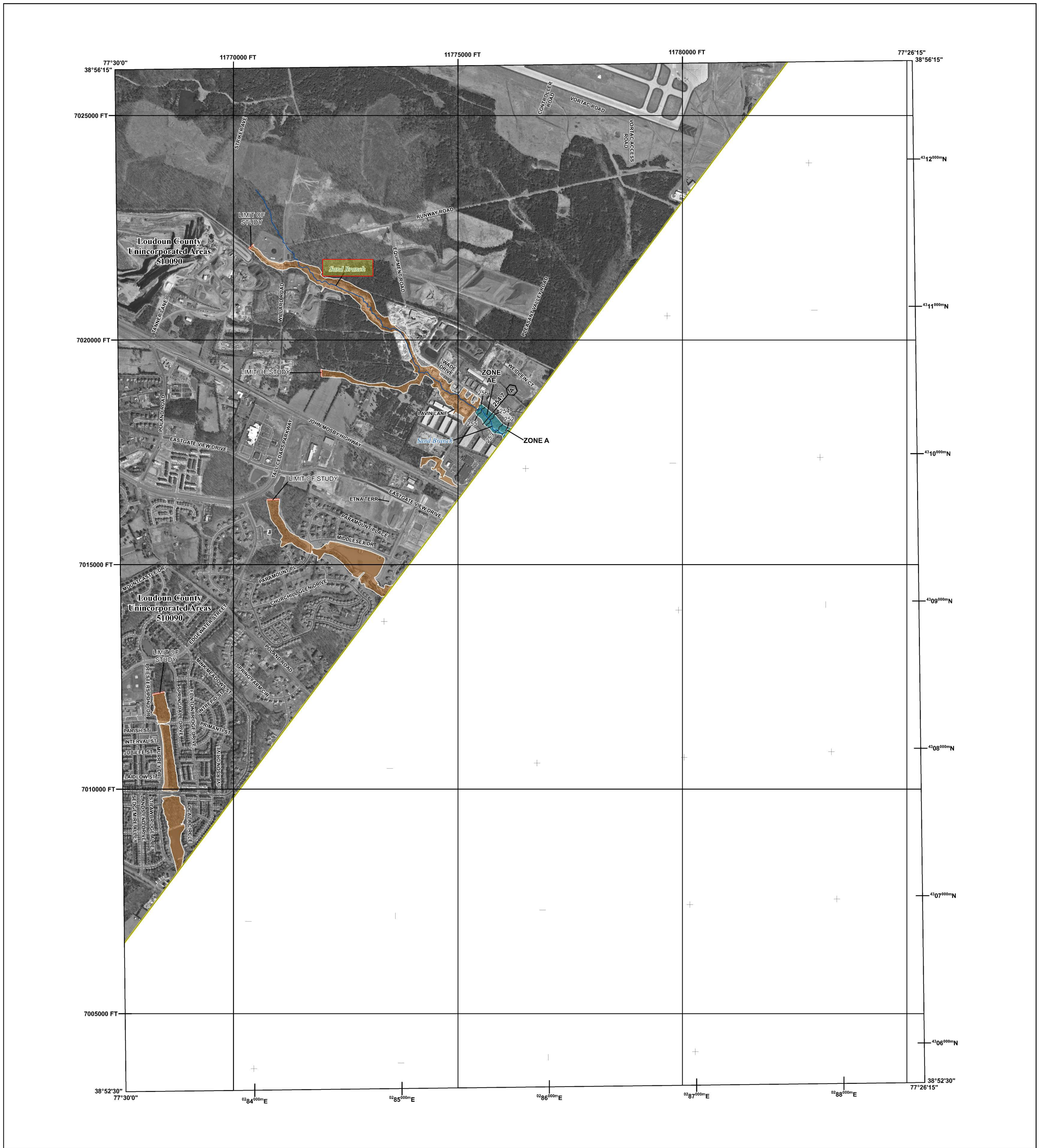
COMMUNITY	NUMBER	PANEL	SUFFIX
LOUDOUN COUNTY	510090	0370	E

VERSION NUMBER
2.3.3.2

MAP NUMBER
51107C0370E

MAP REVISED
FEBRUARY 17, 2017

* PANEL NOT PRINTED



FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR ZONE DESCRIPTIONS AND INDEX MAP
 THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING
 DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT
[HTTP://MSC.FEMA.GOV](http://msc.fema.gov)

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
OTHER AREAS		Areas of Minimal Flood Hazard Zone X
		Area of Undetermined Flood Hazard Zone D
GENERAL STRUCTURES		Channel, Culvert, or Storm Sewer Accredited or Provisionally Accredited Levee, Dike, or Floodwall
		Non-accredited Levee, Dike, or Floodwall
		Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)
		Coastal Transect
		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
OTHER FEATURES		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary

NOTES TO USERS

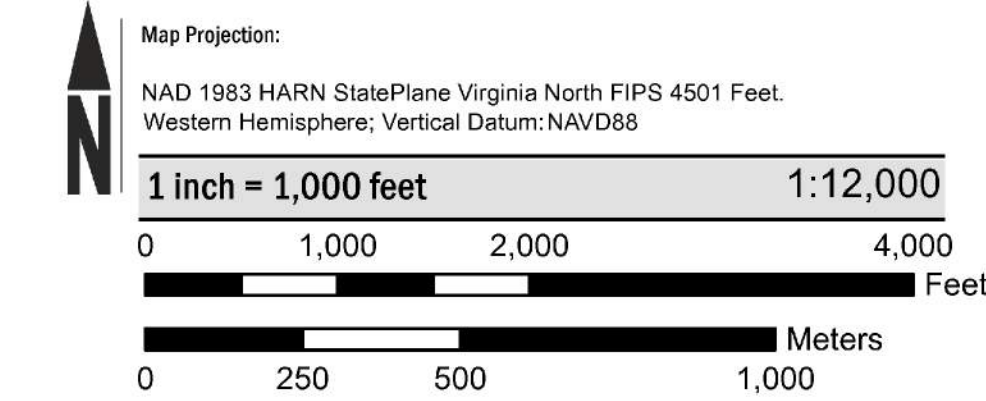
For information and questions about this map, available products associated with this FIRM including historic versions of this FIRM, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-6227) or visit the FEMA Map Service Center website at <http://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 Map Service Center website or by calling the FEMA Map Information eXchange.

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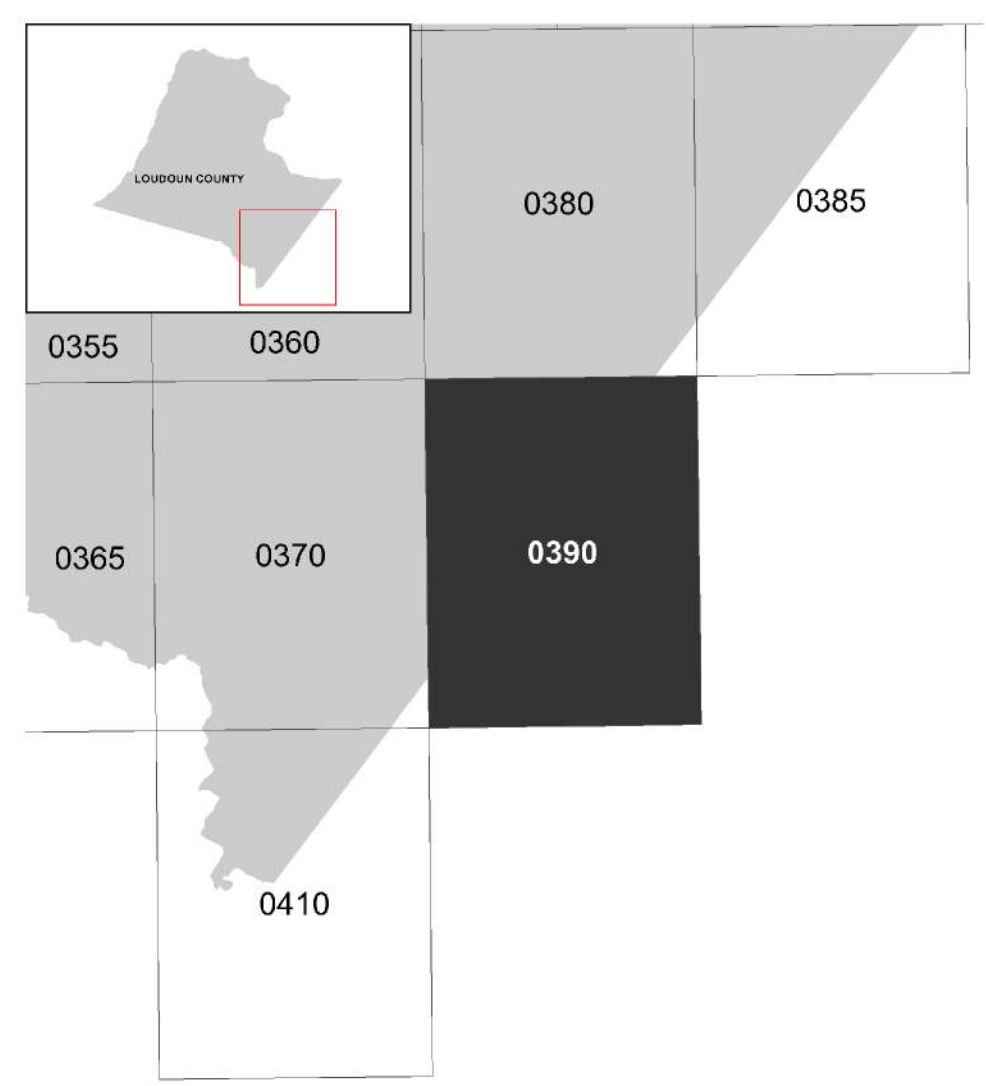
For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction. To determine if flood insurance is available in the community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

Base map information shown on this FIRM was provided in digital format by Loudoun County and was collected by Sanborn Map Company. This information was photogrammetrically compiled at a scale of 1:2,400 from aerial photography dated 2012.

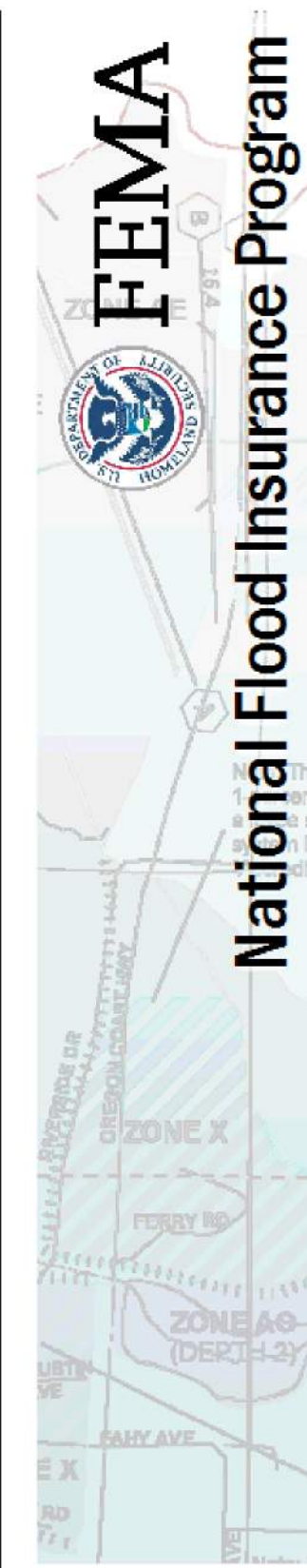
SCALE



PANEL LOCATOR



* PANEL NOT PRINTED



**NATIONAL FLOOD INSURANCE PROGRAM
 FLOOD INSURANCE RATE MAP**

LOUDOUN COUNTY, VIRGINIA
 And Incorporated Areas

PANEL 390 OF 2982



Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
LOUDOUN COUNTY	510090	0390	E

VERSION NUMBER
 2.3.3.2

MAP NUMBER
 51107C0390E

MAP REVISED
 FEBRUARY 17, 2017



FLOOD HAZARD INFORMATION

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THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT [HTTP://MSC.FEMA.GOV](http://msc.fema.gov)

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
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		Area with Reduced Flood Risk due to Levee See Notes. Zone X
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		18.2 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)
		Coastal Transect
		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
		Base Flood Elevation Line (BFE)
OTHER FEATURES		Limit of Study
		Jurisdiction Boundary

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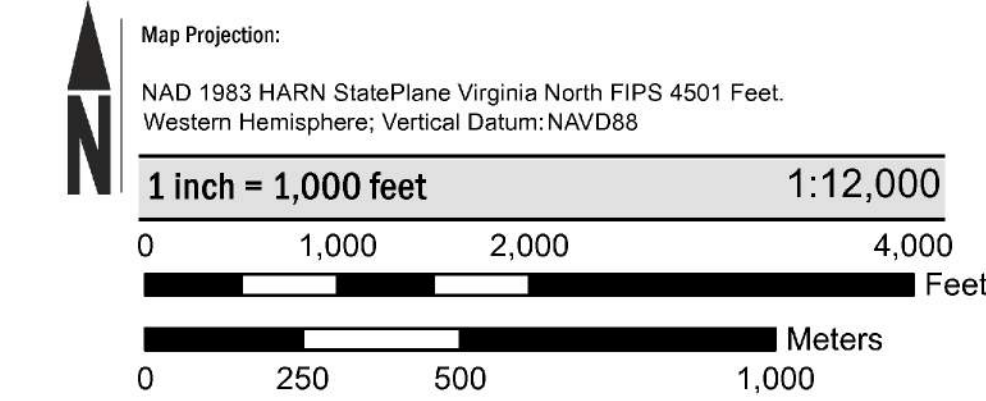
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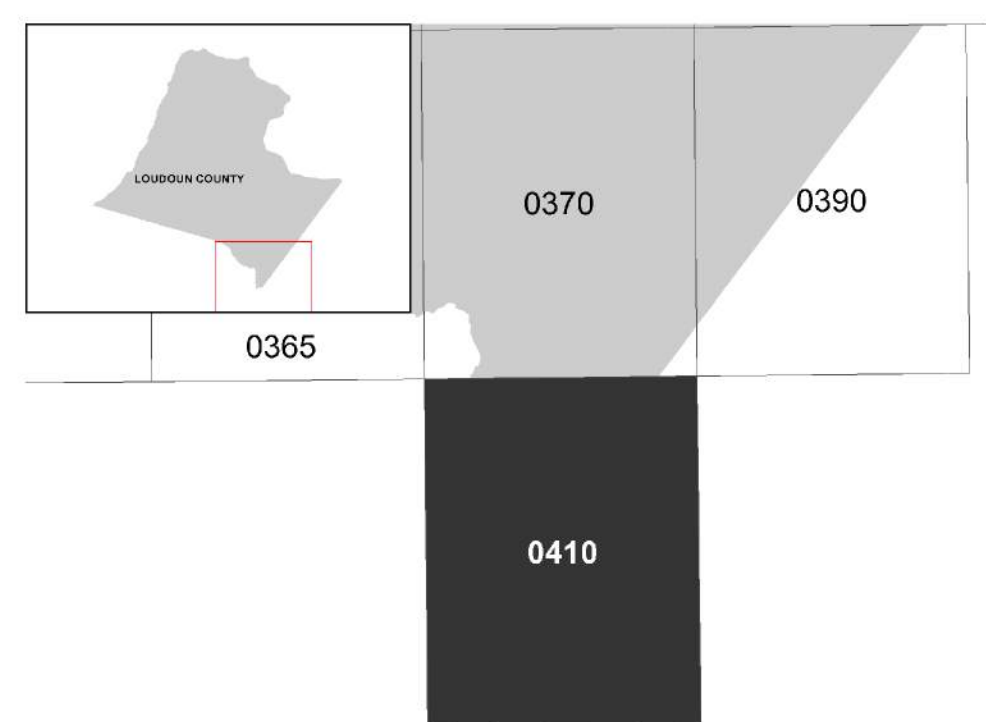
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SCALE



PANEL LOCATOR



* PANEL NOT PRINTED

National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM
 FLOOD INSURANCE RATE MAP

LOUDOUN COUNTY, VIRGINIA
 And Incorporated Areas

PANEL 410 OF 2982

FEMA

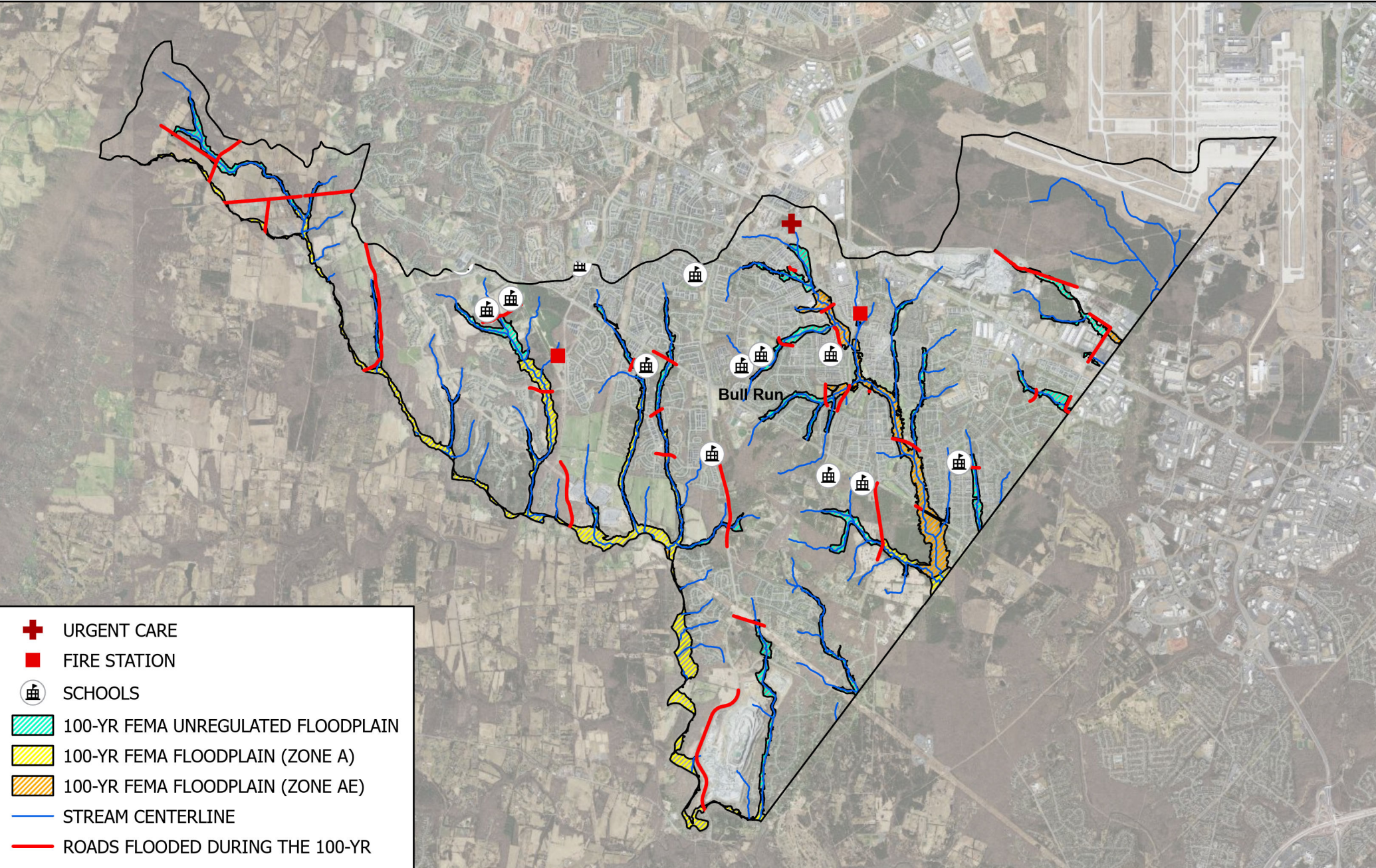
Panel Contains:









COMMUNITY	NUMBER	PANEL	SUFFIX
LOUDOUN COUNTY	510090	0410	E

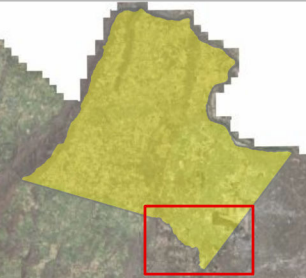
VERSION NUMBER
2.3.3.2

MAP NUMBER
51107C0410E

MAP REVISED
FEBRUARY 17, 2017



-  URGENT CARE
-  FIRE STATION
-  SCHOOLS
-  100-YR FEMA UNREGULATED FLOODPLAIN
-  100-YR FEMA FLOODPLAIN (ZONE A)
-  100-YR FEMA FLOODPLAIN (ZONE AE)
-  STREAM CENTERLINE
-  ROADS FLOODED DURING THE 100-YR



BULL RUN WATERSHED AT RISK CRITICAL INFRASTRUCTURE

Loudoun County
VIRGINIA



0  1.25 Miles

Aerial Data Source:VDOT Spatial Intelligence Group, Virginia Geographic Information Network (VGIN)

Coordinate System: NAD 1983 StatePlane Virginia North FIPS 4501 Feet

Section 4-1500

FOD - Floodplain Overlay District

4-1501

Purpose and Intent. The purpose of these provisions is to conserve the natural state of watercourses and watersheds and 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, 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 areas susceptible to flooding to be protected and/or flood-proofed against flooding and flood damage; and ; (4) preventing individuals from using land and erecting structures which are unsuited for intended purposes because of flood hazards. These provisions shall apply to all privately and publicly owned lands within the jurisdiction of the County of Loudoun and identified as being located within the Floodplain Overlay District (FOD). Only those uses set forth in Section 4-1505 and 4-1506 shall be permitted or special exception uses within the FOD, and land so encumbered may be used in a manner permitted in the underlying zoning district only if and to the extent such use is also permitted in the FOD.

The degree of flood protection sought by Section 4-1500 is considered reasonable for regulatory purposes and is based on acceptable engineering methods of study, but does not imply total flood protection. Larger floods may occur on rare occasions. Flood heights may be increased by man-made or natural causes, such as ice jams and bridge openings restricted by debris. Section 4-1500 does not imply that property outside the FOD or land uses permitted within the FOD will be free from flooding or flood damages. Section 4-1500 shall not create liability on the part of Loudoun County or any officer or employee thereof for any flood damages that result from reliance on Section 4-1500 or any administrative decision lawfully made thereunder.

4-1502

Authority. Authority for these provisions includes:

- (A) Flood Damage Reduction Act, Va. Code Sections 10.1-600 et seq.
- (B) Va. Code Sections 15.2-2200 through 15.2-2329 (Planning, Subdivision of Land and Zoning).
- (C) Soil Conservation Districts Law, Va. Code Sections 10.1-500 et seq.
- (D) Erosion and Sediment Control Law, Va. Code Section 62.1-44.15:51 et seq.
- (E) Potomac River Basin Compact, Va. Code Section 28.2-1001.
- (F) National Flood Insurance Act of 1968, 42 U.S.C. 4001 et seq., as amended by the National Flood Insurance Reform Act of 1994 and the Flood Insurance Reform Act of 2004.

(G) Code of Federal Regulations, Title 44, Section 59.1-70.9

4-1503

Definitions. The words and phrases defined in this subsection shall have the following meanings when used in Section 4-1500.

- (A) **Alteration.** A development action which will change the cross section of the floodplain and will increase either the erosive velocity or height of floodwaters either on-site or off-site. Alterations include, but are not limited to, land disturbing activities.
- (B) **Base Flood.** The flood having a one percent (1%) chance of being equaled or exceeded in any given year. Also known as the 100-year flood.
- (C) **Base flood elevation.** The water surface elevations of the base flood. The water surface elevation of the base flood is calculated based on the datum specified on Loudoun County's Flood Insurance Rate Map.
- (D) **Basement.** That portion of a building having its floor below ground level on all sides.
- (E) **Conditional Letter of Map Revision (CLOMR).** A formal review and written comment from FEMA on a proposed project that would, upon construction, cause an increase in base flood elevation. Upon completion of the construction of such project, a Letter of Map Revision (LOMR) issued by FEMA, determining that the increase was warranted, shall be required.
- (F) **Cross section.** Shape and dimensions of a channel and valley of the floodplain perpendicular to the line of flow.
- (G) **Development.** Any man-made change to improved or unimproved real estate, including, but not limited to, buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations, or storage of equipment or materials.
- (H) **Elevated building.** A non-basement building built to have the lowest floor elevated above the ground level by means of solid foundation perimeter walls, pilings, or columns (posts and piers).
- (I) **Flood or Flooding.**
 - (1) A general or temporary condition of partial or complete inundation of normally dry land areas from:
 - (a) the overflow of inland 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 subsidence 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 a flash flood, or by some similarly unusual and unforeseeable event which results in flooding as defined in paragraph 1(a) of this definition.
- (J) **Flood Insurance Rate Map (FIRM).** The official map of Loudoun County on which the Federal Emergency Management Agency (FEMA) has delineated areas in the floodplain subject to inundation of the base flood and the risk premium zones based on the technical data in the Flood Insurance Study. The FIRM that has been made available digitally is called the Digital Flood Insurance Rate Map (DFIRM).
- (K) **Flood Insurance Study (FIS).** A report by FEMA that examines, evaluates and determines flood hazards and, if appropriate, corresponding water surface elevations, or an examination, evaluation and determination of mudflow and/or flood-related erosion hazards.
- (L) **Floodplain.** Any land area susceptible to being inundated by water from the base flood and having a drainage area greater than one hundred (100) acres. For purposes of regulation under this Ordinance, a distinction is made between the Major Floodplain and Minor Floodplain. Major floodplain shall correspond to Zones AE and A as shown on the FIRM, as may be subsequently revised or amended by FEMA, and is considered to be the Special Flood Hazard Area by FEMA. All watersheds draining greater than 640 acres shall be considered Major Floodplain. Minor Floodplain shall correspond to watersheds of 640 acres or less that are not designated as Zone AE or A.
- (M) **Floodproofing.** 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.
- (N) **Floodway.** The channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without any cumulative increase the base flood elevation. Floodways are included within, and regulated as, FOD (Major Floodplain). Floodways are not shown on the FIRM but are included within the Special Flood Hazard Area designated on the FIRM, which is regulated as FOD (Major Floodplain).
- (O) **Freeboard.** A factor of safety expressed in feet above a flood level for purposes of floodplain management. "Freeboard" compensates for the many unknown factors that contribute to flood heights greater than the

height calculated for Base Flood, such as wave action, bridge openings, and the hydrological effect of urbanization in the watershed.

- (P) **Historic structure.** 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 the Virginia Landmarks Register; or,
 - (4) Individually listed on the Loudoun County Register of Heritage Resources.
- (Q) **Lowest floor.** 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 Code of Federal Regulations 44CFR §60.3.
- (R) **Manufactured Home.** A structure constructed and subject to federal regulation, 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 utilities. The term "manufactured home" also includes recreational vehicles placed on a site for greater than 180 consecutive days whether connected to utilities or not.
- (S) **New construction.** Structures for which the start of construction commenced on or after January 5, 1978. All such structures shall comply with the Loudoun County regulations in effect at the time of construction. Any improvement(s) to a structure shall comply with the Loudoun County regulations in effect at the time of construction of the improvement(s).
- (T) **Recreational Vehicle.** A vehicle which is
- (1) built on a single chassis;
 - (2) 400 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; and

- (4) designed primarily not for use as a permanent dwelling but as temporary living quarters for recreational camping, travel, or seasonal use.
- (U) **Road, Crossing of the Floodplain or Road Crossing.** Any public road, private road or driveway traversing a floodplain generally perpendicular to the flow of the drainageway.
- (V) **Special Flood Hazard Area (SFHA).** The land in the floodplain subject to a one (1%) percent or greater chance of being flooded in any given year. This area corresponds to where the National Flood Insurance Program's (NFIP's) floodplain management regulations must be enforced and includes Zones A, AO, AH, A1-30, AE, A99, AR, AR/A1-30, AR/AE, AR/AO, AR/AH, AR/A, VO, V1-30, VE, and V as shown on the FIRM.
- (W) **Start of construction.** Means the date the building permit was issued, provided the actual start of construction, repair, reconstruction, rehabilitation, addition, placement, substantial improvement 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 and/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 the construction means the first alteration of any wall, ceiling, floor, or other structural part of a building, whether or not that alteration affects the external dimensions of the building.
- (X) **Stormwater Management Improvements.** Surface or subsurface drainage improvements, storm sewers, detention and retention ponds and other such improvements as required by the Facilities Standards Manual (FSM), the Loudoun County Stormwater Management Ordinance, Chapter 1096 of the Codified Ordinances of Loudoun County, or the Loudoun County Erosion and Sediment Control Ordinance and Plan, Chapter 1220 of the Codified Ordinances of Loudoun County.
- (Y) **Stream Corridor.** Includes the stream and extends in cross section from the channel's bankfull level towards the upland (perpendicular to the direction of streamflow) to a point on the landscape where channel-related surface and/or soil moisture no longer influence the plant community.
- (Z) **Stream Restoration.** Converting an unstable, altered, or degraded stream corridor, including adjacent riparian area and flood-prone areas, to its natural stable condition considering recent and future watershed conditions.

- (AA) **Structure.** An assembly of materials forming a construction for occupancy or use including, among others, buildings, stadiums, gospel and circus tents, platforms, stagings, observation towers, telecommunications towers, radio and TV broadcasting towers, water tanks, trestles, piers, open sheds, coal bins, shelters, walls, power line towers, pipelines, railroad tracks, manufactured homes, and gas or liquid storage tanks that are principally above ground.
- (BB) **Substantial damage.** Damage of any origin sustained by a structure whereby the cost of restoring the structure to its before damaged condition would equal or exceed fifty percent (50%) of the market value of the structure before the damage occurred.
- (CC) **Substantial improvement.** Any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds fifty percent (50%) of the market value of the structure before the start of construction of the improvement. This term includes structures which have incurred flood related damages on two (2) occasions in which the cost of the repair on the average equaled or exceeded twenty-five percent (25%) of the market value of the structure at the time of each such flood event or 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 assure safe living conditions, or
 - (2) Any altering, repair or rehabilitation of a historic structure, provided that the altering, repair or rehabilitation will not preclude the structure's continued designation as a historic structure. Historic structures undergoing altering, repair or rehabilitation that would constitute a substantial improvement as defined above, must comply with all requirements of Section 4-1500 that do not preclude the structure's continued designation as a historic structure. Documentation that a specific requirement of Section 4-1500 will cause removal of the structure from the National Register of Historic Places or the Virginia Landmarks Register must be obtained from the Secretary of the Interior or the State Historic Preservation Officer. Any exemption from the requirements of Section 4-1500 will be the minimum necessary to preserve the historic character and design of the structure.
- (DD) **Utility Lines in the Floodplain.** Storm sewers, sanitary sewers, water lines and similar lines running generally parallel and perpendicular to the flow of the drainageway; and other public utility lines traversing a floodplain generally perpendicular to the flow of the drainageway.
- (EE) **Violation.** The failure of a structure or other development to be fully compliant with this Section 4-1500. A structure or other development

without a FEMA approved Elevation Certificate, other certifications, or other evidence of compliance required in this Section 4-1500 shall be presumed to be in violation until such time as that documentation is provided.

- (FF) **Watercourse.** 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 damage resulting from flooding may occur.

4-1504 Administration.

- (A) **Designation of Floodplain Administrator.** The Zoning Administrator, or his/her designee, shall administer and implement these regulations and is referred to herein as the Floodplain Administrator.
- (B) **Duties and Responsibilities of the Floodplain Administrator.** The Floodplain Administrator shall:
 - (1) Review all applications for development located within the FOD.
 - (2) Interpret FOD boundaries in accordance with Section 6-407 and provide available base flood elevation and flood hazard information.
 - (3) Review applications for development to determine whether proposed activities will be reasonably safe from flooding and meet the requirements of Section 4-1500.
 - (4) Review applications for reconstruction, rehabilitation, addition or other improvement of a structure to determine whether such proposed activities constitute substantial improvements.
 - (5) Review applications for development to determine whether all necessary permits have been obtained from the Federal, State or local agencies from which prior or concurrent approval is required; in particular, permits from state agencies for any construction, reconstruction, repair, or altering of a dam, reservoir, or waterway obstruction (including bridges, culverts, structures), any altering of a watercourse, or any change of the course, current, or cross section of a stream or body of water, including any change to the 100-year frequency floodplain of free-flowing non-tidal waters of the State.
 - (6) Verify that applicants proposing to alter a watercourse have notified affected adjacent towns, cities, county or state government, the Department of Conservation and Recreation (Division of Dam Safety and Floodplain Management), and other appropriate agencies (Virginia Department of Environmental Quality, United States Army Corps of Engineers) and have submitted copies of such notifications to FEMA.

- (7) Inspect or cause to be inspected, buildings, structures, and other development for which permits have been issued to determine compliance with Section 4-1500 or to determine if non-compliance has occurred or violations have been committed.
- (8) Review submitted FEMA Elevation Certificate applications and require incomplete or deficient applications to be corrected.
- (9) Submit to FEMA, or require applicants to submit to FEMA, data and information necessary to maintain FIRMs, including Floodplain Studies and Floodplain Alterations approved in accordance with the FSM, within six (6) months after such data and information becomes available if the analyses indicate changes in base flood elevations.
- (10) Maintain and permanently retain records that are necessary for the administration of the FOD, including:
 - (a) Flood Insurance Studies, Flood Insurance Rate Maps (including historic studies and maps and current effective studies and maps), and Letters of Map Change; and
 - (b) Documentation supporting approval or denial of development permits, Elevation Certificates, documentation of the elevation (in relation to the datum on the FIRM) to which structures have been floodproofed, other required design certifications, variations pursuant to Section 4-1511, and records of enforcement actions taken to correct violations of these regulations.
- (11) Enforce the provisions of these regulations, investigate violations, issue notices of violations or stop work orders, and require permit holders to take corrective action.
- (12) Advise the Board of Supervisors regarding the intent of these regulations and, for each application for a variation pursuant to Section 4-1511, prepare a staff report and recommendation.
- (13) Administer the requirements related to proposed work on existing buildings:
 - (a) Make determinations as to whether buildings and structures that are located in FOD (Major Floodplain only) and that are damaged by any cause have been substantially damaged.
 - (b) Make reasonable efforts to notify owners of substantially damaged structures of the need to obtain a permit to repair, rehabilitate, or reconstruct such damaged structures; and prohibit the non-compliant repair of substantially damaged buildings except for temporary emergency protective

measures necessary to secure a property or stabilize a building or structure to prevent additional damage.

- (14) Undertake, as determined appropriate by the Floodplain Administrator due to the circumstances, other actions which may include but are not limited to: issuing press releases, public service announcements, and other public information materials related to development permit requests and repair of damaged structures; coordinating with other Federal, State, and local agencies to assist with substantial damage determinations; providing owners of damaged structures information related to the proper repair of damaged structures in FOD; and provide property owners with information necessary to file claims for Increased Cost of Compliance coverage under the National Flood Insurance Program (NFIP) flood insurance policies.
 - (15) Notify FEMA when the corporate boundaries of the County have been modified and:
 - (a) Provide a map that clearly delineates the new corporate boundaries or the new area for which the authority to regulate pursuant to Section 4-1500 has either been assumed or relinquished through annexation or otherwise; and
 - (b) For any new area for which the authority to regulate pursuant to this Section 4-1500 has been assumed, prepare necessary amendments to the Zoning Map and appropriate requirements, and submit such amendments to the Board of Supervisors for adoption. A copy of the amended regulations shall be provided to Department of Conservation and Recreation (Division of Dam Safety and Floodplain Management) and FEMA.
 - (16) Upon the request of FEMA, complete and submit information regarding the number of buildings in the FOD (Major Floodplain only), number of approved permits for development in the FOD (Major Floodplain only), number of approved variations pursuant to Section 4-1511. Any variations that are approved shall be noted in the annual or biennial report submitted to FEMA's Federal Insurance Administrator.
 - (17) Serve as a referral agent on all legislative land development applications.
- (C) **Delineation of the FOD.** The original basis for the delineation of the FOD shall be the floodplain as shown on the Flood Insurance Study (FIS) and the Flood Insurance Rate Map (FIRM) for the County of Loudoun prepared by FEMA, Federal Insurance Administration, dated February 17, 2017. The boundaries of the floodplain and FOD may change based on

information submitted in accordance with this Chapter, and/or subsequent revisions or amendments to the FIS and FIRM approved by FEMA.

4-1505

Permitted Uses. The following uses shall be permitted within the FOD provided such uses conform with Section 5-1000. Uses allowed in the underlying district shall be prohibited to the extent such uses are not permitted, or special exception uses in the FOD. Where any uses, structures or improvements will result in development within the FOD, an application for a Floodplain Alteration shall be submitted in accordance with Section 4-1508(B) and the FSM.

- (A) Permitted uses in FOD (Major Floodplain). Such uses shall not cause any increases in base flood elevation of the FOD (Major Floodplain) unless otherwise provided below.
 - (1) Agriculture, horticulture, forestry, and fisheries, not requiring the erection of structures, except that incidental structures shall be permitted in accordance with this Section. An increase in base flood elevation may be permitted provided a CLOMR is obtained from FEMA prior to approval of the requisite Floodplain Alteration application for such use.
 - (2) Passive and Active Recreation Uses, except swimming pools, provided that the area of impervious surfaces within the FOD (Major Floodplain) does not exceed three percent (3%) of the area of FOD (Major Floodplain) located within the subject parcel and the boundary of the FOD (Major Floodplain) does not change.
 - (3) Stormwater management improvements as follows:
 - (a) Rooftop disconnection. Associated soil amendments shall be located outside of areas of existing tree cover and shall not require the clearing of existing tree cover.
 - (b) Sheet flow to conservation area.
 - (c) Sheet flow to vegetated filter and associated soil amendments located outside of areas of existing tree cover and not requiring the clearing of existing tree cover.
 - (d) Grass channel and associated soil amendments.
 - (e) Soil amendments located outside of areas of existing tree cover and not requiring the clearing of existing tree cover.
 - (f) Other stormwater management improvements provided that such improvements shall only serve permitted or approved special exception uses in the FOD, and shall only serve those portions of such uses that are located within the FOD.
 - (4) Utility lines in the floodplain and road crossings. An increase in base flood elevation on site may be permitted provided a CLOMR is

obtained from FEMA prior to approval of the requisite Floodplain Alteration application for such use. Road crossings shall be designed and constructed in accordance with the standards and regulations of the Virginia Department of Transportation (VDOT) and/or the FSM, whichever shall apply.

- (5) Public roads shown on the Comprehensive Plan or included in a Capital Improvement Program project. An increase in base flood elevation may be permitted provided a CLOMR is obtained from FEMA prior to approval of the requisite Floodplain Alteration application for such use.
- (6) Public roads, private roads, and driveways.
- (7) Repair, reconstruction or improvement of existing residences, so long as the footprint of the existing residence is not increased within the FOD and provided that such repair, reconstruction or improvement, whether located within or outside of the FOD, is not a substantial improvement. If such repair, reconstruction or improvement is a substantial improvement then conformance with Section 4-1509 shall be required.
- (8) Parking areas accessory to permitted or approved special exception uses in the FOD. All such parking areas shall be equipped with best management practices in accordance with Chapter 5 of the FSM and Chapter 1096 of the Codified Ordinances.
- (9) Incidental structures, not exceeding 840 square feet of floor area, associated with permitted or approved special exception uses in the FOD, and temporary structures associated with Special Events in the FOD. Incidental structures include storage sheds, maintenance sheds, backstops, bath houses and locker rooms. Provided, however, bulk storage of gasoline, chemicals, fuels or similar substances are prohibited in the FOD; and further provided that any new construction shall comply with applicable FEMA standards.
- (10) Temporary storage of material or equipment necessary in the construction of permitted or special exception uses in the FOD.
- (11) Alterations of the floodplain associated with any permitted or approved special exception uses in the FOD. Such alterations shall not relocate or alter the natural active channel except for road crossings permitted under Section 4-1505(A)(4) or Section 4-1505(A)(13), to protect existing habitable structures subject to periodic flooding, or for stream restoration permitted under Section 4-1505(A)(16). Applications for alterations of the floodplain shall be in accordance with Section 4-1508(B). To the extent that the boundaries of the FOD change as a result of an approved Floodplain Alteration, any areas no longer within the FOD may be used for any use in the underlying zoning district,

subject to the provisions of the applicable zoning district regulations and conditions of any approved special exception.

- (12) Restoration and rehabilitation of historic structures.
- (13) Road crossings that result in an increase in the base flood elevation off-site provided that:
 - (a) A CLOMR is obtained from FEMA prior to approval of the requisite Floodplain Alteration application for such use.
 - (b) The road crossing shall be a feature shown on the Comprehensive Plan or included in a Capital Improvements Program project.
 - (c) The road crossing shall be designed and constructed in accordance with the standards and regulations of the Virginia Department of Transportation and/or the FSM, whichever shall apply.
 - (d) The resulting increase in the base flood elevation shall not affect existing buildings and structures.
 - (e) Affected off-site property owners may at any time mitigate impacts on their land as a result of an increase in the base flood elevation by:
 - (i) Submitting a Floodplain Alteration to reclaim that portion of their land subject to the increase in base flood elevation as a result of the road crossing, provided there is no increase in the base flood elevation; and/or
 - (ii) Requesting a modification of the building setback or parking setback requirements on specific lots or parcels of land affected by the increase in the base flood elevation by special exception approved by the Board of Supervisors, in accordance with Section 6-1300 and 4-1507 of the Zoning Ordinance.
- (14) Public water utility drinking water supply reservoirs, including, without limitation, reclaimed quarries.
- (15) Maintenance of the design conditions of an approved Floodplain Alteration.
- (16) Stream Restoration designed in accordance with the FSM and approved by the County. An increase in base flood elevation may be permitted provided a CLOMR is obtained from FEMA prior to approval of the requisite Floodplain Alteration application for such use.

- (17) Wetland Mitigation. An increase in base flood elevation may be permitted provided a CLOMR is obtained from FEMA prior to approval of the requisite Floodplain Alteration application for such use.
 - (18) Flood mitigation practices carried out in order to minimize and reduce flood risk in accordance with the Code of Federal Regulations, Title 44, Section 78.1, et seq.
 - (19) Special Events, pursuant to 5-500(C), without land disturbing activity.
- (B) Permitted uses in floodplains in FOD (Minor Floodplain), with or without an increase in base flood elevation:
- (1) Uses allowed under Section 4-1505(A), except that increases in the base flood elevation in the FOD (Minor Floodplain) shall be permitted.
 - (2) Alteration of the floodplain whether or not associated with a permitted or approved special exception use in the FOD. To the extent that the boundaries of the FOD change as a result of the Floodplain Alteration, any areas no longer within the FOD may be used for any use in the underlying zoning district, subject to the provisions of the applicable zoning district regulations and conditions of any approved special exception.
 - (3) Stormwater management improvements whether or not associated with permitted or approved special exception uses in the FOD.
 - (4) Ponds designed by the Natural Resources Conservation Service, a Licensed Professional Engineer, or a Class B Land Surveyor.
 - (5) Basketball or tennis courts, and swimming pools.
 - (6) Parking areas less than 5,000 square feet not otherwise permitted. Such parking areas shall not be subject to 100-year flooding greater than one (1) foot in depth, shall be equipped with best management practices in accordance with Chapter 5 of the FSM and Chapter 1096 of the Codified Ordinances, and shall not result in any change in existing grade.

4-1506

Special Exception Uses. The following uses and structures may be permitted in the FOD (Major Floodplain or Minor Floodplain) by the Board of Supervisors by special exception, subject to Section 6-1300 and Section 4-1507, provided that such uses conform with Section 5-1000 and such uses shall not cause any increase in the base flood elevation of the FOD (Major Floodplain) unless otherwise provided below. Uses allowed in the underlying district shall be prohibited to the extent such uses are not permitted or special exception uses in the FOD. Where any uses, structures or improvements will result in development within the FOD,

an application for a Floodplain Alteration shall be submitted in accordance with Section 4-1508(B) and the FSM.

- (A) Marinas, boat rentals, docks, piers, wharves, water ski jump facilities.
- (B) Special Events, pursuant to 5-500(C), with land disturbing activity.
- (C) Riding stables.
- (D) Structures required for the operation of a public utility not otherwise permitted by this Ordinance.
- (E) Incidental structures, greater than 840 square feet of floor area, associated with permitted or approved special exception uses in the FOD. Incidental structures include storage sheds, maintenance sheds, backstops, bath houses and locker rooms. Provided, however, bulk storage of gasoline, chemicals, fuels or similar substances are prohibited in the FOD; and further provided that any new construction shall comply with applicable FEMA standards.
- (F) Passive and Active Recreation Uses, except swimming pools, provided that the area of impervious surfaces within the FOD (Major Floodplain) does not exceed ten percent (10%) of the area of FOD (Major Floodplain) located within the subject parcel, that cause the boundary of the FOD (Major Floodplain) to change, and/or that cause an increase in base flood elevation. Such increase in base flood elevation may be permitted provided a CLOMR is obtained from FEMA prior to approval of the requisite Floodplain Alteration application for such use.

4-1507

Standards For A Special Exception. In considering applications for a special exception, the Board of Supervisors shall be satisfied that the following standards and those of Section 6-1300 have been met:

- (A) The proposed use will not increase the danger to life and property due to increased flood heights or velocities.
- (B) The proposed use will not increase the danger that materials may be swept downstream to the injury of others.
- (C) The proposed water supply and sanitation systems are designed to prevent disease, contamination, and unsanitary conditions.
- (D) The proposed use or structure shall be located and designed to limit its susceptibility to flood damage, and available alternative locations, not subject to flooding, for the proposed use shall be considered.
- (E) The proposed use is compatible with existing and planned development.
- (F) The proposed use is in harmony with the Comprehensive Plan.

- (G) The expected heights, velocity, duration, rate of rise and sediment transport of the flood waters expected at the site shall not cause significant damage.

4-1508

Floodplain Overlay District Development Procedures.

- (A) **Floodplain Information to be Submitted with Land Development Applications.** All new subdivision proposals and other proposed development greater than fifty (50) lots or five (5) acres, whichever is the lesser, on any parcel of land which includes FOD within its boundaries, shall include with such proposals base flood elevation data in accordance with Chapter 5 of the FSM. The submission of such base flood elevation data shall be considered a request for a cartographic interpretation pursuant to Section 6-407, to interpret the exact location of the boundaries of the FOD based on such data.
- (B) **Floodplain Alteration.** Any proposed development in the FOD shall require approval of a Declaration of No Impact to Floodplain or Floodplain Alteration in accordance with Chapter 5 of the FSM. Any required Floodplain Alteration shall conform with the following:
 - (1) **Procedures for Floodplain Alterations.** Applications for Floodplain Alterations shall be in accordance with Chapters 5 and 8 of the FSM and conform with the following procedures:
 - (a) An approved CLOMR from FEMA shall be provided prior to approval of a Floodplain Alteration that proposes any increase in the base flood elevation within the FOD (Major Floodplain).
 - (b) Floodplain Alterations that would result in changes to the boundaries of the FOD shall be subject to the following:
 - (i) The application for such Floodplain Alteration shall be considered a request for a cartographic interpretation pursuant to Section 6-407 to interpret the exact location of the boundaries of the FOD upon approval of the Floodplain Alteration.
 - (ii) Prior to approval of a Floodplain Alteration that would result in any increase in the base flood elevation off-site or other changes to the boundaries of the FOD off-site, an instrument describing the change in the base flood elevation executed by each affected property owner shall be recorded among the land records of Loudoun County, Virginia.
 - (2) **Engineering and Environmental Criteria for Floodplain Alterations.** All proposed alterations to the floodplain shall meet the following criteria:

- (a) Alterations to the floodplain shall not create erosive water velocity on-site or off-site (where erosive water velocity is based on analysis of the surface material and permissible velocities for specific cross sections affected by the proposed alteration,), and the mean velocity of stream flow at the downstream end of the site after alteration shall be no greater than the mean velocity of the stream flow under existing conditions.
 - (b) Alterations to the floodplain shall be in conformance with Chapter 1220 of the Codified Ordinances of Loudoun County and the Erosion and Sediment Control Law, Va. Code Section 62.1-44.15:51 et seq.
 - (c) The flood carrying capacity within the altered floodplain shall be maintained.
- (C) **Zoning Permit Required.** All development occurring within the FOD (Major Floodplain), including placement of manufactured homes, shall be undertaken only upon the approval of a zoning permit. The following provisions shall apply to all such zoning permits:
- (1) In addition to the requirements of Section 6-1001, the application for such zoning permit shall include the following:
 - (a) Copies of all necessary permits from Federal, State, or local agencies from which prior or concurrent approval is required.
 - (b) The base flood elevation.
 - (c) The elevation of the lowest floor (including basement).
 - (d) For a structure to be flood-proofed (non-residential only), the elevation to which the structure will be flood-proofed.
 - (e) Topographic information showing existing and proposed ground elevations.

4-1509

Floodplain Overlay District Development Standards:

- (A) **General Development Standards.** The following provisions shall apply to development located in the FOD (Major Floodplain):
- (1) **Residential Construction.** New construction or substantial improvement of any residential structure (including manufactured homes) shall have the lowest floor, including basement, elevated to or above (one (1) foot freeboard recommended) the base flood elevation.
 - (2) **Non-Residential Construction.** New construction or substantial improvement of any commercial, industrial, or non-residential building (including manufactured homes) shall have the lowest floor, including basement, elevated to or above the base flood

elevation. Non-residential buildings may be flood-proofed in lieu of being elevated provided that all areas of the building components lower than one (1) foot above the base flood elevation are water tight with walls 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 licensed professional engineer or architect shall certify that the standards of this subsection are satisfied. Such certification, including the base flood elevation to which such structures are floodproofed, shall be retained by Floodplain Administrator.

- (3) All new construction and substantial improvements (including manufactured homes) shall be in accordance with all applicable sections of this Ordinance, the FSM, and Chapter 1410 of the Codified Ordinances, and anchored to prevent flotation, collapse or lateral movement of the structure.
- (4) Newly placed manufactured homes and/or substantial improvements to manufactured homes shall meet all applicable State anchoring requirements for resisting wind forces and 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.
- (5) All new construction and substantial improvements (including manufactured homes) shall be constructed with materials and utility equipment resistant to flood damage.
- (6) All new construction or substantial improvements (including manufactured homes) shall be constructed by methods and practices that minimize flood damage.
- (7) 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.
- (8) New and replacement public and individual water supply systems shall be designed to minimize or eliminate infiltration of flood waters into the system.
- (9) New and replacement public sewer systems shall be designed to minimize or eliminate infiltration of flood waters into the systems and discharges from the systems into flood waters.
- (10) Individual sewage disposal systems shall be located and constructed to avoid impairment to them or contamination from them during flooding.

- (11) Prior to the approval of a Floodplain Alteration for any proposed alteration or relocation of any channel or watercourse, all required permits shall be obtained from the U. S. Army 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 agencies). The applicant shall provide notification of such alteration or relocation to the Department of Conservation and Recreation (Division of Dam Safety and Floodplain Management) and FEMA. If such alteration or relocation results in a change to the floodplain in an adjacent town, city, county, or state, notification shall also be provided by the applicant to such jurisdiction.
 - (12) The flood carrying capacity within an altered or relocated portion of any channel or watercourse shall be maintained. Under no circumstances shall any development adversely affect the water carrying capacity of any channel or watercourse.
- (B) **Space Below the Lowest Floor.** In FOD (Major Floodplain), fully enclosed areas, of new construction or substantially improved structures, which are below the base flood elevation shall meet the following minimum standards:
- (1) Such areas shall not be designed or used for human habitation. Such areas shall only be used for parking of vehicles, building access, or limited storage of maintenance equipment used in connection with the premises. Access to such areas 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) Such areas shall be constructed entirely of flood resistant materials below the base flood elevation.
 - (3) Such areas shall include measures to automatically equalize hydrostatic flood forces on walls by allowing for the entry and exit of floodwaters that are either certified by a licensed professional engineer or architect or that meet the following minimum design criteria:
 - (a) Provide a minimum of two (2) openings on different sides of each enclosed area. Foundation enclosures made of flexible skirting are not considered enclosed areas for regulatory purposes, and, therefore, do not require openings. Masonry or wood underpinning, regardless of structural status, are considered as enclosed areas and require such openings.
 - (b) The total net area of all openings must be at least one (1) square inch for each square foot of enclosed area subject to flooding.

- (c) If a building has more than one (1) enclosed area, each area must have openings to allow floodwaters to automatically enter and exit.
 - (d) The bottom of all required openings to such enclosed areas shall be no higher than one (1) foot above the adjacent grade.
 - (e) Openings shall only be equipped with screens, louvers, or other opening coverings or devices that permit the automatic flow of floodwaters in both directions.
- (C) **Standards for Recreational Vehicles.** The following provisions shall apply to recreational vehicles located within the FOD (Major Floodplain):
- (1) Any recreational vehicles placed on a site shall be fully licensed, on its wheels or jacking system, and attached to the site only by quick disconnect type utilities and security devices, and shall have no permanently attached additions; or
 - (2) Recreational vehicles placed on a site for 180 days or longer shall be deemed to be manufactured homes and shall meet all development standards of Section 4-1509(A) and 4-1509(B).
- (D) **Standards for Subdivision Proposals.** The following provisions shall be required for any subdivision of a parcel that includes FOD (Major Floodplain):
- (1) All subdivision proposals shall be consistent with the need to minimize flood damage.
 - (2) All subdivision proposals that have public utilities and facilities, such as sewer, gas, electrical and water systems, shall have such utilities and facilities located and constructed to minimize flood damage.
 - (3) All subdivision proposals shall have adequate drainage provided to reduce exposure to flood hazards.

4-1510 Density Calculations. For purposes of calculating the permitted floor area and number of residential units in the underlying zoning district, the land area in any portion of the FOD shall be included as part of the land area for such calculations.

4-1511 Variations.

- (A) **Authority.** Pursuant to Code of Federal Regulations 44CFR60.6, the Board of Supervisors may approve a variation of the standards of Sections 4-1509(A), (B), and (C) for any proposed development within the FOD (Major Floodplain) in the instances as set forth below. Requests for approval of a variation of the standards of Sections 4-1509(A), (B), and (C) shall be made in accordance with the procedures for a Minor Special Exception application as set forth in Section 6-1300, except that the issues

for consideration shall be as set forth in Section 4-1511(B). No variation shall be approved for any proposed development within the FOD (Major Floodplain) that will cause any increase in the base flood elevation of the FOD (Major Floodplain).

- (1) New construction and substantial improvements to be erected on a lot of one-half acre or less in size contiguous to and surrounded by lots with existing structures constructed below the base flood elevation provided that such new construction or substantial improvement is protected by methods that minimize flood damages during the base flood and creates no additional threats to public safety.
 - (2) Repair or rehabilitation of historic structures provided that such repair or rehabilitation shall not preclude the structure's continued designation as a historic structure and the variation is the minimum necessary to preserve the historic character and design of the structure.
- (B) **Application for a Variation of the Standards of Sections 4-1509(A), (B), and (C).** Any person owning property, or having a possessory or contract interest in property and the consent of the owner, may file an application for variation of the standards of Sections 4-1509(A), (B), and (C) in regard to such property with the Floodplain Administrator. The application shall contain the following information and such additional information as required by Section 6-403:
- (1) The particular standards of Sections 4-1509(A), (B), and (C) that prevent the proposed construction on, or use of, the property.
 - (2) The existing zoning of the property, including any previously approved modifications, conditions, or proffers.
 - (3) The special conditions, circumstances or characteristics of the land, building or structure that prevent the use of the land in compliance with the standards of Sections 4-1509(A), (B), and (C).
 - (4) The particular hardship that would result if the specified standards of Sections 4-1509(A), (B), and (C) were to be applied to the property.
 - (5) The extent to which it would be necessary to vary the standards of Sections 4-1509(A), (B), and (C) in order to permit the proposed construction on, or use of, the property.
 - (6) An explanation of how the requested variation conforms to each of the applicable standards set out in Section 4-1511(D).
- (C) **Issues for Consideration.** In considering an application for a variation of the standards of Sections 4-1509(A), (B), and (C), the following factors shall be given reasonable consideration:

- (1) The danger to life and property due to increased flood heights or velocities caused by encroachments.
 - (2) The danger that materials may be swept on to other lands or downstream to the injury of others.
 - (3) The proposed water supply and sanitation systems and the ability of these systems to prevent disease, contamination, and unsanitary conditions.
 - (4) The susceptibility of the proposed facility and its contents to flood damage and the effect of such damage on the individual owners.
 - (5) The importance of the services provided by the proposed facility to the community.
 - (6) The requirements of the facility for a waterfront location.
 - (7) The availability of alternative locations not subject to flooding for the proposed use.
 - (8) The compatibility of the proposed use with existing development and development anticipated in the foreseeable future.
 - (9) The relationship of the proposed use to the comprehensive plan and floodplain management program for the area.
 - (10) The safety of access by ordinary and emergency vehicles to the property in time of flood.
 - (11) The expected heights, velocity, duration, rate of rise, and sediment transport of the flood waters expected at the site.
 - (12) The historic nature of a structure.
 - (13) Such other factors which are relevant to the purposes of this ordinance.
- (D) **Decision on Application for Variation of the Standards of Sections 4-1509(A), (B), and (C).** No such variation of the standards of Sections 4-1509(A), (B), and (C) shall be approved by the Board of Supervisors unless all of the following findings are made:
- (1) The applicant has demonstrated good and sufficient cause.
 - (2) Failure to grant the variation of the standards of Sections 4-1509(A), (B), and (C) would result in exceptional hardship to the applicant.
 - (3) Granting of such variation of the standards of Sections 4-1509(A), (B), and (C) will not result in:

- (a) any increase in base flood elevation of the FOD (Major Floodplain);
 - (b) additional threats to public safety;
 - (c) extraordinary public expense;
 - (d) the creation of nuisances;
 - (e) fraud or victimization of the public; or
 - (f) conflicts with other local laws or ordinances.
- (4) The variation of the standards of Sections 4-1509(A), (B), and (C) is the minimum required to provide relief.
- (E) **Notice of Approval.** Upon approval of a variation of the standards of Sections 4-1509(A), (B), and (C), the Floodplain Administrator shall notify the applicant of such approval, in writing, and that development in accordance with the approved variation may increase the risks to life and property and may result in increased premium rates for flood insurance.

Grant Application Summary Form

Bull Run Watershed Management Plan

Basic Information

Name of grant: Community Flood Preparedness Fund Grant (CFPF) Dept. name: General Services

Dept. Head signature Ernest N. Brown Digitally signed by Ernest N. Brown
Date: 2023.10.06 16:58:17 -04'00' Date 06OCT2023

Name of grant program manager/staff contact: Dennis Cumbie Ext. 8699

Amount of grant funding \$250,000 Grant application due by: 11/12/2023

Grantor: VA DCR State Federal Grant Type: New Continuation

Local match required?: yes no Type and amount of local match: \$250,000 cash in-kind

Describe the authorized uses of funds: (Salary & benefits, Supplies, Contractual Services Travel, Other)
Development of a Watershed Management plan for the Bull Run Watershed.

Local match funds available in existing department appropriations: yes, index code
106421 (C00003) and 106420 (N02002)

Does this grant involve the receipt or purchase of equipment? yes no

If so, briefly describe: _____

Grant time period: 1/01/2024 to 01/01/26

Are there any provisions to renew beyond this time period? yes no

If yes, what are they and how will they be funded? The grant period can be extended if approved by DCR..

Are there any special conditions or provisions related to "maintenance of effort" (conditions or provisions that require the County to maintain this program after grantor funding is no longer available? yes no

If yes, what are they? The watershed management plan will be a living document and can be updated as changes in the watershed occur or better data becomes available in the future.

Are there any other special conditions or provisions? yes no

If yes, what are they? _____

of FTE funded through the grant: 0 Preliminary job classifications: _____

Grant Program Information

Brief narrative of program to be provided using grant funds: This grant and matching funds will go toward the development of a Watershed Management Plan for the Bull Run Watershed. The Plan will be used by DGS to identify local TMDL projects and to implement the watershed management item in the Environment and Energy Work Plan. This effort would build upon a successful citizen and Environmental Commission led effort to expand watershed management planning in the County and includes a significant public outreach component.

Is this grant an expansion of an existing program, if so what index codes are associated? No If this is a new grant, identify the program code/ user code where the new index codes will be setup. _____

How does this program fit in the context of your department's management plan? By helping to achieve required nutrient reductions within the MS4 Permit. Meeting the goals of the Environmental Commission as represented in the new Watershed Management Plan item in the Environment and Energy Work Plan approved by the Board of Supervisors on September 5, 2023.

Is this (or a similar) program provided by any other County or school agency? _____yes ____No ____no

Impact on and Need for Resources

How will the grant program manager's workload be affected by this grant? This will be one additional project to track. However, implementation of the grant will be done by General Services staff.

What staff in other departments will be needed to implement or support this program?

Have you contacted those departments to discuss this grant? _____yes ____NA ____no

Is your existing office space sufficient to accommodate the new staff? _____yes ____no

Will additional office space be needed? _____yes ____x____no

If yes, how much office space? _____

Will you need any reconfiguration of existing office space? _____yes ____x____no

Will any new or additional systems furniture be needed: _____yes ____X____no

Will a County vehicle be needed: _____yes ____x____no If yes, how often? _____

What new or additional office equipment or furniture is needed? _____none ____x____

How many new telephones and/or phone lines are needed? _____none ____x____

What additional computer hardware or software will be needed? _____none ____x____

Will the hardware or software be supplied through the grant? _____yes ____x____no

If yes, will the hardware/software be updated/replaced (using grant funds) as needed or required? ____yes ____no


Will any reconfiguration of existing computer hardware be needed? _____yes ____x____no

Will any of the following be needed: Mainframe access? _____yes ____X____no
E-mail? _____yes ____x____no
Voicemail? _____yes ____x____no

Do not write in this space

Budget Analyst Recommendation: approve _____disapprove

Budget Analyst Comments: Confirmed no concerns from Stormwater Capital Budget Analyst (Chris Hetland).

Budget Analyst Signature:  Date: October 19, 2023

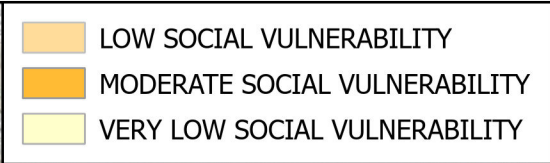
Grants Analyst Recommendation: approve _____disapprove X

Grants Analyst Comments: _____

Grants Analyst Signature: Barb Lawrence Date: 10/20/23

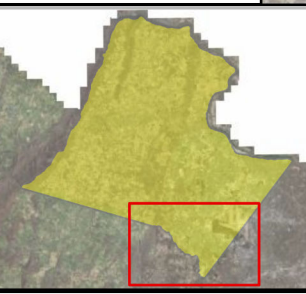
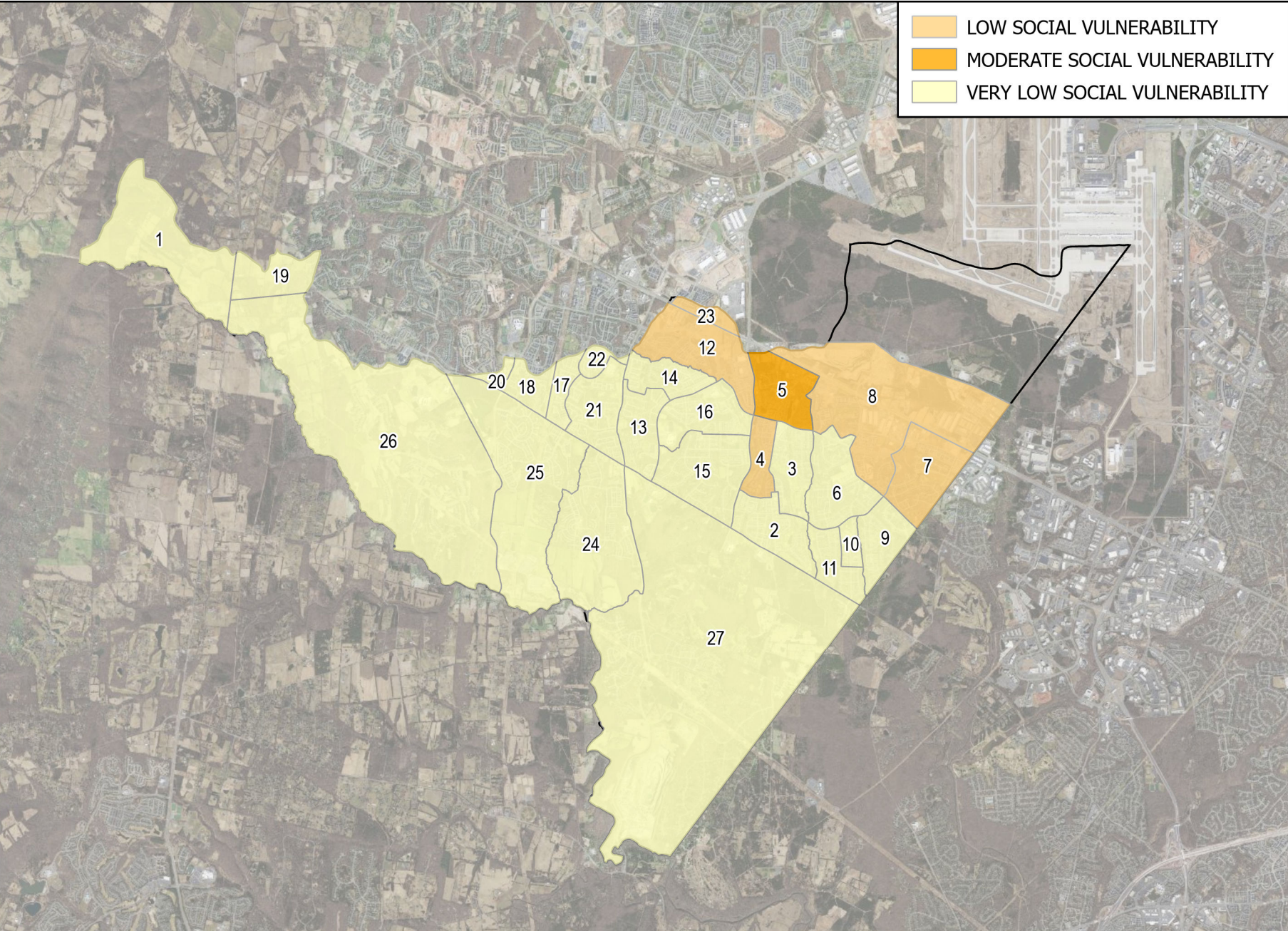
County Administrator Decision: approve _____disapprove

County Administrator Signature: _____ Date: _____



SOCIAL VULNERABILITY SCORE

1.	-1.36
2.	-1.47
3.	-1.09
4.	-0.96
5.	0.63
6.	-1.51
7.	-0.88
8.	-0.06
9.	-1.36
10.	-1.41
11.	-1.81
12.	-0.73
13.	-1.31
14.	-1.45
15.	-1.44
16.	-1.47
17.	-1.38
18.	-1.51
19.	-1.65
20.	-1.51
21.	-1.33
22.	-1.47
23.	-0.67
24.	-1.51
25.	-1.16
26.	-1.30
27.	-1.31



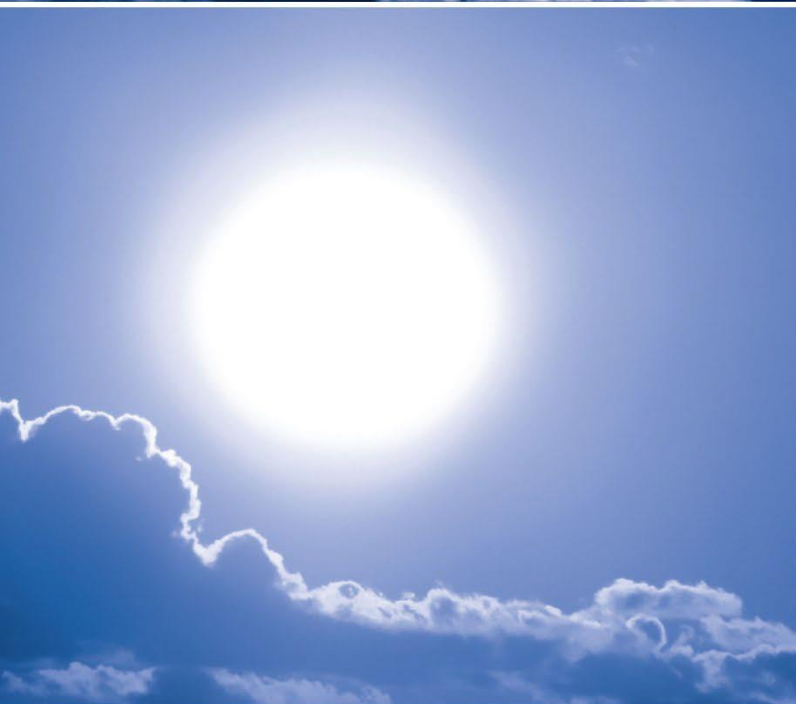
**BULL RUN WATERSHED
SOCIAL VULNERABILITY INDEX**

Loudoun County
VIRGINIA



Aerial Data Source:VDOT Spatial Intelligence Group, Virginia Geographic Information Network (VGIN)

Coordinate System: NAD 1983 StatePlane Virginia North FIPS 4501 Feet



Northern Virginia Hazard Mitigation Plan
Annex 8: Loudoun County

November 2022— FINAL



Loudoun County Overview

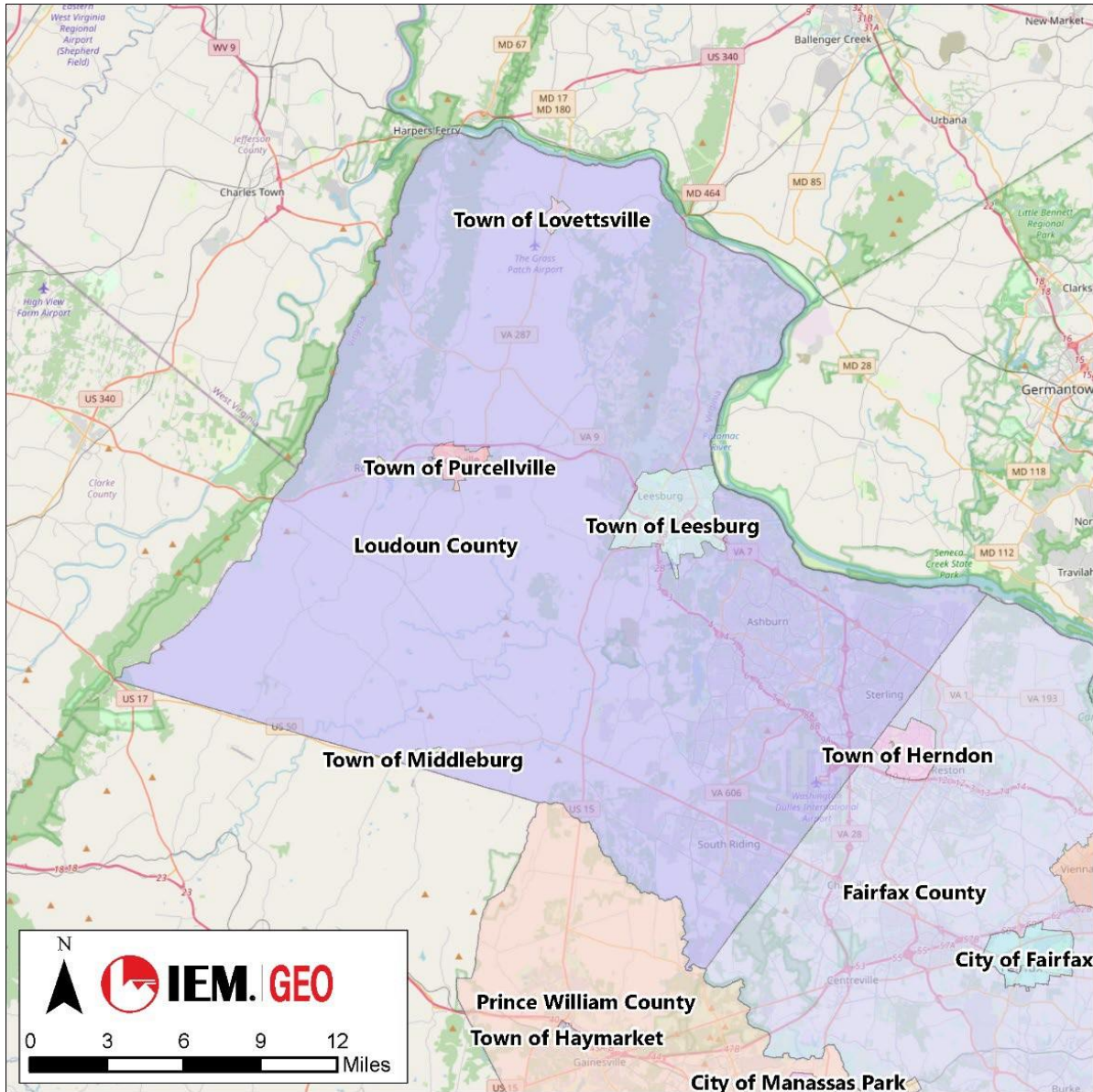








Table 1: Specific Jurisdictional Data

 ESTABLISHED	 LAND AREA	 2020 POPULATION	 GOVERNMENT ADDRESS	 HOUSEHOLDS	 MITIGATION FOCUS
1757	520 sq. mi.	421,636	1 Harrison St. Leesburg, VA 201745	142,074	Flood and Severe Storms

Loudoun County’s Risk Environment

The following is a snapshot of the details in this annex. The well-researched details form the basis of effective mitigation strategies to improve community resilience.

Hazard Event History

National Centers for Environmental Information (NCEI), 1950–June 2021

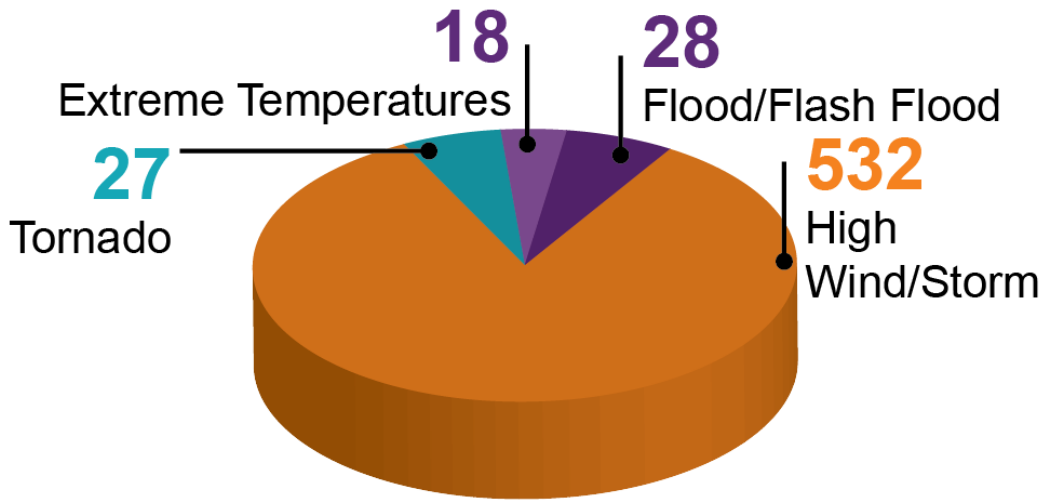


Figure 1: Number of Hazards

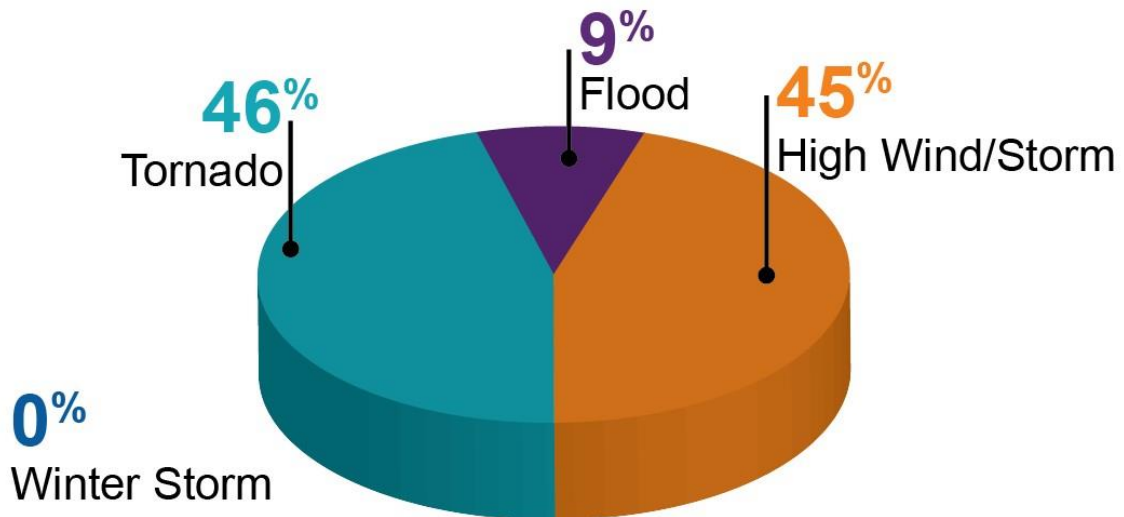


Figure 2: Property Damage Percentages from Natural Hazard Events

Natural Hazard Risk Ranking

Table 2: Natural Hazard Risk Ranking Summary

Hazard	Hazard Ranking
Winter Weather	High
High Wind/Severe Storm	High
Flood	High
Tornado	High
Dam Failure	Medium
Drought	Medium
Extreme Temperatures	Medium
Earthquake	Medium
Landslide	Low
Wildfire	Low
Karst/Sinkhole/Land Subsidence	Low

Community Lifelines and Respective Critical Assets

Table 3: Number of Critical Assets for Community Lifelines/Sectors

Lifeline/Sector	Number of Assets
Safety and Security	28
Food, Water, Shelter	59
Health and Medical	19
Energy	14
Communications	56
Transportation	922
Hazardous Materials	437
Education	146
Cultural/Historical	22
High Hazard Dams	23

A lifeline enables the continuous operation of government and business functions that are critical for human health, safety, or economic security. Lifelines are the most fundamental services for a community that, when stabilized, enable all other aspects of society to function. These lifelines are assets that may be a facility, infrastructure, operation, or entity. The information related to Community Lifelines and critical assets in Loudoun County is primarily provided by Hazus (Version 4.2). Due to the time lag in collecting and verifying data and the method of documenting location and jurisdiction used in Hazus, this may not reflect the current inventory maintained by Loudoun County. Further information about Community Lifelines is discussed in Section 1.4 of this document.



Figure 3: Community Lifeline Components

Community Lifelines Outlined

- **Safety and Security:** Law Enforcement/Security, Fire Service, Search and Rescue, Government Service, Community Safety
- **Food, Water, Shelter:** Food, Water, Shelter, Agriculture
- **Health and Medical:** Medical Care, Public Health, Patient Movement, Medical Supply Chain, Fatality Management
- **Energy:** Power Grid, Fuel
- **Communications:** Infrastructure, Responder Communications, Alerts Warnings and Messages, Finance, 911 and Dispatch
- **Transportation:** Highway/Roadway/Motor Vehicle, Mass Transit, Railway, Aviation, Maritime
- **Hazardous Materials:** Facilities, HAZMAT, Pollutants, Contaminants

Mitigation Capabilities Summary

Table 4: Capability Assessment Summary Ranking for Loudoun County

Capability	Ranking
Planning and Regulatory	High
Administrative and Technical	High
Safe Growth	High
Financial	Moderate
Education and Outreach	Moderate

Hazard Mitigation Plan Points of Contact

Table 5: Points of Contact Information

Contact Type	Contact Information
Primary Point of Contact	Kelly Myers, Assistant Coordinator–Planning Division Loudoun County Office of Emergency Management 703-771-5788–TTY 711 Kelly.Myers@loudoun.gov 801 Sycolin Road, SE Suite 100 Leesburg, VA 20175
Secondary Point of Contact	Jeff Fletcher, Deputy Coordinator 703-771-5788–TTY 711 Jeff.Fletcher@loudoun.gov 801 Sycolin Road, SE Suite 100 Leesburg, VA 20175

Loudoun County

This annex presents the following jurisdiction-specific information provided by Loudoun County for the 2022 update to the *Northern Virginia Hazard Mitigation Plan (NOVA HMP)*.

Table of Contents

- Loudoun County Overview i**
 - Loudoun County’s Risk Environment ii**
 - Hazard Event History ii
 - Natural Hazard Risk Ranking iii
 - Community Lifelines and Respective Critical Assets iii
 - Community Lifelines Outlined iv
 - Mitigation Capabilities Summary v
 - Hazard Mitigation Plan Points of Contact v**
 - Loudoun County vi**
- List of Tables viii**
- List of Figures..... ix**
- 1. Jurisdiction Profile..... 1**
 - 1.1. Location..... 1**
 - 1.2. History 1**
 - 1.2.1. Loudoun Settlements..... 1
 - 1.3. Demographics, Economy, and Governance 2**
 - 1.4. Built Environment and Community Lifelines..... 5**
 - 1.4.1. Safety and Security 6
 - 1.4.2. Food, Water, Shelter..... 6
 - 1.4.3. Health and Medical 6
 - 1.4.4. Energy 6
 - 1.4.5. Communications 6
 - 1.4.6. Transportation 7
 - 1.4.7. Hazardous Materials..... 8
 - 1.4.8. Education..... 8
 - 1.4.9. Recreational, Cultural, and Historic Sites and Assets..... 9
 - 1.5. Growth and Development Trends 12**
- 2. Jurisdiction Planning Process 14**
 - 2.1. Public Participation 17**
- 3. Jurisdiction-Specific Hazard Event History 18**
- 4. Hazard Risk Ranking..... 20**
 - 4.1. Additional Hazard Risk Considerations 21**
 - 4.1.1. National Risk Index..... 21
 - 4.1.2. Dam Failure 22
 - 4.1.3. Flood/Flash Flood 25
 - 4.1.4. High Wind/Severe Storm 26

4.1.5. Winter Weather	27
5. Vulnerability Assessment	28
5.1. National Flood Insurance Program.....	28
5.2. Population	30
5.3. Built Environment.....	33
5.4. Community Lifelines and Assets	33
5.5. Environment.....	35
5.6. Economy	35
5.7. Cultural/Historical.....	35
6. Capability Assessment.....	39
6.1. Capability Assessment Summary Ranking and Gap Analysis	39
6.1.1. Planning and Regulatory Capabilities Summary	41
6.1.2. Administrative and Technical Capabilities Summary	41
6.1.3. Safe Growth Capabilities Summary	42
6.1.4. Financial Capabilities Summary	42
6.1.5. Education and Outreach Capabilities Summary.....	43
6.2. Capability Summary – Activities that Reduce Natural Hazard Risk or Impacts.....	43
7. Resilience to Hazards	45
7.1. Community Resilience Estimate	46
7.2. New Hazard Risk Challenges or Obstacles.....	47
8. Mitigation Actions	48
8.1. Goals and Objectives	48
8.2. Status of Previous Actions.....	48
8.3. New Mitigation Actions	48
8.4. Action Plan for Implementation and Integration	48
9. Annex Maintenance Procedures	51
9.1. Maintenance of the Jurisdiction Annex	51
9.1.1. Plan Maintenance Schedule.....	51
10. Annex Adoption	53
11. Loudoun County Attachments.....	54
11.1. Attachment 1: Adoption Resolution	55
11.2. Attachment 2: Planning Worksheets and Documentation	56
Capability Assessment	56
National Flood Insurance Program (NFIP) Survey Form	68
11.3. Attachment 3: Documentation of Public Participation	70
11.4. Attachment 4: Mitigation Actions	73

List of Tables

Table 1: Specific Jurisdictional Data	i
Table 2: Natural Hazard Risk Ranking Summary	iii
Table 3: Number of Critical Assets for Community Lifelines/Sectors.....	iii
Table 4: Capability Assessment Summary Ranking for Loudoun County	v
Table 5: Points of Contact Information.....	v
Table 6: Population and Growth Rate	3
Table 7: Economic Data	3
Table 8: Urban County Executive Governance.....	4
Table 9: Number of Community Lifelines and Critical Assets in Loudoun County.....	5
Table 10: Quick Stats–The Loudoun County School District.....	9
Table 11: Loudoun County Population Estimates through 2045 by Subregions.....	13
Table 12: Local Planning Participants.....	14
Table 13: Schedule of Jurisdiction Meetings	16
Table 14: Federal Disaster and Emergency Declarations (2017–2021), Loudoun County	18
Table 15: Significant Hazard Events Identified by Loudoun County, 2017–2021	18
Table 16: Hazard Risk Ranking Summary: Natural Hazards	20
Table 17: Hazard Risk Ranking Summary: Non-Natural Hazards	21
Table 18: State-Regulated High Hazard Dams in Loudoun County, as of May 2021.....	23
Table 19: Flood/Flash Flood Events in Loudoun County, 1950–May 31, 2021	26
Table 20: High Wind/Severe Storm Events in Loudoun County, 1950–June 30, 2021	26
Table 21: Severe Winter Storm Events in Loudoun County, 1950–June 30, 2021	27
Table 22: National Flood Insurance Program Status, Loudoun County.....	28
Table 23: NFIP Status, Insurance Summary, as of September 14, 2021	28
Table 24: NFIP Status, Staff Resources, as of September 14, 2021.....	29
Table 25: NFIP Status, Compliance History, as of September 14, 2021	29
Table 26: Building Stock Exposure by General Occupancy	33
Table 27: Vulnerable Community Lifeline Assets (in Thousands of Dollars)	33
Table 28: Critical Facilities Exposed to FEMA Floodplains, Loudoun County	34
Table 29: Direct Economic Losses Related to Earthquake, Flood, and Hurricane Wind.....	35
Table 30: Significant Historical and Cultural Landmarks	35
Table 31: Loudoun County Critical Assets Located in FEMA Identified Floodplains	36
Table 32: Capability Assessment Summary Ranking for Loudoun County	41
Table 33: Capability Summary – Activities that Reduce Natural Hazard Risk or Impacts	43
Table 34: Comparison of Loudoun County Scores with Virginia and National Average	45
Table 35: Loudoun County Risk Ranking	45
Table 36: Action Plan for Implementation and Integration, Loudoun County.....	49
Table 37: Loudoun County Plan Maintenance Responsibilities for the <i>Northern Virginia Hazard Mitigation Plan</i> , 2022 NOVA HMP Base Plan	51
Table 38: Loudoun County Jurisdiction Annex Maintenance Procedure	52
Table 39: Previous Mitigation Actions.....	73
Table 40: Non-Natural Hazard Mitigation Actions for County and Participants	79

List of Figures

Figure 1: Number of Hazards.....	ii
Figure 2: Property Damage Percentages from Natural Hazard Events.....	ii
Figure 3: Community Lifeline Components.....	iv
Figure 4: Race and Ethnicity Demographics.....	3
Figure 5: Loudoun County Road and Town Map.....	7
Figure 6: Loudoun County Historic Districts.....	11
Figure 7: Loudoun County Comprehensive Plan.....	13
Figure 8: Hazard Type Risk Index, National Risk Index.....	22
Figure 9: Overall Social Vulnerability (2018), Loudoun County.....	31
Figure 10: Social Vulnerability, by Theme, Loudoun County.....	32
Figure 11: Location of Loudoun County Rivers and Streams.....	34
Figure 12: Loudoun County Critical Assets Located in the Flood Zone.....	37
Figure 13: Legend to Figure 12 - Loudoun County Critical Assets Located in the Flood Zone.....	38
Figure 14: Summary of National Risk Index Findings, Loudoun County.....	45
Figure 15: Community Resilience Estimate for Loudoun County.....	47
Figure 16: Promotional Flyer Distributed throughout the Planning Area.....	71

1. Jurisdiction Profile

Established	1757
Incorporated Towns	7
Total Land Area	520 square miles (515 on land, 5 on water)
Geographic Region	Piedmont/Coastal Plain
Persons Per Household	3.06
Persons Per Square Mile	810
Median Age	36.2
Elevation	180 to 1,900 feet above sea level

1.1. Location

Located in the northeast region of the Commonwealth of Virginia, Loudoun County is part of the suburban ring of Washington, D.C. The county is partially bounded on north by the Potomac River. Directly across the river are three Maryland counties: Frederick, Montgomery, and Washington.

Loudoun County it is bounded on the east by Fairfax County, on the south by Prince William and Fauquier Counties, and to the west by Clarke County (VA), Jefferson County (WVA), and the Blue Ridge Mountain watershed. The Bull Run Mountains and Catoctin Mountain bisect the county. To the west of the range is the Loudoun Valley. Short Hill Mountain bisects the Loudoun Valley from Hillsboro to the Potomac River.

1.2. History

Loudoun County constitutes a part of the 5-million-acre Northern Neck of Virginia Proprietary granted by King Charles II of England to seven noblemen in 1649. This grant, later known as the Fairfax Proprietary, lay between the Potomac and Rappahannock Rivers. Between 1653 and 1730, Westmoreland, Stafford, and Prince William Counties were formed within the Proprietary, and in 1742 the remaining land was designated Fairfax County.

In 1757, by act of the Virginia House of Burgesses, Fairfax County was divided. The western portion was named Loudoun for John Campbell, the fourth earl of Loudoun, a Scottish nobleman who served as commander-in-chief for all British armed forces in North America and titular governor of Virginia from 1756 to 1759. Leesburg has served continuously as the county seat since 1757.

1.2.1. Loudoun Settlements

In-migration to the area in and around Loudoun County began between 1725 and 1730, while it was owned by Lord Fairfax. Permanent settlers came from Pennsylvania, New Jersey, and Maryland. During the same period, settlers from eastern Virginia, of English Cavalier stock, came to lower Loudoun and established large tobacco plantations. From 1745 to 1760, Germans from Pennsylvania and Maryland formed the settlement at Lovettsville. After General Braddock's defeat by the French at Fort Duquesne in 1755, refugees from the Shenandoah Valley of Virginia settled in the western part of Loudoun County, south of Short Hill. Catoctin Church became the center of that settlement.

For over two centuries, agriculture served as the main driver of the Loudoun County economy which had a relatively constant population of about 20,000. That began to change in the early 1960s, when Dulles

International Airport was built in the southeastern part of the county, with parts of the airport located in both Loudoun and Fairfax Counties. The airport attracted new businesses, workers, and their families to the area and increased tourism in the overall region, including the nation's Capital.

In addition to farm and cattle operations, the region supports large equine and microbrewery industries. In October 2021, the Virginia Equine Alliance generated an economic impact of over \$540 million and provided over 5,000 jobs across the Commonwealth.¹ Farms are also expanding their scope and have become a magnet for microbreweries since 2012, when the state allowed these businesses to serve pints instead of samples to visitors.² The website VisitLoudoun.org states that there are currently over 30 breweries in the county and the industry is growing.³

The 1970 population of 35,500 grew at a moderate pace for the next decade, reaching 87,208 in 1990. Beginning in 1990, the metropolitan region of Washington, D.C. began a period of rapid growth, spurred by the improvement of major transportation routes that enabled the resident population to commute to nearby industry centers. Development in the western areas of Loudoun County and inbound population movement to the area has been fostered by road access. In the last three decades, the population of Loudoun County has nearly quadrupled. The population grew 41% between 1990 and 2020, but growth in population since 1970 is significant at 1,138%.

Today, Loudoun County is a growing, dynamic county of 421,636 residents, renowned for its beautiful scenery, rich history, healthy diversity of expanding business opportunities, comfortable neighborhoods, and high-quality public services.

Due to its location on both the Virginia Piedmont near the Potomac River and its mountainous western region, the county experiences weather of all types, thus increasing the area's vulnerability to a range of hazards, notably flooding and severe storms. In addition to snow melt and rain-related river flooding episodes, low-lying areas of Loudoun County along the Potomac River are also subject to tidal and storm surge flooding. As sea levels rise, permanent inundation of low-lying areas along and near the river shoreline is also a threat. Additionally, winter storms pose significant threats, as evidenced during the 2015–2016 winter season, when snow levels in late January reached between 23 and 31 inches across the county, and ice and blizzard-related wind conditions impacted travel and caused power outages and property damage.

1.3. Demographics, Economy, and Governance

The Northern Virginia regional profile is presented in **Section 1, Base Plan** as context for the entire plan. The 2020 U.S. census population estimate for Loudoun County is 421,636, an increase of approximately 35% since 2010. The population density is 810 persons per square mile, significantly lower than other Northern Virginia counties, such as Fairfax County with 2,941.8 residents per square mile. Since 2008, the county has been ranked among the highest in the U.S. in median household income among jurisdictions with a population of 65,000 or more.

¹ Roy, Lisa (WUA) and McBride, Sharla (WUSA) (2021, October 28), A deeper look at the cultural and economic importance of horses in Virginia, WUSA9, <https://www.wusa9.com/article/features/cultural-economic-importance-horses-middleburg-virginia-salamander-hotel-national-sporting-library/65-0c508db6-0c1b-4d70-bcf5-2337015fc5>

² Freed, Benjamin, (2016, August 11), How Loudoun County Became a Beer-Head's Mecca, The Washingtonian, <https://www.washingtonian.com/2016/08/11/Loudoun-county-beer-mecca-breweries/>

³ Visit Loudoun, Breweries (ND), <https://www.visitloudoun.org/drink/loco-ale-trail/breweries/>

Table 6: Population and Growth Rate⁴

Year	Population	Percent Increase over Previous Census
1970	37,150	
1980	57,427	55%
1990	87,208	52%
2000	173,897	99%
2010	312,468	80%
2020	421,636	35%

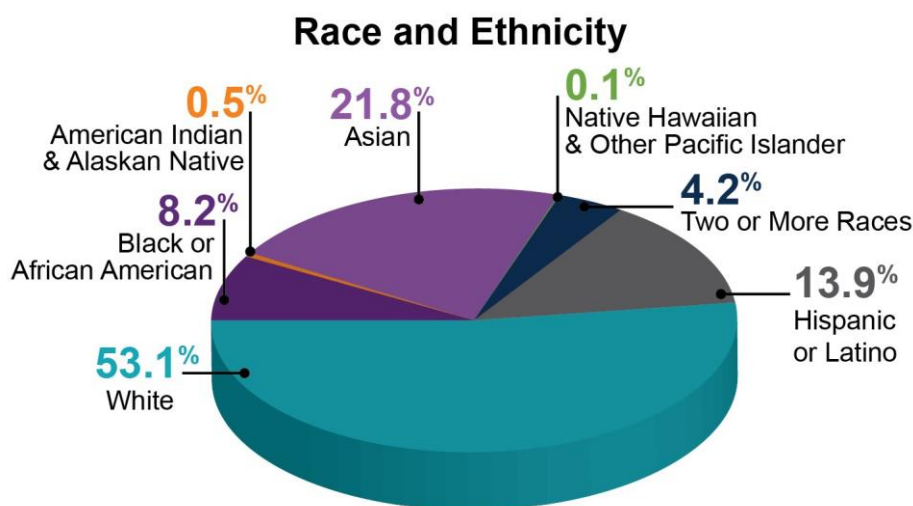


Figure 4: Race and Ethnicity Demographics⁵

Table 7: Economic Data⁶

Economy	Data
Median household income (2021)	\$142,299
Unemployment rate (November 2021)	2.1%
(September 2021)	2.25%
Per capita income (2019)	\$55,744
Median house or condo market value (2021)	\$508,100
Percentage below poverty (2019)	3.2%
Number of businesses (2019)	11,028

⁴ U.S. Census (1970–2020), [City-Data](http://www.city-data.com) (www.city-data.com), [U.S. Census Bureau](http://www.census.gov) (www.census.gov), and [Loudoun County](http://www.Loudouncounty.gov) (www.Loudouncounty.gov)

⁵ 2020 U.S. Census

⁶ U.S. Census (1970–2020), [City-Data](http://www.city-data.com) (www.city-data.com), [U.S. Census Bureau](http://www.census.gov) (www.census.gov), and [Loudoun County](http://www.Loudouncounty.gov) (www.Loudouncounty.gov)

Economy	Data
Most common businesses	Agriculture (1,400 farms), Information and communications technology

Table 8: Urban County Executive Governance⁷

Urban County Executive Governance	Members
Board of Supervisors	9
Constitutional Officers	5
Congressional Districts	1 (VA-10)
Commonwealth's Attorney	1
Commissioner of the Revenue	1
Treasurer	1
County Executive	6
Sheriff	1
Clerk of Circuit Court	1
County Departments/Offices	38

Despite having a high median income, approximately 3.2% of residents live in poverty, the highest group being females between the ages of 1-24, or 17.71% of those impoverished. Rates for all older age groups are higher than those of the male population. It is likely that many of these women are heads of households with dependents under the age of 18.⁸

The county's location in the Washington metropolitan area, its ease of access by car and public transportation, and its highly skilled labor force have attracted an increasingly varied residential and commercial mix. Much of the commercial development in Loudoun County is centered around three stations of Metrorail's Silver Line: the Ashburn Memorial Station, Dulles Airport Metrorail Station, and the Loudoun County Gateway Metrorail Station.

The Loudoun County Department of Economic Development (LCDE) is a significant data source for information about current and growth business initiatives. The LCDE identified key industry segments as follows:

- Data Centers
- Information and Communication Technology
- Federal Government Contracting
- Aerospace and Defense
- Aviation and Transportation
- Health Innovation and Technology
- Agriculture and Related Businesses

⁷ Ibid.

⁸ Data USA: Loudoun County, <https://datausa.io/profile/geo/loudoun-county-va#housing>

The LCDE reported that Loudoun is known as “Data Center Alley” because its data centers are home to more than 3,500 technology companies, including 25+ million square feet of current data centers and with another 4 million square feet under development. Astonishingly, there has not been a single day without data center construction in Loudoun in more than 13 years. Much of the world’s internet traffic passes through Loudoun’s digital infrastructure, making it a key player in the world’s technology economy.

The location of Dulles International Airport in Loudoun County has provided a boost to small businesses for which product shipping is essential to their operations. In an article about Loudoun’s Air Cargo Industry, the LCDE discusses how the agency helped small businesses, such as Georgetown Cupcake and Hypericum Flowers, work through steps needed to manage shipping nationally and internationally.⁹

1.4. Built Environment and Community Lifelines

The information related to Community Lifelines and critical assets in Loudoun County presented in this section has been collected from multiple sources, including Loudoun County Office of Emergency Management, Hazus (Version 4.2), and county government websites. Data extracted from the Hazus Level 1 assessment indicates that Loudoun County has an estimated total of 808 Community Lifelines and critical assets. Due to the time lag in collecting and verifying data and the method of documenting location and jurisdiction used in Hazus, this may not reflect the current inventory maintained by Loudoun County. Additional information about assets is included in the Base Plan.

Table 8 provides a summary of the number of critical assets, by type. Loudoun County maintains a detailed list of Community Lifeline facilities, sites, and critical assets.

Table 9: Number of Community Lifelines and Critical Assets in Loudoun County^{10,11}

Lifeline/Sector	Number of Assets
Safety and Security	28
Food, Water, Shelter	59
Health and Medical	19
Energy	14
Communications	6
Transportation	433
Hazardous Materials	59
Education	145
Cultural/Historical	22
High Hazard Dams	23

⁹ Loudoun County Economic Development Council, (2012, May 17), From Flowers to Cupcakes -Loudoun’s Air Cargo Industry, <https://biz.loudoun.gov/2012/5/17/from-flowers-to-cupcakes-Loudoun’s-air-cargo-industry/>

¹⁰ Loudoun County, Hazus

¹¹ CountyOffice.gov, Hospitals-Loudoun County, VA (Emergency & Medical Care, <https://www.countyoffice.org › Hospitals–Virginia>)

1.4.1. Safety and Security

Hazus data citing Loudoun County assets to address community Safety and Security included mention of one Emergency Operations Center, 20 fire stations, and eight police stations. Hazus medical data was combined with that found at www.countyoffice.org, a centralized database of government services provided in all 50 states.

1.4.2. Food, Water, Shelter

Food commodities are available throughout Loudoun County from public retail providers, wholesalers, and contracted services for specific institutions and facilities. Additional contracts may be entered into for post-disaster needs.

Four service providers in Loudoun County provide potable water services: Goose Creek Water Treatment Plant, Hamilton Acres Water Treatment Plant, Kenneth B. Rollins Memorial Water Filtration, and the Town of Purcellville Water Treatment Plant.

Wastewater treatment services are provided in all sectors of the county, although several of those managed by the county are just coming online. These facilities include reservoirs, lift stations, wells, and storage tanks. Hazus reports that there are 30 wastewater treatment plants and services managed by the county and an additional 24 managed by the Town of Round Hill, for a total of 59 wastewater treatment facilities.

1.4.3. Health and Medical

The Hazus program identified four hospitals as being located in Loudoun County:

- Stone Springs Hospital Center
- Inova Loudoun Hospital
- HealthSouth Rehabilitation Hospital
- North Spring Behavioral Healthcare

Additional healthcare resources identified as being located in the county include:

- Three Emergency Services Centers
- Three Health Department Offices
- Three Mental Health Services facilities (in addition to the North Spring facility)

1.4.4. Energy

Fourteen energy assets are identified in the Hazus database as being in Loudoun County. Natural gas pipelines include those maintained by Dominion Transmission Company, Columbia Gas Transmission Company, and Cove Point Pipeline. The county includes three natural gas compressor plants and the Stonewall Power Plant located in Leesburg.

1.4.5. Communications

Most communications and information systems and infrastructure in the United States are privately owned; however, the county maintains authority and control over public safety communications for fire, police, and other responding agencies. Hazus identified one broadcast station (WAGE 1200) as being in

the county, but the Loudoun County Department of Economic Development listed among its business members those who manage local news websites, magazines, and newsletters. Loudoun County is also well served by an array of broadcasters either in the county or the larger surrounding counties, Washington, D.C., and communities directly across the Potomac River in Maryland. On another front, Loudoun County is a national leader in information technologies (IT) communications given the region's concentration of businesses providing IT services.

In recent years, the federal government has taken a stronger role in protecting information and communications infrastructure, which may also present a challenge in relation to disaster impacts. Increasing reliance on this infrastructure by individuals, businesses, and government could cause vulnerabilities which emergency managers should take into consideration in pre- and post-incident planning and operations.

1.4.6. Transportation

U.S. Highway 15 and Virginia Route 7 intersect in Leesburg, providing highway access in all directions. The Point of Rocks bridge on U.S. Highway 15, north of Leesburg, is the only bridge across the Potomac River between it and the Capital Beltway.

Loudoun County is served by the following major highways and commuter lines shown on a map included on the LoudounHistory.org website.

- U.S. Highways: 7, 9, 15, 50, 340
- Loudoun County Parkway
- Dulles Greenway
- Washington Metrorail: Silver Lines

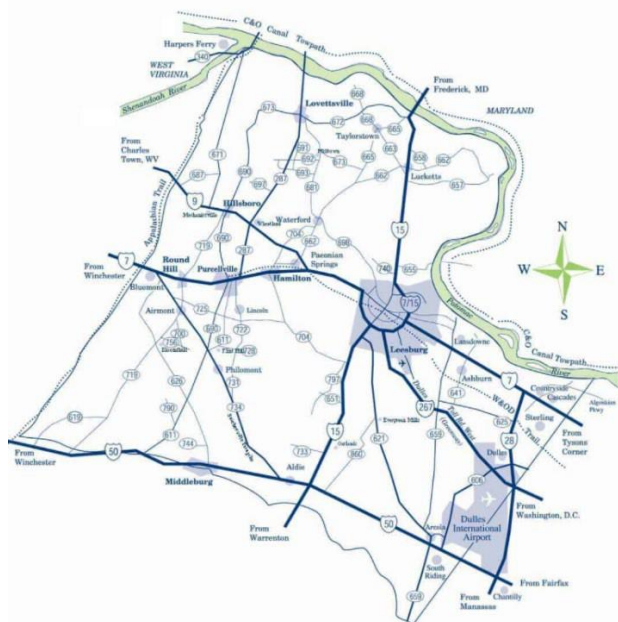


Figure 5: Loudoun County Road and Town Map¹²

¹² The History of Loudoun County, Loudoun County Town and Road Map, <https://www.loudounhistory.org/history/history-loudoun/>

The maintenance of transportation facilities and systems is the responsibility of the owner or entity with authority, including municipal, county, state, and federal highway departments and agencies; toll and rail authorities; and the military. The Virginia Department of Transportation maintains most primary and secondary roads in Loudoun County, except for the Dulles Toll Road, which is under the authority of the Metropolitan Washington Airports Authority. Loudoun County Transit (LCT) manages local fixed-route bus service from Purcellville through Leesburg and eastern Loudoun County. In keeping with the community's interest in outdoor recreation and environmental preservation, all local buses are equipped with bike racks. LCT also provides paratransit service for eligible persons with disabilities, but fixed-route busses are equipped with wheelchair lifts and are wheelchair-accessible.

Metrorail, operated by the Washington Metropolitan Area Transit Authority, enables commuters, visitors, and area residents a mechanism for travel throughout the Washington, D.C. area. The system is the second busiest in the U.S. and is currently piloting an After-Hours Commuter Service Program.

The Hazus database notes a total of 443 transportation structures, facilities, or segments, including the following:

- Highway bridges: 402
- Highway segments: 39
- Airport facilities: 2

However, it must be noted that the one airport facility listed by Hazus as being in Loudoun County is Leesburg Executive Airport. There are actually two airport facilities in Loudoun County, with Dulles International Airport being the more notable.

1.4.7. Hazardous Materials

The Hazus database identifies a list of assets including 10 natural gas pipelines, three natural gas compressor plants, and one power plant located in Loudoun County. In October 2021, the EPA issued its Toxic Release Inventory (TRI) of chemicals released in the year 2020. The report showed that 9,287 pounds of 19 different chemicals—from 1,2,4 trimethylbenzene and ammonia to xylene and n-hexane—were released through onsite or offsite disposal.¹³ The Loudoun County Office of Emergency Management works closely with companies that dispose of chemicals to monitor processes and ensure that hazardous materials are handled safely.

1.4.8. Education

Loudoun County Public Schools (LCPS) is the third largest school division in the Commonwealth of Virginia. Established in 1870, LCPS is in the rapidly growing Washington, D.C., metro area. Loudoun County is the fastest growing county in the Commonwealth of Virginia. Each year, LCPS opens one to three new school facilities to accommodate our growing student population.

LCPS students earned an average SAT score of 1173 (592 Reading and 581 Math). The LCPS Class of 2020 had 54 National Merit Semifinalists and an on-time graduation rate of 96.8%. They earned more than \$48.2 million in scholarships. Accreditation was waived by the Virginia Department of Education (VDOE) in 2020 due to the pandemic, but 100% of LCPS schools were fully accredited in 2019. LCPS has a nearly \$1.3 billion operating budget and prides itself on competitive starting teacher salaries.¹⁴

¹³ U.S. Environmental Protection Agency, Toxic Release Inventory (TRI), Toxic Release Explorer, Loudoun County Chemical Release Report, <https://tinyurl.com/yswvbxct>

¹⁴ <https://www.lcps.org>

A report on LCPS published in *U.S. News and World Report* highlighted key facts:

Table 10: Quick Stats–The Loudoun County School District¹⁵

Student-Teacher Ratio	14-1
Number of Schools	94
Number of Students	83,606
Minority Enrollment	50%
Economically Disadvantaged	15.3%
Racial Breakdown Percentage	<ul style="list-style-type: none"> • White: 46.4% • African American: 6.2% • Asian or Asian/Pacific Islander: 22.8% • Hispanic/Latino: 17.9% • American Indian or Alaska Native: 0.6% • Native Hawaiian or other Pacific Islander: 0.1% • Self-identified as being of 2 or more races: 5.6%

At schools in Loudoun County Public Schools, 15.3% of students are eligible for the federal free and reduced-price meal program and 13.9% of students are English-language learners.

Loudoun County has one of the largest public-school districts in the United States, with 198 prekindergarten through twelve grade schools and centers and a diverse student population of 83,606 students. More than 27% of these students are considered economically disadvantaged, and more than 26% of students learn English as a second language.

In addition to these public and private educational facilities within Loudoun County, there are 35 college and university facilities located within its jurisdictional boundaries, including:

- The Art Institute of Washington: Dulles
- Northern Virginia Community College
- George Washington University: Virginia
- George Mason University: Loudoun Campus
- Shenandoah University: Leesburg Campus
- Shenandoah University: Ashburn Campus
- Virginia Polytechnic Institute and State University: Leesburg Campus

1.4.9. Recreational, Cultural, and Historic Sites and Assets

The Loudoun County Department of Parks, Recreation, and Community Services (PRCS) develops and maintains a system of parks, recreational facilities, and community services. At the same time, the Department protects environmentally sensitive land and resources and areas of historic significance. The Department manages a Capital Asset Preservation Program (CAPP) that provides a consistent means of planning and financing asset maintenance efforts. The program provides the county with the ability to extend the useful life of mature and aging features, including repair, total demolition and replacement. CAPP is designed to address and fund replacement and maintenance of park facilities. Features

¹⁵ U.S. News and World Report, n.d., <https://www.usnews.com/education/k12/virginia/districts/loudoun-co-pblc-schs-105672>

addressed through CAPP can be structural (i.e., structural assessments and replacement of buildings, pavilions, roofs, storage sheds, office building, equipment storage building/maintenance shops, bridges), site-related (i.e., asphalt/concrete, stormwater facilities, channel restoration, playing fields, fences, backstops), mechanical (i.e., outside of buildings), and electrical or plumbing (i.e., boilers, water heaters). CAPP also addresses environmental issues, such as asbestos and lead paint removal and disposal, and the structural integrity of existing and historical buildings which may result in recommendations for removal, replacement, or repair.¹⁶

- **Arcola Park Pavilion:** Roof Replacement
- **Ashburn Park:** Pavilion Repair
- **Bles Park:** Replace the irrigation line and upgrade the power to the electrical panel
- **Claude Moore Park Fence Replacement:** Fields 1, 2 and 3
- **Conklin Park:** Develop conceptual plans for features and trails within the park. This development must go through the legislative process for a Special Exception with a Site Plan Amendment. The park is in major and minor floodplain.
- **Douglass Community Center:** Trails and Sidewalk Repair/Replacement
- **Franklin Park Tennis Courts:** Repair/Replacement including fence replacement
- **Trailside Park Bridges:** Repair one and replace two of the three bridges in collaboration with the Dept. of General Services, including channel restoration and floodplain study. Includes the need for a retaining wall and guardrails.

Loudoun County is also a member of NOVA Parks (formerly **Northern Virginia Regional Park Authority**), an inter-jurisdictional organization that owns and operates over 10,000 acres of woodlands, streams, parks, trails, nature reserves, countryside, and historic sites in Northern Virginia. The group is governed by a 12-member policy board, with representation from three counties—Loudoun, Arlington, and Fairfax—and three cities—Alexandria, Falls Church, and Fairfax.¹⁷

1.4.9.1. Historic and Cultural Conservation Districts

The Historic District Program enables Loudoun County to be a Certified Local Government. This gives the county standing with the State Preservation Office to comment on nominations of property to the national and state registers and allows the county to apply for grant money specifically allocated for local preservation efforts. Loudoun County Historic Districts include Aldie, Beaverdam Creek Historic Roads, Bluemont, Goose Creek, Oatlands, Taylorstown, and Watersford. The Towns of Leesburg, Middleburg, and Purcellville also have locally designated historic districts administered by the town governments.¹⁸

¹⁶ Loudoun County Department of Parks, Recreation, and Community Services (PRCS)

¹⁷ <https://www.novaparks.com/about-nova-parks/about-nova-parks>

¹⁸ Loudoun County Planning and Zoning, Historic & Heritage Resources, County Historic Districts, <https://www.loudoun.gov/2370/County-Historic-Districts>

Loudoun County Historic Districts

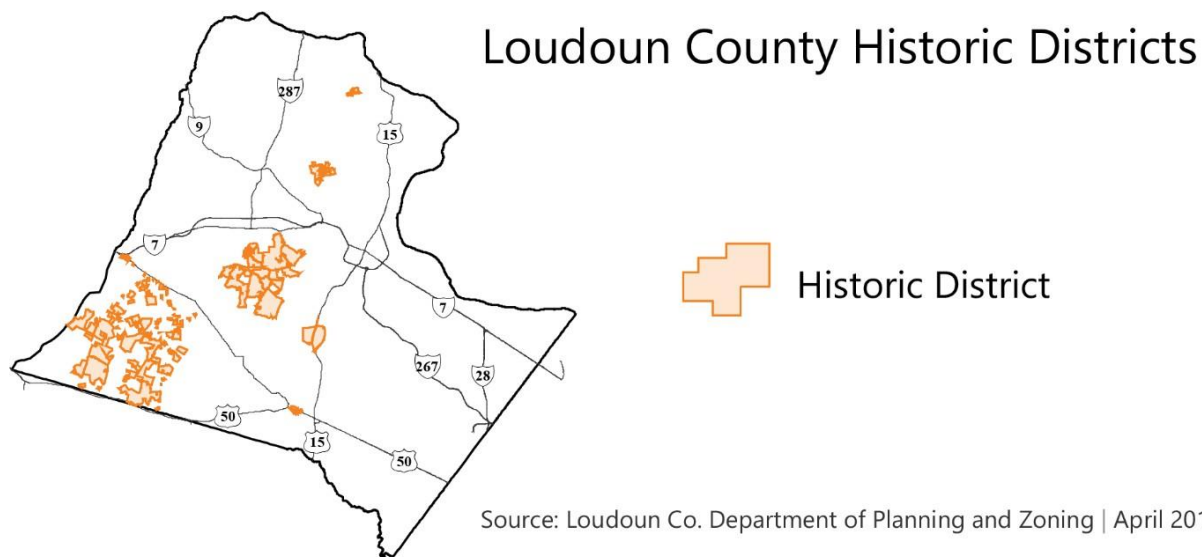


Figure 6: Loudoun County Historic Districts

The Loudoun County Resident Curator Program (RCP) helps preserve the county's historic buildings by rehabilitating and maintaining underutilized historic properties and making them accessible to the public. The county will provide long-term leases to qualified tenants who agree to rehabilitate and maintain these historic resources in accordance with established preservation standards. A curator can be a private citizen, a nonprofit entity, or a for-profit entity. The RCP is part of the county's implementation of its Heritage Preservation Plan, allowing the county to protect and preserve resources through acquisition, maintenance, and public engagement and education related to county-owned properties.

The RCP was designed to reduce the public costs associated with the care and preservation of the properties by enabling groups or individuals to take over the responsibility. In addition to caring for the day-to-day management of the property, the curators are responsible for the rehabilitation and continued maintenance of the property. Properties that are included in the RCP have been deemed historically significant and either meet the county's established criteria of eligibility for curation and/or also may meet the National Historic Register criteria.

Three RCP initiatives support Loudoun County's vision of recognizing its historical past while looking ahead to improving life of and services for its residents.

1. Maintained a Master List of archeology sites

For most types of development applications, an archaeological survey is required to determine if the proposed development will negatively impact significant historic and archaeological sites.

Loudoun County has over 1,500 recorded archaeological sites that include both prehistoric Native American sites and early European domestic and industrial sites. The majority of archaeological investigation that occurs in Loudoun County is directly linked to both county and federal requirements related to land development projects.

2. Developed the African American Survey

In 2002 and 2003, the Loudoun County Board of Supervisors contracted with History Matters, a program of the City of New York (CUNY) and George Mason University, to survey historic resources related to the history of African Americans in Loudoun County, Virginia. As a result of the survey, the Virginia Department of Historic Resources determined that seven of the African-American communities are eligible for listing on the National Register of Historic Places:

Bowmantown, Brownsville, Howardsville, Murphy's Corner, St. Louis, Watson, and Willisville. The county continues its efforts to capture all resources available to understanding the contribution of African Americans to the development of the state and our nation.

3. Created a Heritage Preservation Plan

The Heritage Preservation Plan includes strategies for identifying, preserving and promoting Loudoun County's heritage resources on three fronts: community education, heritage tourism, and resource protection. The plan recommends implementation steps, such as the creation of a Heritage Commission and a Heritage Register.

1.5. Growth and Development Trends

The county's population grew slowly through the 1970s. Until around 1990, the population was under 100,000, but since that time the growth rate has moved from a relatively flat horizontal line to growth spurts between each year from 2000 to the present, when the line becomes vertical.

In recent decades, Loudoun County has transitioned from a residential suburb of Washington, D.C. to a vital commercial, residential, office, and research hub. This substantial change has been reflected in the jurisdiction's land-use pattern, with the vast expansion of nonresidential land uses and, to a lesser extent, growth in residential land use, by acres. Since 1990, the rate of multi-family townhouses and apartments has exceeded single-family detached housing construction at a rate of two to one. As of December 2020, there was a planned 2.7 million square feet of office space under construction in the county.¹⁹

This rate of growth has had a significant impact on public facilities and infrastructure, particularly on transportation capacity and the reduction in the supply of vacant land. The increased demand for future development and infrastructure may result in pressure to build in areas susceptible to impacts from natural hazards such as floods. Land use controls through the county's ordinances and regulations provide some protection against this pressure but should be continuously monitored for new demands that could increase hazard risks in the future.

Despite the overall slowing growth rate, the 2050 forecast for population, housing units, and households indicates slight growth. Much of the population growth is related to continuing development of multi-family housing, including owned and rental properties. For this reason, stakeholders developed the Loudoun County 2019 Comprehensive Plan (Comprehensive Plan). This plan is the culmination of a collaborative multiyear effort and an unprecedented public outreach campaign that brought together Loudoun's citizens, elected and appointed officials, stakeholders, and county staff to create a new comprehensive plan for the county. This planning process, known as Envision Loudoun/Loudoun 2040, encapsulates what residents want to see in the way of future development of Loudoun County while considering growth management; land use; place types; transportation; natural, environmental, and heritage resources; and community facilities. This led to the development of the 2019 Comprehensive Plan, which describes the community's vision.²⁰

¹⁹ [Real Estate Report, Loudoun County Economic Development Authority, Year-End 2020](https://www.Loudouncountyeconomicdevelopmentauthority.org/wp-content/uploads/2021/07/Yearend2020RealEstateReport.pdf), December 31, 2020. (<https://www.Loudouncountyeconomicdevelopmentauthority.org/wp-content/uploads/2021/07/Yearend2020RealEstateReport.pdf>)

²⁰ Loudoun County, *New Comprehensive Plan: The History of the Envision Loudoun Process*, <https://www.loudoun.gov/3298/Envision-Loudoun-Process>



Figure 7: Loudoun County Comprehensive Plan

Among the datasets included in the Comprehensive Plan is an estimate of population growth for each five-year period between the years 2021 and 2045.

Table 11: Loudoun County Population Estimates through 2045 by Subregions²¹

Subregion	2025	2030	2035	2040	2045
Ashburn	5,205	5,804	1,952	1,975	1,627
Dulles	4,521	3,086	1,242	529	358
Leesburg	2,021	2,339	1,023	132	15
Northwest	312	365	488	507	507
Potomac	167	120	243	284	196
Route 15 North	210	210	227	226	226
Route 15 South	145	200	150	111	111
Route 7 West	515	420	238	250	80
Southwest	105	125	135	156	156
Sterling	1,282	1,658	1,360	990	409
County	14,483	14,327	7,058	5,160	3,685

The Comprehensive Plan highlights the intent for appropriate residential development of land in relation to flood hazards, as stated in Objective 7, Policy a: “Prohibit new residential structures within flood impact hazard areas.” This objective, in combination with the land-use ordinances and Floodplain Management Plan, provide some controls that limit the increase of flood hazard risk caused by future development. Land development in Loudoun County is monitored and controlled at the county level. Loudoun County will continue to be a planning partner with local jurisdictions and regional entities to identify hazard mitigation opportunities that reduce risk. Projected growth trends should be monitored in the next planning cycle with the intent to provide a more detailed statistical analysis of vulnerable populations and how this could potentially impact hazard consequences and mitigation opportunities.

²¹ Source: Loudoun County Department of Budget and Finance

2. Jurisdiction Planning Process

For the 2022 NOVA HMP update, Loudoun County followed the planning process described in [Section 2, Base Plan](#). In addition to providing representation to the NOVA HMP Planning Team, the county supported the local planning process requirements by coordinating with representatives from other departments and agencies within its jurisdiction. Participants in the local planning activities are listed in Table 11.

Table 12: Local Planning Participants

Kelly Myers	Assistant Coordinator- Planning	Loudoun County Office of Emergency Management
Joe Dame	Emergency Management Coordinator	Town of Leesburg
Danny Davis	Town Manager	Town of Middleburg
Melissa Hynes	Town Administrator	Town of Round Hill
Harriet West	Town Clerk	Town of Round Hill
Cynthia McAlister	Chief of Police	Town of Purcellville
Ernie Brown	Director	Loudoun County- Department of General Services
Alan Brewer	Director	Loudoun County- Department of Building and Development
Alana Ray	Director	Loudoun County- Department of Planning and Zoning
Monica Spells	Assistant County Administrator- Human Services	Loudoun County Office of the County Administrator
Sam Finz	Town Manager	Town of Lovettsville
John Merrithew	Planning Director	Town of Lovettsville
Joe Betts	Project Manager	Town of Lovettsville
Buddy Rizer	Director	Loudoun County Economic Development

Colleen Kardasz	Assistant Director	Loudoun County Economic Development
Joe Kroboth	Assistant County Administrator- Community Development	Loudoun County Office of the County Administrator
Aj Panebianco	Chief of Police	Town of Middleburg
Alton Echols	Deputy General Manager of Operations & Maintenance and Engineering	Loudoun Water
Maggie Auer	Floodplain Manager	Loudoun County- Department of Building and Development
David Ma	Senior Engineer	Town of Leesburg
Betsey Arnett	Public Information Officer	Town of Leesburg
Gwen Kennedy	Program Manager	Loudoun County- Department of Building and Development
Richard Williams	Director of Parks and Recreation	Town of Leesburg
Russell Chambers	Plant Manager- Water Treatment Facility	Town of Leesburg
Philip Jones	Assistant Director for Capital Projects	Town of Leesburg
Matt Schulz	Assistant Coordinator - Operations	Loudoun County Office of Emergency Management
Andrew Irvine	Emergency Preparedness Specialist	Loudoun County Office of Emergency Management
Glen Barbour	Public Information Officer	Loudoun County Office of Public Affairs
Elizabeth Moore	Emergency Preparedness Specialist	Loudoun County Office of Emergency Management

The list of project meetings in which representatives of Loudoun County and/or its jurisdictions participated show the degree to which the county and its jurisdictions are committed to the hazard mitigation planning process. Shown here are meetings at which the county and towns discussed their specific hazards of concern, though many of the county and town representatives also attended meetings of the full NOVA HMP Planning Team.

Table 13: Schedule of Jurisdiction Meetings

Date	Jurisdiction(s)	Purpose
May 25, 2021	Loudoun County, Town of Leesburg, Town of Purcellville, Town of Middleburg, and Town of Round Hill	Jurisdiction Planning Needs Assessment
June 25, 2021	Loudoun County and Town of Leesburg	Technical Assistance
July 22, 2021	Loudoun County	Capability Assessment
August 2, 2021	Loudoun County, Town of Leesburg, Town of Purcellville, and Town of Middleburg	Action Item review and creation
August 23, 2021	Loudoun County, Town of Leesburg, Town of Purcellville, and Town of Middleburg	Action Item review and creation
August 27, 2021	Town of Lovettsville	Hazard Identification, Community Asset Identification, Jurisdiction Information Collection, Jurisdiction Needs Assessment, and Action Items and Action Plan Completion
September 30, 2021	Town of Lovettsville	Capability Assessment, Hazard Risk Ranking, and Critical Facilities and Historical Information Review
October 29, 2021	Town of Middleburg	Capability Assessment and Critical Facilities and Historical Information Review

The jurisdiction identified its chief hazard mitigation planning responsibility as providing oversight in the planning process through the Emergency Manager's Group and representation in the Emergency Manager's Planning Group. The county also identified the following tasks as part of its mitigation planning responsibilities:

- Jurisdictional Planning Team
- Management support for the planning effort
- Planning Team resource/subject matter expert
- Hazard risk and vulnerability assessment
- Provide technical data and hazard information
- Capabilities assessment
- Mitigation strategy development
- Sponsor mitigation actions
- Review plan drafts and provide input
- Public outreach activities
- Implementing the plan
- Maintaining the plan

Loudoun County planning participants coordinated primarily by means of virtual meetings during the planning process and as needed to carry out independent planning activities completed through a series of worksheets that provided background information on the history of hazard events, hazard risks and vulnerabilities, capabilities, and past mitigation efforts. Additional planning process documentation of the Planning Team meetings is included in the **Base Plan, Appendix A**.

2.1. Public Participation

Several opportunities for public involvement were provided during the planning process, including a Public Hazard Survey <https://www.loudoun.gov/752/Hazards> and access to the draft plan for review and input.

In reviewing both documents, the public was offered the opportunity to provide input to the community hazards of concern and the Draft 2022 Plan update that recommends mitigation strategies to minimize the impact of any and all hazards. Notification of the Draft Plan release was made through the same county web link used to enable residents to participate in the community survey. Documentation of the public survey and draft plan review is included in **Attachment 3** of this annex.

3. Jurisdiction-Specific Hazard Event History

Loudoun County’s comprehensive hazard history is described in [Section 5, Base Plan](#). The diversity of the landscape increases the vulnerability to a variety of hazards, most notably flooding and severe storms. In addition to snow melt and rain-related river flooding episodes, low-lying areas of the county along the Potomac River are also subject to tidal and storm surge flooding. As sea levels rise, permanent inundation of low-lying areas along and near the river shoreline is also a threat. Additionally, winter storms pose significant threats, as evidenced during the 2015–2016 winter season, which resulted in a Federal Disaster Declaration.

The National Oceanic and Atmospheric Administration (NOAA) National Center for Environmental Information (NCEI) Storm Events Database includes 1,036 recorded natural weather events that took place in the county between January 1, 1950, and May 2021. The county has been included in three Federal Disaster Declarations and emergencies between 2017 and May 2021.

Table 14: Federal Disaster and Emergency Declarations (2017–2021), Loudoun County²²

Declaration	Date	Hazard	Assistance Type
DR-4512-VA	4/2/2020 (continuing)	COVID-19 Pandemic	Individual Assistance, Public Assistance
EM-3448-VA	3/13/2020 (continuing)	COVID-19 Pandemic	Public Assistance (Category B)
EM-3403-VA	9/11/2018	Hurricane Florence	Public Assistance (Category B)

Table 15: Significant Hazard Events Identified by Loudoun County, 2017–2021

Date	Hazard	Event and Description
February 2020	EF0 Tornado	An area of low pressure formed over the area in response to an impressive longwave trough approaching from the west. A line of low-topped showers and thunderstorms formed along the system's cold front, leading to instances of damaging winds and a tornado in Leesburg. Many trees were downed and fell on homes and cars. Property damage totaled \$5,780,000, the largest amount for a hazard event in Loudoun County in the last five years.
February 2019	Winter Weather	Surface high pressure was located over the region, giving way to several waves of low pressure. Intermittent precipitation led to snow accumulations up to around one inch and ice accumulations generally between 0.10 and 0.20 inches, although these figures were as high as 0.50 to 1.0 inch across the higher elevations. The only direct fatality reported by NCEI since 2017 occurred when a 52-year-old woman in northeastern Loudoun County was killed from a falling branch outside of her home due to weight from ice on

²² FEMA

Several significant events were identified by NCEI as taking place in recent years.

Date	Hazard	Event and Description
		the tree limbs. The elevation of the incident was approximately 680 feet.
March 2018	High Wind	A low-pressure system moved in from the central United States and intensified rapidly as it moved eastward. Winds up to 58 mph were recorded in several locations, including a report from Dulles International Airport, which clocked the wind at 57 mph. Numerous trees were downed, and the wind blew roofing, siding, and doors from residential structures, although no official report of damages is recorded.

4. Hazard Risk Ranking

After developing hazard profiles, the Loudoun County Mitigation Planning Team conducted a two-step quantitative risk assessment for each hazard that considered population vulnerability, geographic extent/location, probability of future occurrences, and potential impacts and consequences. The numerical scores for each category were totaled to obtain an Overall Risk Score, which is summarized as one of these risk and vulnerability classifications:

- **Low:** Two or more criteria fall in lower classifications or the event has a minimal impact on the planning area. This rating is sometimes used for hazards with a minimal or unknown record of occurrences or for hazards with minimal mitigation potential.
- **Medium:** The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating. This rating is sometimes used for hazards with a high extent rating but very low probability rating. The potential damage is more isolated and less costly than a widespread disaster.
- **High:** The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area.

The two-step hazard risk ranking methodology is detailed in [Section 4, Base Plan](#). The Hazard Risk Ranking scores by individual categories for Loudoun County are provided in [Attachment 2](#) of this annex.

The Overall Risk Score for each hazard served as the basis for determining whether a vulnerability assessment should be conducted. Natural hazard profiles are presented within the hazard subsections in [Section 5, Base Plan](#), and local detail is provided in the Jurisdiction Annexes. Non-natural hazard profiles are presented in [Volume II of the Base Plan](#).

Table 16: Hazard Risk Ranking Summary: Natural Hazards

Hazard	Total Probability Score	Total Consequence Score	Overall Risk Score	Hazard Ranking
Winter Weather	3.3	3.5	6.8	High
High Wind/Severe Storm	2.7	3.4	6.1	High
Flood	1.7	4.1	5.8	High
Tornado	1.7	4.1	5.8	High
Dam Failure	1.0	4.4	5.4	Medium
Drought	2.0	3.2	5.2	Medium
Extreme Temperatures	2.3	2.7	5.0	Medium
Earthquake	1.7	3.2	4.9	Medium
Landslide	1.3	2.5	3.9	Low
Wildfire	1.0	2.8	3.8	Low
Karst/Sinkhole/Land Subsidence	1.0	2.5	3.5	Low

Table 17: Hazard Risk Ranking Summary: Non-Natural Hazards

Hazard	Total Probability Score	Total Consequence Score	Overall Risk Score	Hazard Ranking
Infectious Disease/Public Health	2.0	5.3	7.3	High
Terrorism	1.0	6.1	7.1	High
Cyberattack	1.7	4.7	6.4	High
Civil Unrest	1.0	4.9	5.9	Medium
Communication Disruption	1.3	3.7	5.0	Medium
Hazardous Materials	1.0	3.9	4.9	Low
Active Violence	1.0	3.6	4.6	Low

Based on the hazard risk scores, Loudoun County evaluated the level of risk for 18 hazards: 11 natural and 7 non-natural.

Eight natural hazards were identified as high or medium risk hazards to which the jurisdiction is vulnerable:

- **High:** Winter Weather, Flood (riverine/flash flood), and High Wind/Severe Storm
- **Medium:** Dam Failure, Drought, Earthquake, Extreme Temperatures, Tornado

Five non-natural hazards were ranked as high or medium risk:

- **High:** Infectious Disease/Public Health, Terrorism, Cyberattack
- **Medium:** Civil Unrest, Communication Disruption

All other hazards are ranked as “low,” signifying a minimal risk to Loudoun County.

4.1. Additional Hazard Risk Considerations

4.1.1. National Risk Index

The National Risk Index (NRI) is a dataset and online tool developed by the Federal Emergency Management Agency (FEMA) and other partners to help illustrate communities in the United States at risk for 18 natural hazards. Hazard risk is calculated on data for a single hazard type and reflects the relative risk for that hazard type; it should be considered only as a baseline relative risk measurement for comparison with the local hazard risk ranking in the Hazard Risk Ranking section of this annex. In addition, some hazards are defined differently from those in this plan, so a direct hazard-to-hazard risk comparison is not possible.

Based on the NRI findings, the highest hazards by risk rating for Loudoun County are Winter Weather, Strong Wind, Tornado, and Cold Wave (included in this plan as Extreme Cold). Loudoun County was rated as having “very low” risk ratings overall, and those labeled as presenting the most risk are only marginally more threatening than those considered to be of lower risk. Of the 15 hazards for which risk ratings are given, they were all determined to be “very low,” with one hazard (Heat Wave) determined as “relatively low” when compared to the rest of the state and the national average.















Hazard Types	Risk Index Rating	Risk Index Score
Avalanche	Not Applicable	--
Coastal Flooding	Not Applicable	--
Cold Wave	Very Low	0.01 
Drought	Very Low	0.00 
Earthquake	Very Low	0.00 
Hail	Very Low	0.01 
Heat Wave	Very Low	0.00 
Hurricane	Very Low	0.00 
Ice Storm	Very Low	0.00 
Landslide	Very Low	0.00 
Lightning	Very Low	0.00 
Riverine Flooding	Very Low	0.00 
Strong Wind	Very Low	0.01 
Tornado	Very Low	0.01 
Tsunami	Not Applicable	--
Volcanic Activity	Not Applicable	--
Wildfire	Very Low	0.00 
Winter Weather	Very Low	0.01 

Figure 8: Hazard Type Risk Index, National Risk Index²³

The NRI calculation does not follow the same criteria and formulas used in the hazard risk ranking methodology for this plan but is provided as a comparative measurement tool.

4.1.2. Dam Failure

The USACE National Inventory of Dams lists 99 dams as being in Loudoun County²⁴: 14 are classified as **High Hazard** and 9 are classified as being a **Significant Hazard** due to the consequences of a failure of the structure. USACE data includes dam locations, ownership, pool volume, impoundment capacity, and use.

The 23 high and significant hazard dams in Loudoun County are both publicly and privately owned and used for a variety of purposes, including flood control, stormwater management, and recreation.

²³ National Risk Index, FEMA.

²⁴ Dam Inventory–2021, US Army Corps of Engineers,

Table 18: State-Regulated High Hazard Dams in Loudoun County, as of May 2021²⁵

Dam Name	Classification	Dam Owner/Operator
Arcola Center Dam	Significant	Arcola Limited Liability Company
Creighton Hills Dam	Significant	Creighton Hills, LLC
J.T. Hirst Dam	Significant	Town of Purcellville
Dulles Airport Dam	Significant	Metro-Washington Airport Authority
Red Cedar Lake Two Dam	Significant	Ian S. & Debra J. Foster
Oliver Dam	Significant	Woodmar Farm Conservancy
Daley Dam	Significant	Brian Meyerriecks, Timothy Biddle
Haynes Dam	Significant	Martin Lawrence Family Trust
Precision Dynamics Lake Dam	Significant	Round Hill Owners Association
Richmond Square Dam	High	Exeter Homeowners Association
Moorefield Station East SWM Pond Dam	High	Loudoun County Board of Supervisors
Kalnasy Dam	High	Johnson, Cedric & Cynthia Holgate, Marc Weiner.
Beaverdam Creek Dam	High	Loudoun Water
Goose Creek Dam	High	Loudoun Water
Horsepen Dam	High	Metro-Washington Airport Authority
Ashburn Village Lake #2	High	Ashburn Village Community Association
Brambleton Land Bay 3 Pond 6 Dam	High	Brambleton Group LLC
Ashburn Village Lake #1	High	Ashburn Village Community Association
Gore Dam	High	Jo Ann D. Athey
The Lakes At Red Rock Dam	High	The Lakes at Red Rocks Homeowners Association
Moorefield Station West SWM Pond Dam	High	Claude Moore Charitable Foundation
Sleeter Lake Dam	High	Round Hill Owners Association
Hope Parkway Dam	High	East Stratford Residential Community Association, Inc.

In the year 2017, after the previous mitigation plan was developed, a report titled *A Heightened Focus on Public Safety at Dams Does Not Happen by Accident* was produced by engineering firm Gannett Fleming, Inc., to discuss Loudoun Water's recently developed Public Safety Plan (PSP). It was decided such a plan was needed in the wake of several fatalities and near fatalities occurring at Goose Creek Dam and Beaverdam Creek Dam. Both of these assets are used for water supply, but the county's increased growth makes these and other dams attractive for recreational purposes.²⁶

The report led to Loudoun Water developing guidelines for protecting the public, including methods used to ensure conformity with the public safety plan, public safety education, training and outreach programs implemented by Loudoun Water, and additional public safety improvements planned for Beaverdam Creek. The report also cited publicly available resources about specific incidents that prompted development of the safety plan.²⁷

²⁵ Source: U.S. Army Corps of Engineers, National Inventory of Dams

²⁶ Insert Footnote info

²⁷ Ibid

- *Leesburg Today* article about teens ignoring the signs and rules about entry and showing them jumping from the handrail on the access bridge into the reservoir.



- The Associated Press piece describing how a mother and her two children drowned at Beaverdam Reservoir.



- *Loudoun Times-Mirror* article about drowning in Beaverdam Creek Reservoir.



- *Station WVTR-TV* (Richmond, VA) article about family of five being rescued from their boat perched on the crest of Goose Creek Dam.



4.1.3. Flood/Flash Flood

The Loudoun County Planning Team noted that the frequency of flash flood incidents has increased in recent years, attributable to more frequent excessive rainfall events combined with aging drainage and stormwater infrastructure designed to lower capabilities. The county is addressing this issue through increased maintenance of drainage systems and capacity upgrades funded through capital improvement projects, but it highlights the need for additional studies to identify potential locations and the extent of future events.



Table 19: Flood/Flash Flood Events in Loudoun County, 1950–May 31, 2021²⁸

Jurisdiction	Flood/Flash Flood Events	Direct Deaths	Direct Injuries	Property Damage	Crop Damage	Total Property and Crop Damage
Loudoun County Including: Town of Leesburg Town of Lovettsville Town of Middleburg Town of Purcellville Town of Round Hill	162	0	0	\$2,018,000	\$170,000	\$2,188,000

4.1.4. High Wind/Severe Storm

Table 23 presents the number of severe storm events documented in the NCEI Storm Events Database, including high wind, hail, and lightning, and the impacts of hazard events on people, property, and crops.

Table 20: High Wind/Severe Storm Events in Loudoun County, 1950–June 30, 2021²⁹

Jurisdiction	High Wind/Severe Storm Events	Direct Deaths	Direct Injuries	Property Damage	Crop Damage	Total Property and Crop Damage
Loudoun County Including: Town of Leesburg Town of Lovettsville Town of Middleburg Town of Purcellville Town of Round Hill	696	1	9	\$10,248,650	\$224,600	\$10,473,250

²⁸ NCEI Storm Events Database

²⁹ NCEI Storm Events Database

4.1.5. Winter Weather

Table 24 presents the number of severe winter storm events documented in the NCEI Storm Events Database, including blizzard, heavy snow, winter storm, and winter weather. Noteworthy is the fact that NCEI does not include in its records any events that took place before December 2014.

Table 21: Severe Winter Storm Events in Loudoun County, 1950–June 30, 2021³⁰

Jurisdiction	Severe Winter Storm Events	Direct Deaths	Direct Injuries	Property Damage	Crop Damage	Total Property and Crop Damage
Loudoun County Including: Town of Leesburg Town of Lovettsville Town of Middleburg Town of Purcellville Town of Round Hill	101	1	0	\$0	\$0	\$0

Other hazard information for Loudoun County is presented in the [Base Plan](#).

³⁰ NCEI Storm Events Database

5. Vulnerability Assessment

The methodology for calculating loss estimates presented in this annex is the same as that described in [Section 4, Base Plan](#). Quantitative loss estimates are provided when available. Qualitative measurement considers hazard data and characteristics, including the potential impact and consequences based on past occurrences. Accompanying the data is a discussion of community assets potentially at risk during a hazard event.

The assets at risk were identified during the planning process as potential assets vulnerable to one or more hazards.

5.1. National Flood Insurance Program

Loudoun County and the five towns participating in the 2022 plan update process all participate in the National Flood Insurance Program (NFIP). In addition, the county participates in NFIP's voluntary Community Rating System (CRS) program under the NFIP with a CRS Class of 10 rating. At this class rating, property owners are not able to take advantage of lower flood insurance premium deductions available to those lower classes. As such, Loudoun County is considering ways it could increase its class status and save money for those who choose to purchase flood insurance.

The Flood Risk Report (FRR) for Loudoun County, released on October 15, 2016, included discussion about waterways in unincorporated Loudoun County—the five municipalities participating in the 2022 Northern Virginia HMP update (Leesburg, Lovettsville, Middleburg, Purcellville, and Round Hill), as well as the Town of Hillsboro and the Town of Hamilton. The report provides non-regulatory information to help local or tribal officials, floodplain managers, planners, emergency managers, and others better understand their flood risk, take steps to mitigate those risks, and communicate those risks to their citizens and local businesses. Because flood risk often extends beyond community limits, the FRR provides flood risk data for all of Loudoun County, as well as for each individual community. This approach also includes a focus on flood risk reduction activities that may impact areas beyond jurisdictional boundaries. The report also discusses the types of mitigation actions a community can pursue, including planning and regulatory, structural, natural system protection, and public outreach and education.

Table 22: National Flood Insurance Program Status, Loudoun County³¹

Initial FHB Identified	Initial FIRM Identified	Current Eff Map Date	Reg-Emer Date	CRS Entry Date	Current Eff Date	CRS Class	% Disc SFHA	% Disc Non SFHA
04/25/1975	01/05/1978	02/17/2017	01/05/1978	10/1/1992	05/01/2003	10	0%	0%

Table 23: NFIP Status, Insurance Summary, as of September 14, 2021³²

NFIP Topic	Source of Information	Comments
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³¹ FEMA NFIP Community Status Report, September 9, 2021

³² Loudoun County Office of Emergency Management

How many NFIP policies are in the community? What is the total premium and coverage?	State NFIP Coordinator or FEMA NFIP Specialist Community Information System Database	6,615 policies countywide based on information through July 2021. Total premium is \$3,601,181. Approximately 73% of the insured structures are located outside FEMA's designated Special Flood Hazard Areas (SFHAs).
How many claims have been paid in the community? What is the total amount of paid claims? How many of the claims were for substantial damage?	FEMA NFIP or Insurance Specialist Community Information System Database	1,260 claims paid through July 2021; total amount \$13,844,072 . Information on how many of the paid claims were for substantial damage is not available.
How many structures are exposed to flood risk within the community?	Community Floodplain Administrator (FPA) Estimate from FEMA	Approximately 2,000 structures are estimated to be in SFHAs.
Describe any areas of flood risk with limited NFIP policy coverage.	Community FPA and FEMA Insurance Specialist	An estimated 10% of the structures in SFHAs do not have NFIP coverage , presumably because their owners do not hold federally backed mortgages.

Table 24: NFIP Status, Staff Resources, as of September 14, 2021³³

NFIP Topic	Source of Information	Comments
Is the Community FPA or NFIP Coordinator certified?	Community FPA	Community FPA/NFIP Coordinator holds Professional Engineer (PE) and Certified Floodplain Manager (CFM) certifications.
Is floodplain management an auxiliary function?	Community FPA	No. Floodplain management is a primary function of the two primary agencies responsible—the Department of Land Development Services (LDS) and the Department of Public Works and Environmental Services (DPWES).
Provide an explanation of NFIP administration services (e.g., permit review, GIS, education or outreach, inspections, engineering capability).	Community FPA	The full range of NFIP administrative services (permitting, inspections, outreach, GIS, and engineering analysis) is provided by LDS and DPWES.
What are the barriers to running an effective NFIP program in the community, if any?	Community FPA	Currently no barriers.

Table 255: NFIP Status, Compliance History, as of September 14, 2021³⁴

³³Loudoun County Office of Emergency Management

³⁴Loudoun County Office of Emergency Management

NFIP Topic	Source of Information	Comments
Is the community in good standing with NFIP?	State NFIP Coordinator, FEMA NFIP Specialist, community records	Yes
Are there any outstanding compliance issues (i.e., current violations)?		No
When was the most recent Community Assistance Visit (CAV) or Community Assistance Contact (CAC)?		October 6, 2014

5.2. Population

Loudoun County is somewhat less densely populated than other counties near Washington, D.C., given that a large portion of its land is used for agricultural purposes, while there are denser population clusters elsewhere in the county. U.S. Census Bureau figures show that, of the 366,827 persons over the age of five, 31.6% speak a language other than English, and 9.8% speak English “less than very well.” This situation highlights the challenge of communicating emergency information and educating residents about hazard risks and vulnerabilities and the benefits of hazard mitigation.

The Census Bureau also reports that approximately 5.8% of the population, or 24,455 residents, is identified as non-institutionalized disabled persons due to access or functional needs.

Estimates of the number of residents in Loudoun County vulnerable to each hazard are presented in the various hazard sections in the [Base Plan](#).

The Centers for Disease Control and Prevention’s (CDC) Social Vulnerability Index (SVI) is a tool that can be used to identify specific vulnerable populations. The CDC SVI categorizes the vulnerability of communities at the census tract level, by county, into fifteen census-derived factors grouped into four themes—socioeconomic status, household composition/disability, race/ethnicity/language, and housing type/transportation. Social vulnerability refers to a community’s capacity to prepare for and respond to the stress of hazardous events ranging from natural disasters, such as tornadoes or disease outbreaks, to human-caused threats, such as toxic chemical spills.

The Overall CDC SVI illustrated in Figure 10 indicates the locations of highest overall vulnerability are in more urbanized areas, such as the Jefferson, Loudoun, Mt. Vernon, and Upper Potomac Planning Districts, and along major transportation routes.

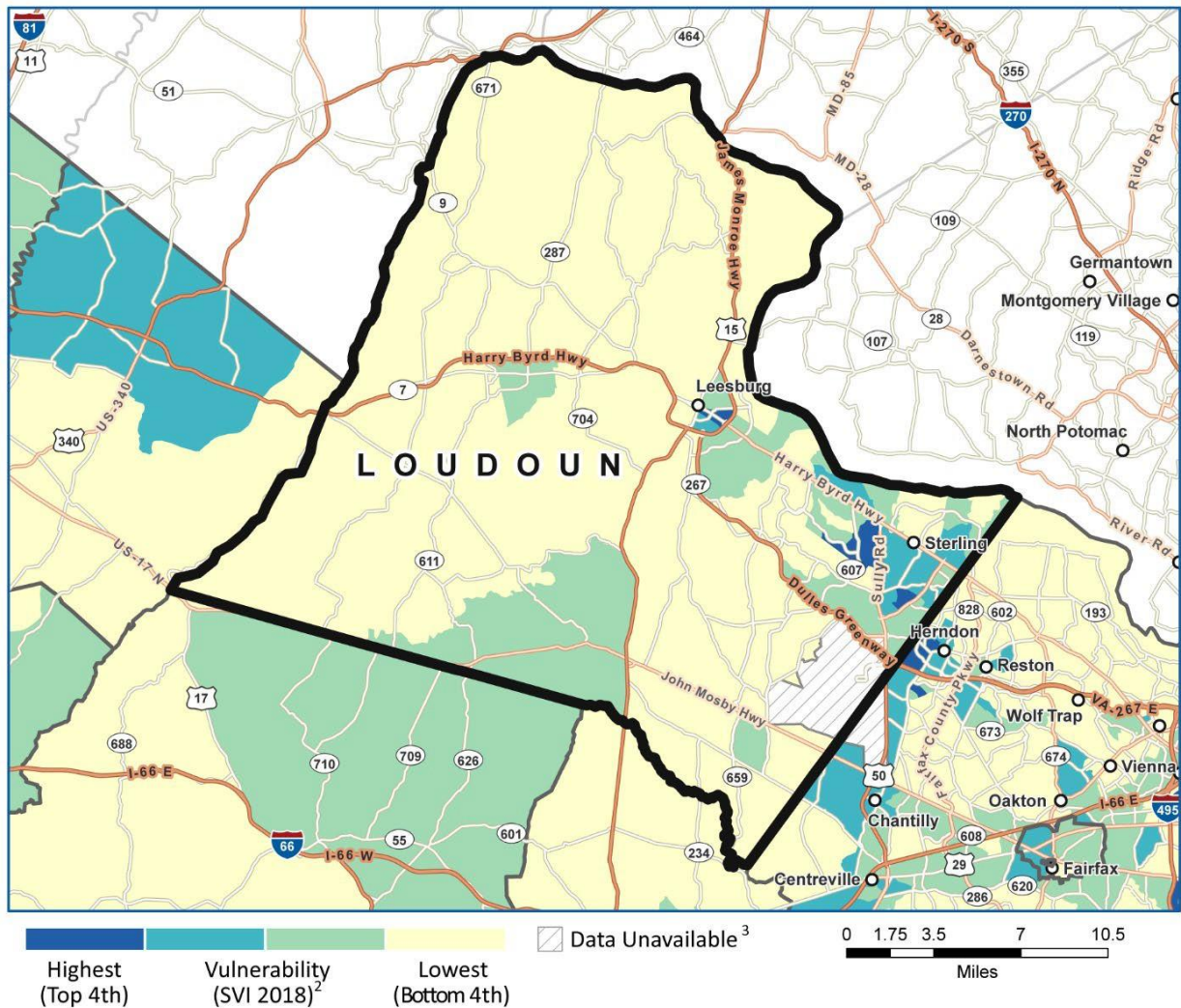


Figure 9: Overall Social Vulnerability (2018), Loudoun County³⁵

When examined by vulnerability theme, one can see that the planning districts with highest vulnerabilities vary widely across the county.

- **Socioeconomic Status:** Countryside Cascades, Sterling, Middleburg, Purcellville
- **Household Composition/Disability:** Loudoun Heights, Dulles Town Center, Leesburg
- **Race/Ethnicity/Language:** Belmont, Dulles Town Center, South Riding, Conklin, Arcola
- **Housing Type/Transportation:** Leesburg, Potomac Falls, Broadlands, Moorefield Station

³⁵ [Centers for Disease Control and Prevention](https://svi.cdc.gov/map.html) (https://svi.cdc.gov/map.html)

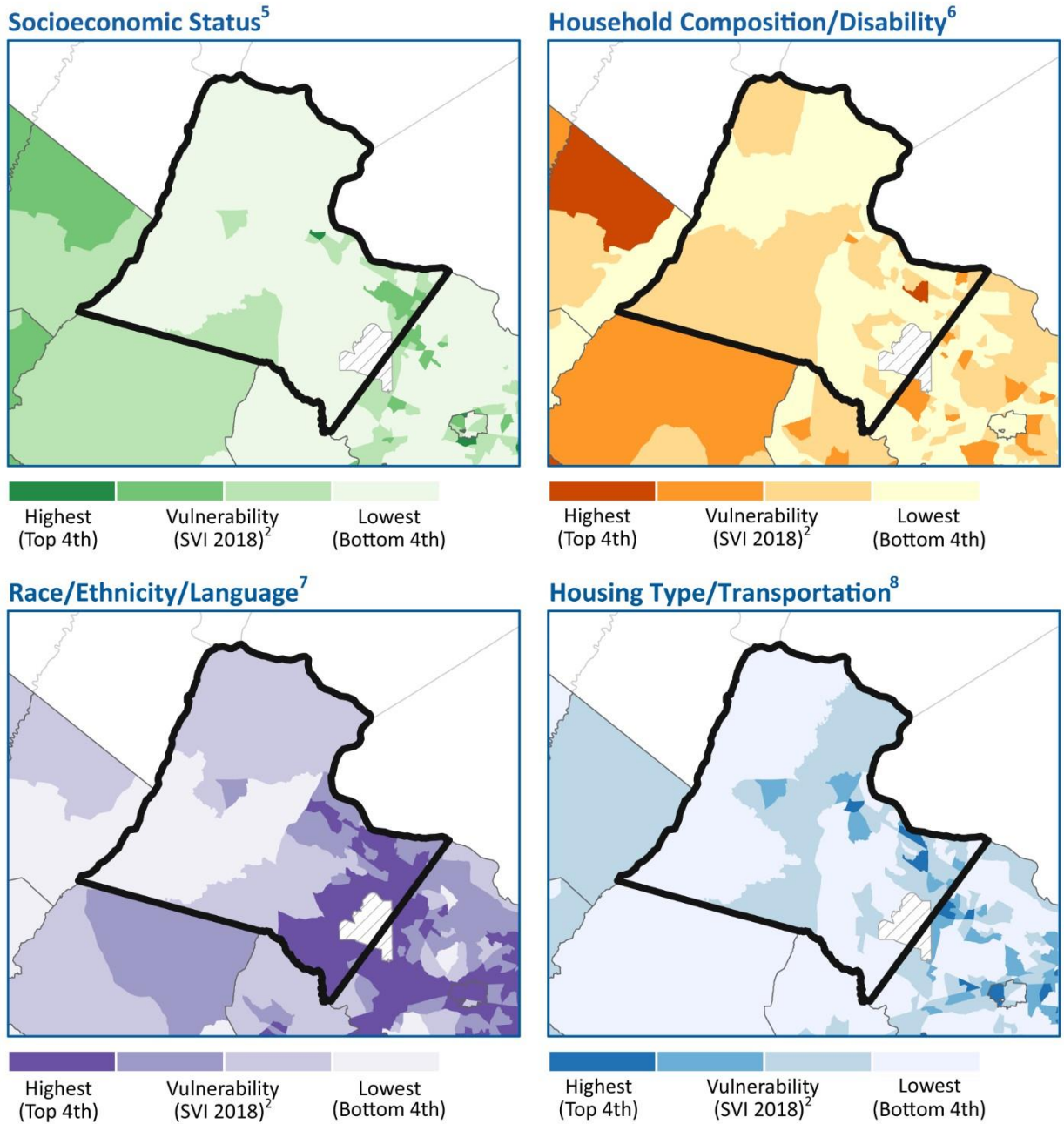


Figure 10: Social Vulnerability, by Theme, Loudoun County³⁶

The themed maps illustrate the county’s higher level of vulnerability within the race/ethnicity/language theme, demonstrating the importance of communicating essential hazard mitigation, preparedness, response, and recovery information to the public in alternate formats and multiple languages.

³⁶ Centers for Disease Control and Prevention (<https://svi.cdc.gov/map.html>)

5.3. Built Environment

Based on data currently available through Hazus, the tables presented in this section provide a total number of exposed facilities and properties in relation to earthquake, flood, and hurricane wind.

Table 26: Building Stock Exposure by General Occupancy³⁷

Type	Amount
Residential	\$144,188,703,000
Commercial	\$20,116,524,000
Industrial	\$2,464,611,000
Agricultural	\$272,032,000
Religion	\$1,827,947,000
Government	\$579,222,000
Education	\$1,378,119,000
TOTAL	\$170,827,158,000

Loudoun County has more than \$170.8 million in exposure to buildings within the 100-year floodplain. Using the 100-year flood scenario, Hazus identified a total of 357 structures that would be damaged, with 44 being at least 50% damaged and 88 sustaining substantial damage.

5.4. Community Lifelines and Assets

Loudoun County reviewed its community lifelines and assets to identify critical facilities, systems, and infrastructure that have the most significant risks and exposure. Vulnerabilities include structures, systems, resources, and other assets defined by the community as susceptible to damage and loss from hazard events.³⁸ The vulnerability of critical infrastructure is presented within the lifeline sector categories identified by FEMA.

Table 27: Vulnerable Community Lifeline Assets (in Thousands of Dollars)³⁹

Sector	Dollar Exposure (in thousands)
Safety and Security	Undetermined
Food, Water, Shelter	\$1,487,248
Health and Medical	Undetermined
Energy	\$837,534
Communications	\$744
Transportation	\$2,411,988
Hazardous Materials	Undetermined

³⁷ Hazus-MH

³⁸ Although Loudoun County maintains a separate critical facilities inventory, information used in this analysis is extracted from the Hazus-MH critical facilities database to maintain consistency with other jurisdictions.

³⁹ Hazus-MH

Table 28: Critical Facilities Exposed to FEMA Floodplains, Loudoun County⁴⁰

Type of Critical Facility	Total Facilities	In 100-Year Floodplain	In 500-Year Floodplain
Wastewater Treatment Plants	20	6	0
Ferries	1	1	0
Fire Stations	20	1	0
Highway Bridges	364	127	9
Highway Segments	32	15	0
Natural Gas Pipelines	10	9	0

A map on page 23 of the Loudoun County *2016 Flood Risk Report* illustrates the many rivers and streams that course through the region. Almost all segments of both unincorporated Loudoun County and within its towns are located relatively near a water body.

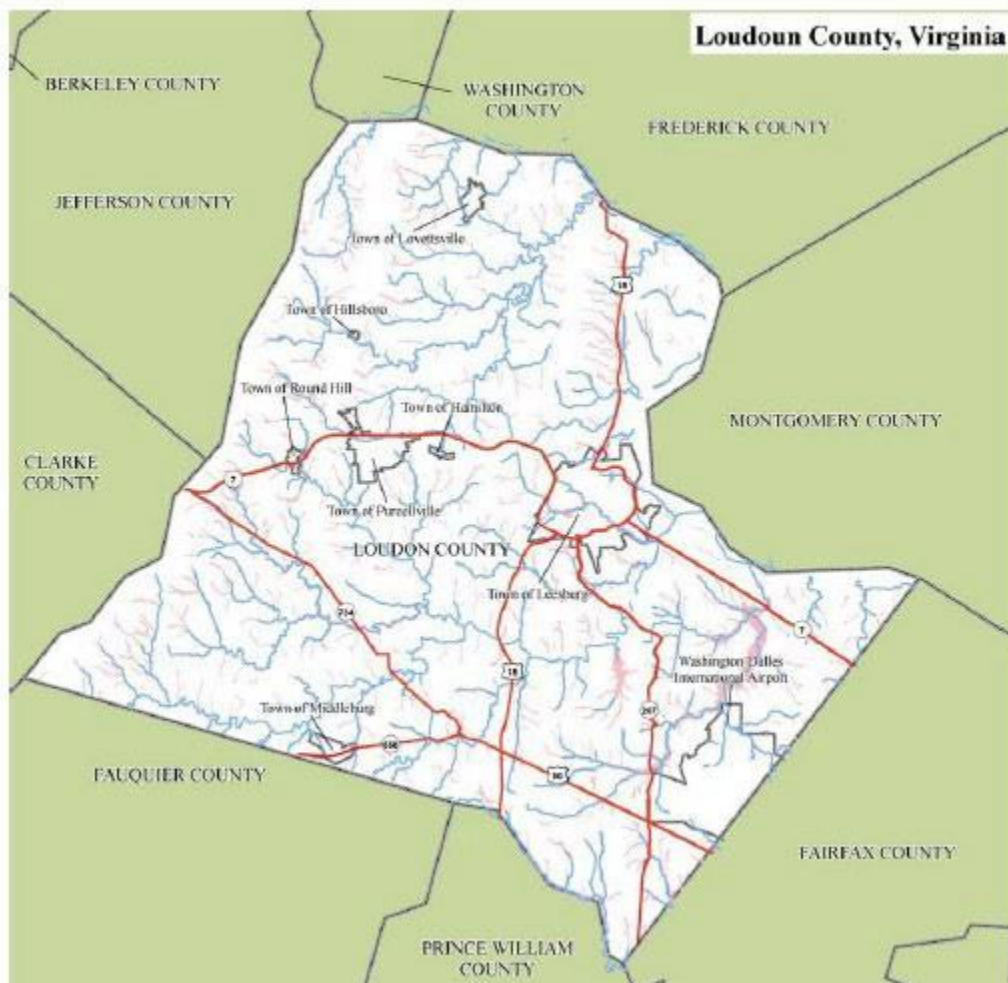


Figure 11: Location of Loudoun County Rivers and Streams

⁴⁰ Ibid.

5.5. Environment

Information related to environmental vulnerability is presented in the hazard-specific sections of the **Base Plan**.

Additional environmental concerns for Loudoun County are related to the Potomac Watershed Waterways and potential for flooding. The county also has a high number of public parks, outdoor sporting facilities, and National Park Service trails and parks. The county identified Huntley Meadows as a critical habitat due to its forests, meadows, and wetlands.

5.6. Economy

Information related to economic vulnerability is presented in the hazard-specific sections of the **Base Plan**. Specific direct economic losses (in thousands of dollars) related to a 2,500-year 6.5 magnitude earthquake event are identified by Hazus for specific assets.

Table 29: Direct Economic Losses Related to Earthquake, Flood, and Hurricane Wind⁴¹

Hazard	Buildings (Capital Stock and Income)	Transportation	Utilities
Earthquake	\$441,720	\$4,977	\$30,872
Flood	\$434,725	\$0	\$96,696.45
Hurricane Wind	\$30,325	\$0	\$0

Additional economic concerns for Loudoun County are related to the area's economic base which relies on government, information technology, and finance. Major employers include Fortune 500 companies, the federal government, and the military.

5.7. Cultural/Historical

Information related to vulnerability of cultural and historical assets is presented in the hazard-specific sections of the **Base Plan**.

Loudoun County holds significant historical and cultural landmarks linked to the founding of our nation, many of which are National Trust Historic Sites or locally designated landmarks.

Table 30: Significant Historical and Cultural Landmarks

Historic/Cultural Site	Location
Amos-Goodin House	Loudoun County
Arcola Elementary School	Arcola
Arcola Quarters for the Enslaved	Arcola
Edward Nichols House (Seacrest)	Leesburg
General George C. Marshall House, Dodona Manor	Leesburg
Hamilton Masonic Lodge	Hamilton
Home Farm	Loudoun County

⁴¹ Hazus-MH (2,500-year, 6.5 magnitude Earthquake scenario, 100-year Flood scenario, 2,500-year Hurricane event)

Historic/Cultural Site	Location
Leeland and Lawrence Lee House (Ellwood)	Loudoun County
Locust Grove House	Purcellville
Lucketts School	Lucketts
Morrison House and Janney Hill (Janney House)	Hamilton
Mount Zion Old School Baptist Church	Loudoun County
Mt. Olive Methodist Episcopal Church	Leesburg
Much Haddam House	Middleburg
Purcellville Train Station	Purcellville
Red Fox Inn	Middleburg
Rock Spring Farm	Leesburg
Spring Hill Farm	Hamilton
Waverly Mansion	Leesburg
William Virst House (Uriah Beans House)	Loudoun County
Woodgrove	Round Hill

Historic structures and sites and other types of facilities are frequently more vulnerable to flood hazards due to the typical development of a city or town along waterways. Because removing historic structures from their original site affects their historical value, there are challenges to protecting these fragile sites while following historic preservation standards and guidelines.

Table 31: Cultural and Historic Properties Exposed to FEMA Identified Floodplains⁴²

Total Facilities	In 100-Year Floodplain	In 500-Year Floodplain
99	28	1

Table 32: Loudoun County Critical Assets Located in FEMA Identified Floodplains⁴³

Critical Facilities	Total Facilities	In 100-year Floodplain	In 500-year Floodplain
Wastewater Treatment Plants	20	6	0
Ferries	1	1	0
Fire Stations	20	1	0
Highway Bridges	364	127	9
Highway Segments	32	15	0
Natural Gas Pipelines	1	9	0

The location of these and other assets are shown in the map and legend that follow.

⁴² Loudoun County, Hazus

⁴³ Loudoun County, Hazus

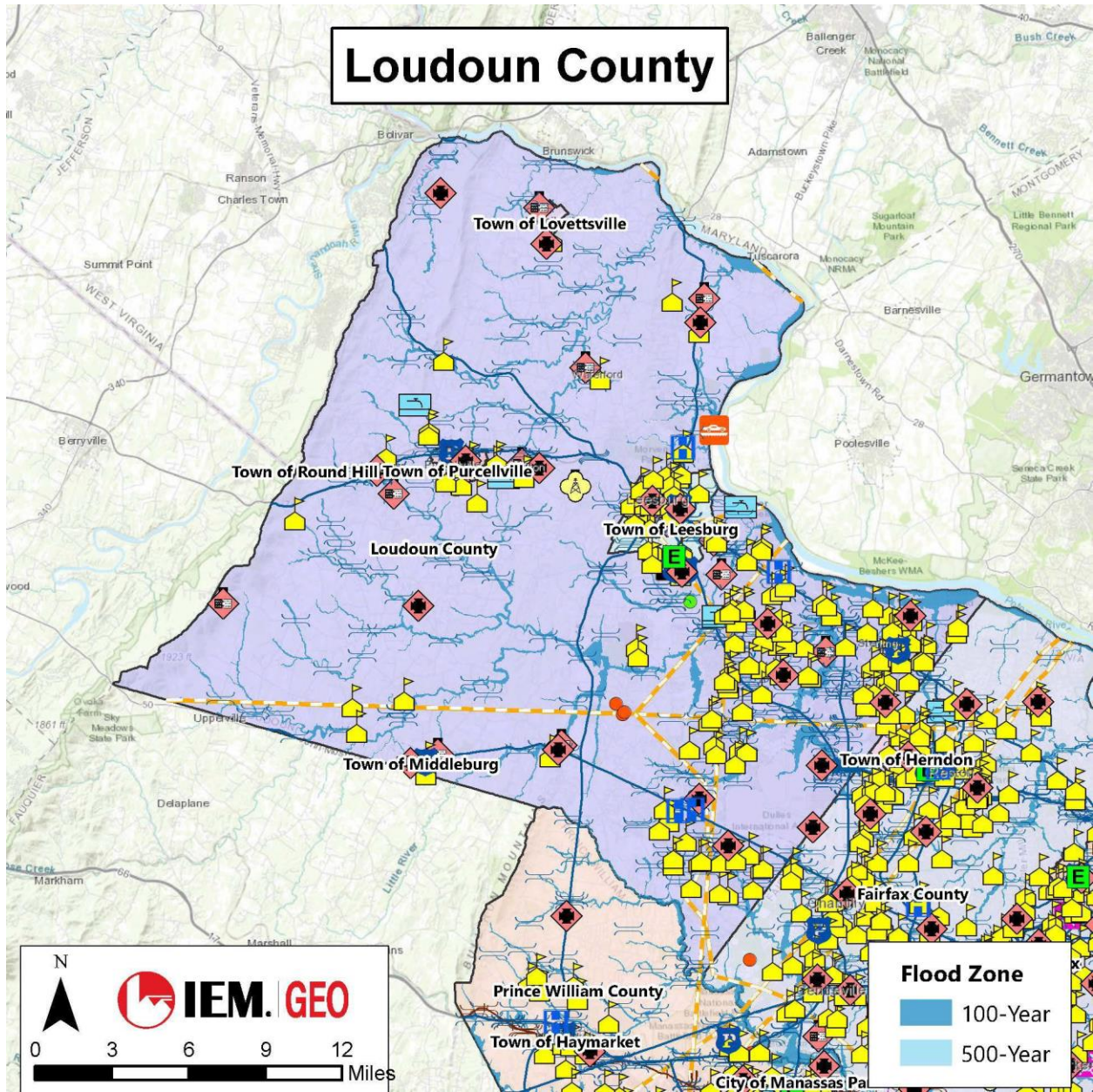


Figure 12: Loudoun County Critical Assets Located in the Flood Zone

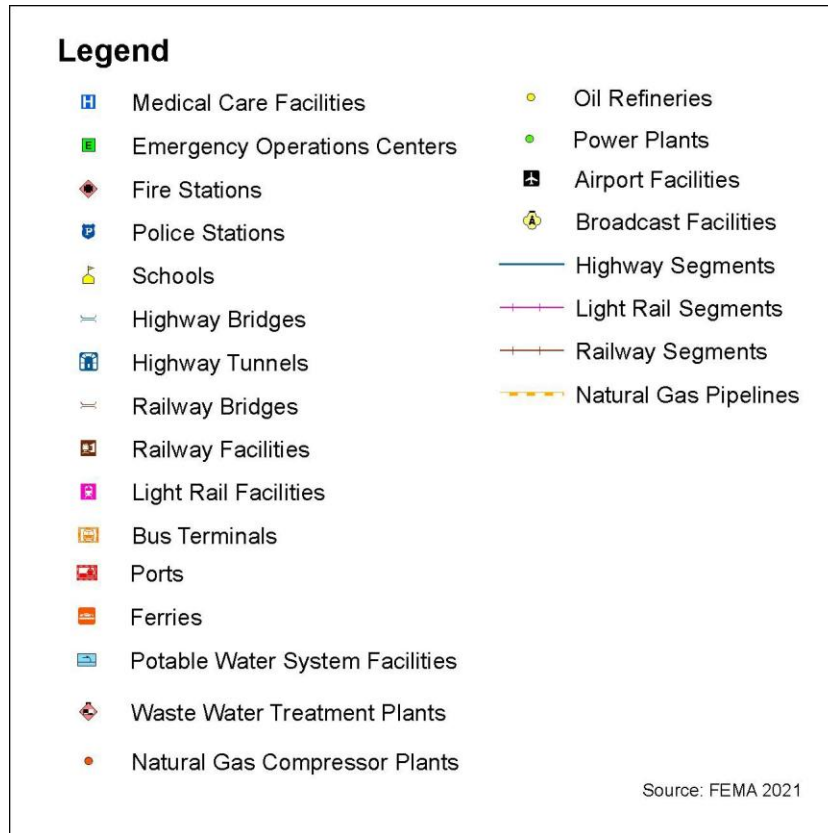


Figure 13: Legend to Figure 12 - Loudoun County Critical Assets Located in the Flood Zone

6. Capability Assessment

Loudoun County reviewed its legislative and departmental capabilities to identify resources, strengths, and gaps for implementing hazard mitigation efforts. Using a Capabilities Assessment Worksheet, the community documented existing institutions, plans, policies, ordinances, programs, and resources that could be brought to bear on implementing the mitigation strategy. The capabilities in relation to hazard mitigation were assessed in the following categories:

- Planning and regulatory
 - Implementation of ordinances, policies, site plan reviews, local laws, state statutes, plans, and programs that relate to guiding and managing growth and development
- Administrative and technical
 - County, city, and town staff and their skills and tools that can be used for mitigation planning and to implement specific mitigation actions
- Safe growth
 - Use of community planning through comprehensive plans as hazard mitigation to increase community resilience
- Financial
 - Resources that a jurisdiction has access to or is eligible to use to fund mitigation actions
- Education and outreach
 - Programs and methods that could be used to implement mitigation activities and communicate hazard-related information

In addition to the Capabilities Assessment Worksheet, Loudoun County completed a Jurisdiction Needs Identification Questionnaire that summarized changes in and enhancements of capabilities since the last plan. This information is integrated into the summaries in this section.

6.1. Capability Assessment Summary Ranking and Gap Analysis

The jurisdiction ranked the level of capability in relation to each assessment category as a means of identifying where elements could be strengthened or enhanced. Capabilities were ranked on a qualitative basis as demonstrated by the jurisdiction's authorities, programs, plans, and/or resources:

- **Limited:** The jurisdiction has limited capabilities within this category and is generally unable to implement most mitigation actions.
- **Low:** The jurisdiction has some capabilities within this category and can implement few mitigation actions.
- **Moderate:** The jurisdiction has some capabilities within this category, but improvement is needed in order to implement some mitigation actions.
- **High:** The jurisdiction has significant capabilities within this category as demonstrated by its authorities, programs, plans and/or resources and can implement most mitigation actions.

Assessment of Loudoun County Community Assets and Potential Hazard Impacts⁴⁴Loudoun County evaluated different assets in the community to determine which are potentially at risk to hazards.

Natural Environment: What assets may be impacted by which hazard(s)?

- **Water resources:** In the Loudoun Plain, six rivers and creeks course through the county: Broad Run River, Bull Run River, Catoclin Creek, Goose Creek, Little River Creek, and Piney Run River. Beaverdam Reservoir, the Potomac River, wetlands, groundwater, drainage systems, and karst terrain are important natural assets.
- **Recreation Areas:** Forty-seven parks, plus three adult day centers; seven community centers; seven historical sites located within parklands; twenty-five neighborhood parks; and parks with significant ponds/lakes (including three managed dam systems). Any of the structures or outdoor assets could be damaged during a hazard event and the impact may be worsened if staff and residents are using facilities, trails, or waterways.
- **Critical Habitat:** Forest cover along Blue Bridge, Short Hill, and Catoclin Mountain ranges have zoning ordinances that require reservation.
- **Hazards:** All Hazards

Economy: What assets may be impacted by which hazard(s)?

- **Major Employers** include Loudoun County Public Schools, Loudoun County Government, Verizon, Northrop Grumman, United Airlines, Raytheon, Inova Loudoun, Walmart, US Postal Service, Dynaletric, Harris Teeter, Bowers
- **Primary economic sectors** include data centers, information, and communications Technology, Federal Government Contracting, Aerospace and Defense, Aviation and Transportation, Health Innovation and Technology, Agriculture and Related Business.
- **Hazards:** All Hazards

Population: What assets may be impacted by which hazard(s)?

- Loudoun County has a population of 421,636, an increase of approximately 35% since 2010. The population density is 810 persons per square mile, significantly lower than other Northern Virginia counties.
- **Hazards:** All hazards

Built Environment: What assets may be impacted by which hazard(s)?

- The Loudoun County Government Center And other public facilities provide services to residents.
- **Critical Facilities** include public safety facilities such as Fire-Rescue Stations, Emergency Operations Center, Sheriff's Office Substations, hospitals (Leesburg, Landsdowne, Ashburn, and Stone Springs), Loudoun Water facilities, data centers, government facilities, schools, and long-term care facilities.
- Loudoun County contains numerous historic properties; natural preservation sites; artifacts and archeology assets. These are discussed in greater detail in 1.4.9.1.

Loudoun County addresses future development in the Loudoun County 2019 Comprehensive Plan.

Hazards: Natural disasters; fire; vandalism; pandemic impacts to staffing, economic loss of funding

⁴⁴ Loudoun County, Community Assets Worksheet 3

Climate Change: Which assets are at risk of future conditions related to climate change?

- The built environment, natural environment, infrastructure, economy and those who live and work in Loudoun County all face risks related to climate change.

Table 33: Capability Assessment Summary Ranking for Loudoun County

Capability	Ranking
Planning and Regulatory	High
Administrative and Technical	High
Safe Growth	High
Financial	Moderate
Education and Outreach	Moderate

6.1.1. Planning and Regulatory Capabilities Summary

The Loudoun County Office of Planning and Zoning takes an all-hazards approach when developing any jurisdictional plans—including emergency operations—and continuity of operations, as well as the hazard mitigation plan.

The following plans have been newly developed or updated since the 2017 HMP:

- Loudoun County 2019 Comprehensive Plan
- 2019 Transportation Plan (part of the 2019 Comprehensive Plan)
- Fiscal Years 2021-2026 Capital Improvement Plan
- Loudoun Water 2021-2030 Capital Improvement Plan
- 2017 Economic Growth and Diversification Plan
- July 2019 Emergency Operations Plan
- Loudoun County Small Municipal Separate Storm Sewer System (MS4) Stormwater Management Program Plan, July 2018-June 2023
- Loudoun Health District, Pandemic Response Plan, March 2020
- FEMA Flood Insurance Rate Maps, 2019

Capability Analysis: High

Loudoun County is mindful of the need to develop plans, codes, and regulations that minimize the likelihood that hazard events will negatively affect people, property, crops, and farm animals. These include natural hazard-specific ordinances (stormwater, steep slope, wildfire), and the Mountainside Development Overlay District and Steep Slope Standards of the County Zoning Ordinance.

6.1.2. Administrative and Technical Capabilities Summary

Loudoun County identified the following departments and agencies as key stakeholders in its hazard mitigation planning process and implementation of the plan:

- Planning/Engineer: Planning Department, Zoning, Building and Development
- Building and Public Works engineers trained in construction practices related to buildings and infrastructure
- Planners/engineers with an understanding of natural and/or man-made hazards
- GIS and Fire and Rescue Departments with personnel skilled in GIS and Hazus
- Scientists familiar with community hazards
- Emergency Management personnel
- Grant writers in all departments

Capability Analysis: High

The Loudoun County staff across the board is trained in how to maintain current systems for managing all business, societal, and economic sectors and improves staffing needs as is necessary.

6.1.3. Safe Growth Capabilities Summary

Loudoun County departments cover safe growth on many levels. The 2019 Loudoun County Comprehensive Plan includes policies and guidance to cover or reinforce best practices in the following areas:

- Land Use
- Transportation
- Environmental Management
- Public Safety
- Zoning
- Subdivision Development
- Historic Preservation

Capability Analysis: High

The Safe Growth Capabilities in the Plan show that Loudoun County is proud of its illustrious past and tries to maintain a balance between honoring historic assets while taking advantage of future opportunities available to a community located near the nation's capital.

6.1.4. Financial Capabilities Summary

Loudoun County is able to take advantage of financial mechanisms in place to generate funding for current and future opportunities.

- Capital Improvements Project funding
- Authority to levy taxes for specific purposes
- Community Development Block Grants
- Public/Private Partnerships
- State Funding

Capability Analysis: Moderate

While Loudoun County takes full advantage of current financial capabilities, it looks forward to addressing new funding opportunities, including the use of federal grants from FEMA and other agencies.

6.1.5. Education and Outreach Capabilities Summary

Several departments and agencies conduct education and outreach to make citizens aware of resources available to them.

- Sheriff's Office: Adult Crime Prevention Unit offers classes to the public on crime prevention topics
- Loudoun County Public Schools Outreach Services includes a Parent Liaisons program, Language Assistance Service, and a Community Schools Initiative to provide mental health resources and afterschool opportunities to socialize or receive academic assistance.
- The Loudoun Education Foundation provides multicultural educational information and conducts direct outreach to promote interchange between diverse groups.

6.1.5.1. Capability Analysis: Moderate

Loudoun County is well positioned to build on its current education and outreach programs to promote hazard awareness and mitigation efforts that can be practiced by businesses, community groups, individuals, households, and other stakeholders. Its ten public libraries and array of facilities under the Department of Parks, Recreation, and Community Services (PRCS) all provide locations where staff and volunteers regularly interact with the public. These physical structures and the array of print, web-based, and broadcast media show that "the sky's the limit" for the number of ways to create community awareness about hazards and their impact on the community.

6.2. Capability Summary – Activities that Reduce Natural Hazard Risk or Impacts

As a component of the capability assessment, Loudoun County identified activities related to each natural hazard that support risk reduction. They are listed in Table 32.

Table 34: Capability Summary – Activities that Reduce Natural Hazard Risk or Impacts

Hazard	Activity
Dam Failure (including Levees)	<ul style="list-style-type: none"> • All but three dams classified as being high or significant hazard dams in Loudoun County have Emergency Action Plans for potential incidents. Per National Dam Inventory, USACE
Drought	<ul style="list-style-type: none"> • Public education and operational plans address preparedness and response to reduce risk. • Land use and environmental policies acknowledge the importance of protecting the natural environment.
Earthquake	<ul style="list-style-type: none"> • State and international building codes provide for seismic design regulations. • Public education and operational plans address preparedness and response to reduce risk.
Extreme Temperature	<ul style="list-style-type: none"> • Public education and operational plans address preparedness and response to reduce risk.

Hazard	Activity
Flood/Flash Flood	<ul style="list-style-type: none"> • Floodplain administration and regulations ensure that inappropriate activities and future development in the floodplain are prohibited. • Stormwater management program and projects address flood prevention and risk reduction.
High Wind/Severe Storm	<ul style="list-style-type: none"> • State and international building codes provide for wind and seismic design regulations.
Karst/Sinkhole/Land Subsidence	<ul style="list-style-type: none"> • Land use and environmental policies acknowledge the importance of protecting the natural environment.
Landslide	<ul style="list-style-type: none"> • Land use and environmental policies acknowledge the importance of protecting the natural environment.
Tornado	<ul style="list-style-type: none"> • Public education and operational plans address preparedness and response to reduce risk.
Wildfire	<ul style="list-style-type: none"> • Public education and operational plans address preparedness and response to reduce risk.
Winter Weather	<ul style="list-style-type: none"> • Public education and operational plans address preparedness and response to reduce risk.
Non-Natural Hazards	<ul style="list-style-type: none"> • Public education and operational plans address preparedness and response to reduce risk. • Beginning with the 2022 NOVA HMP, hazard mitigation planning is being integrated into existing planning and risk reduction activities for technological and human-caused hazards.
Climate Change	<p>A chapter of the Loudoun County 2019 Comprehensive Plan addresses Land Use and how to develop a resilient built environment. The chapter on Natural, Environmental and Heritage Resources discusses the need to consider how best to maintain a fragile ecosystem and historic resources in the face of current and future climate change.</p>

7. Resilience to Hazards

The National Risk Index (NRI) provides an overview of hazard risk, vulnerability, and resilience. The designation of “low risk” is driven by lower loss due to natural hazards, lower social vulnerability, and higher community resilience.

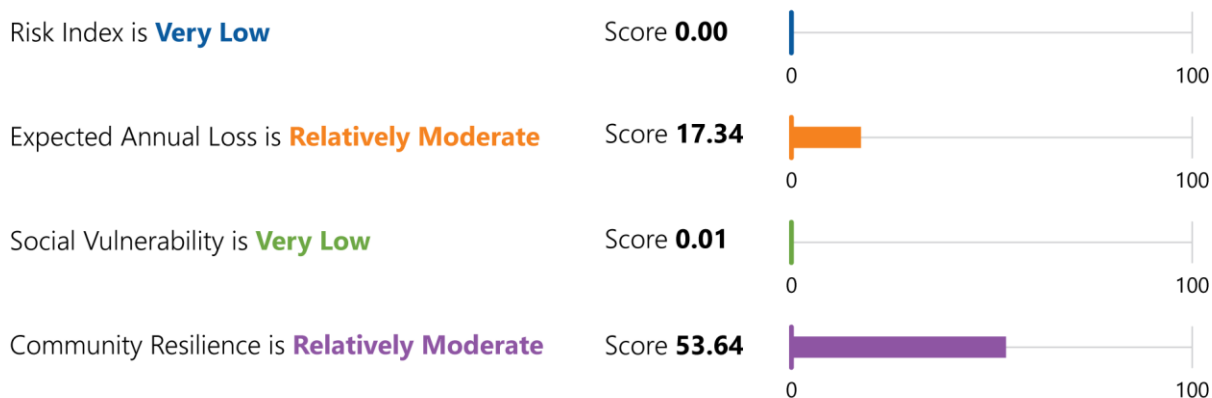


Figure 14: Summary of National Risk Index Findings, Loudoun County⁴⁵

Table 35: Comparison of Loudoun County Scores with Virginia and National Average⁴⁶

Index	Loudoun County	Virginia Average	National Average
Risk	3.26	6.62	10.70
Expected Annual Loss	17.34	9.35	13.47
Social Vulnerability	0.01	35.32	38.35
Community Resilience	53.64	54.92	54.59

Table 36: Loudoun County Risk Ranking⁴⁷

Index	Rank
Risk	Very Low
Expected Annual Loss	Relatively Moderate
Social Vulnerability	Very Low
Community Resilience	Relatively Moderate

⁴⁵ National Risk Index

⁴⁶ Ibid.

⁴⁷ Ibid.

Loudoun County's NRI Community Resilience score of 53.64 represents a relatively low ability to prepare for anticipated natural hazards, adapt to changing conditions, and withstand and recover rapidly from disruptions when compared to the rest of the United States.

7.1. Community Resilience Estimate

The Community Resilience Estimate (CRE) is a data product produced by the U.S. Census Bureau that can be utilized to estimate potential community resilience to disasters by combining data from several sources to analyze individual and household-level risk factors.

The index produces aggregate-level (census tract, county, and state) small-area estimates that provide a tool for understanding how much risk a specific neighborhood might face as a result of characteristics that may render certain segments of the population more vulnerable to the impacts and consequences of disasters. These risk factors⁴⁸ include the following:

1. Income-to-poverty ratio
2. Single or zero caregiver household
3. Unit-level crowding
4. Communication barrier
5. Aged 65 years or older
6. Lack of full-time or year-round employment (household)
7. Disability
8. No health insurance coverage
9. No vehicle access (household)
10. No broadband internet access (household)

In 2021, the U.S. Census Bureau released data estimates showing the counties and states with the highest percentage of residents who are considered vulnerable to a disaster or other emergency. The percentages were mapped by *U.S. News and World Report*.⁴⁹

⁴⁸ The Community Resilience Estimates are developed by the U.S. Census Bureau (initial release date August 10, 2021). Methodology is described at the [U.S. Census Bureau Community Resilience Methodology page](https://www.census.gov/programs-surveys/community-resilience-estimates/technical-documentation/methodology.html) (<https://www.census.gov/programs-surveys/community-resilience-estimates/technical-documentation/methodology.html>).

⁴⁹ Alex Leeds Matthews, [U.S. News and World Report](https://www.usnews.com/news/health-news/articles/2021-10-13/counties-where-americans-are-most-vulnerable-to-disaster), 10-13-2021. Where Americans Are Most Vulnerable to Disaster, <https://www.usnews.com/news/health-news/articles/2021-10-13/counties-where-americans-are-most-vulnerable-to-disaster>

Share of Residents With at Least 3 'Resilience' Risk Factors, by County

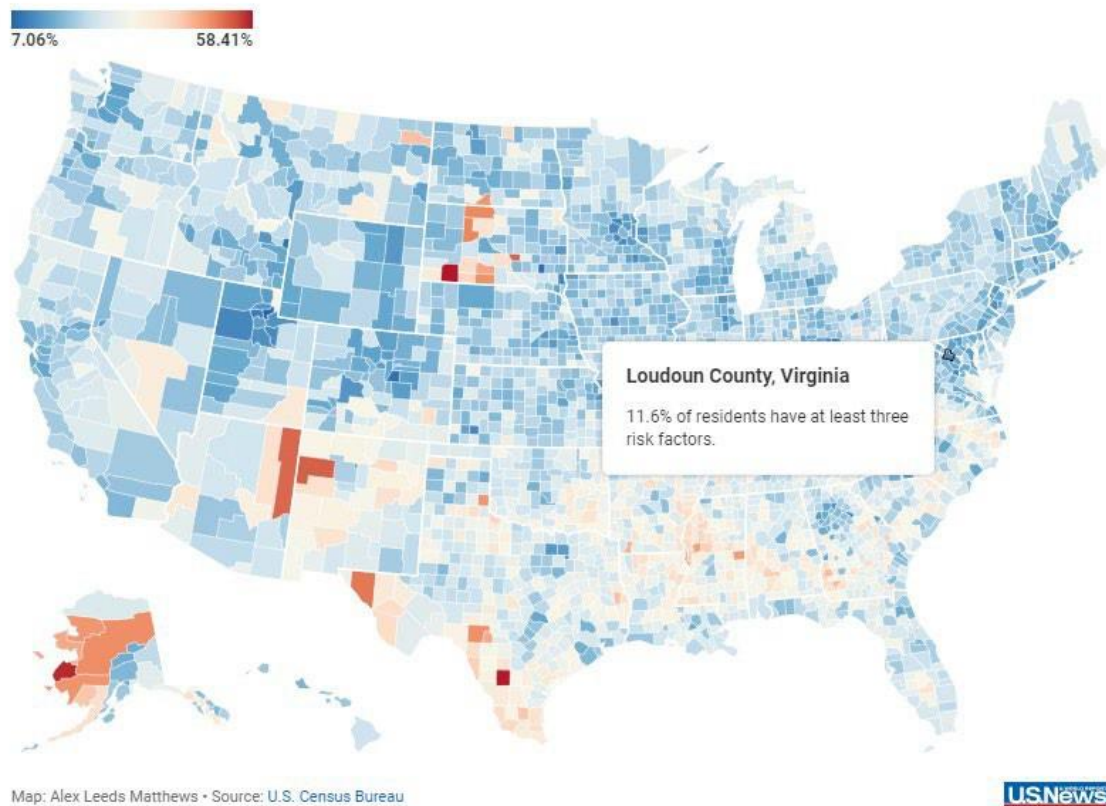


Figure 15: Community Resilience Estimate for Loudoun County⁵⁰

The combination of data and analysis described in this section provides a comprehensive representation of Loudoun County's risk, vulnerability, and resilience to all hazards.

7.2. New Hazard Risk Challenges or Obstacles

The Loudoun County Planning Team identified specific hazard challenges and obstacles to be monitored in the next planning cycle:

- The risk of cyber-related incidents on Critical Infrastructure and Key Resource sites
- Climate change
- Increases in the number of excessive rainfall events that impact areas currently identified as flood zones, as well as new areas of flooding that emerge as stormwater management events.

⁵⁰ Community Resilience Estimates, U.S. Census Bureau

8. Mitigation Actions

8.1. Goals and Objectives

The Loudoun County Planning Team adopted the regional goal statement presented in [Section 8, Base Plan](#). In addition, the *Loudoun County Emergency Operations Plan (EOP)*, dated June 2019, outlines the need to conduct Threat and Hazard Identification and Risk Assessment (THIRA), a strategic analysis of hazards that pose a significant threat to the community. The THIRA evaluates and analyzes past experience, historical information, probability, projected impacts, and resource availability—all elements of the hazard mitigation planning process. The EOP states, “By recognizing and understanding the risks that the community faces, Loudoun County places itself in a position to make better resource management decisions” (*Loudoun County EOP*, p. 1-12, Base Plan). The link between the goals of the *NOVA HMP* and the *EOP* increases the likelihood of success in implementing mitigation actions.

8.2. Status of Previous Actions

Loudoun County monitors actions and tracks progress through the periodic review, evaluation, revision, and update of the NOVA HMP. Some projects that contribute to risk reduction have been completed or are currently in progress but have not been included in this plan for one of the following reasons:

- Project funding has been approved, received, or identified, and additional resources are not needed to complete the project.
- The project scope is inconsistent with the hazard mitigation planning goals defined in this plan.
- The responsible department, agency, or organization maintains an internal tracking system that documents progress and resulting risk reduction.

The Loudoun County Mitigation Actions list includes previously identified actions from the 2006, 2010, and 2017 plans. Four actions from the 2006 plan were carried forward for the 2022 NOVA HMP update. Twelve actions from the 2010 plan were carried forward, and one was noted as completed and removed from the list. Nine actions from the 2017 plan were carried forward and three were noted as complete. The comprehensive list of previous mitigation actions, including descriptions of progress made and current status, is presented in [Attachment 4](#) of this annex.

8.3. New Mitigation Actions

In addition to the actions carried forward from previous plans, the Loudoun County Planning Team identified two new mitigation actions to be included in this plan. These actions address the expansion and strengthening of the Office of Emergency Management continuity program by increasing the resilience of county operations; they also facilitate coordination with FEMA to re-evaluate flood zones and update Flood Insurance Rate Maps (FIRMs) as a basis for future National Flood Insurance Program Activities. [Attachment 4](#) of this annex includes a table that summarizes each new and continued action, describing the proposed activity, priority level, estimated cost, and lead agency.

8.4. Action Plan for Implementation and Integration

The Loudoun County Office of Emergency Management (OEM) is responsible for coordinating county departments and agencies participating in hazard mitigation activities. The OEM-designated mitigation coordinator (Assistant Coordinator- Planning) is responsible for implementing the mitigation plan on two levels: the jurisdictional level and the multi-jurisdictional regional level. Tasks to ensure the implementation of the jurisdiction’s actions are integrated into the *Action Plan for Implementation and*

Integration (which includes the prioritized list of Mitigation Actions), and plan maintenance procedures are described in the next section.

The *Loudoun County Emergency Operations Plan (EOP)*, dated June 2019 (p. 82), defines criteria for project eligibility under the Hazard Mitigation Grant Program (HMGP); it states that a project must meet the following requirements:

- Conform to the State Hazard Mitigation Plan.
- Conform to environmental, historical, and economic justice issues.
- Provide a long-term solution.
- Demonstrate cost effectiveness.
- Comply with program regulations.
- Be consistent with overall mitigation strategies.

The Action Plan for Implementation and Integration describes how the county's hazard mitigation risk assessment and goals will be incorporated into its existing plans and procedures.

Table 37: Action Plan for Implementation and Integration, Loudoun County

Existing Plan or Procedure	Description of How Mitigation Will Be Incorporated or Integrated
Integrate goals into local comprehensive plan.	Continue to coordinate with departments to incorporate current and emerging risks and actions into planning efforts.
Review/update land development regulations for consistency with mitigation goals.	Continue coordinating with Planning and Zoning and Building Development on future land use projects.
Review/update building/zoning codes for consistency with mitigation goals.	Work with Planning and Zoning and Building and Development to ensure county zoning ordinances are consistent with mitigation goals.
Maintain regulatory requirements of floodplain management program (NFIP).	Support the Department of Building and Development sectors of Natural Resources and Water and Hydrology to ensure compliance with NFIP floodplain management regulations.
Enhance floodplain management through Community Rating System (CRS).	Work with applicable departments on floodplain management and mapping.
Review/update economic development plan and policies for consistency with mitigation goals.	Work with Loudoun County Department of Economic Development to ensure consistency and integration between the mitigation plan and plans for future development.
Continue public engagement in mitigation planning.	Continue to promote awareness of hazards and incorporate public feedback into planning processes for resident feedback.
Identify opportunities for mitigation education and outreach.	Identify opportunities to conduct community outreach to promote the importance of mitigation projects.

Existing Plan or Procedure	Description of How Mitigation Will Be Incorporated or Integrated
Review/update stormwater plans and procedures for consistency with mitigation goals.	Work with Department of General Services Stormwater Division to discuss plans and procedures on a more frequent basis.
Review/update emergency plans to address evacuation and sheltering.	Continue to work with partner agencies list in the EOP and the Shelter Operations Plan.
Maintain ongoing enforcement of existing policies.	Support Department of Planning and Zoning with any applicable enforcement policies.
Monitor funding opportunities.	Continue to monitor funding sources and coordinate with departments on projects that support mitigation actions.
Incorporate goals and objectives into day-to-day government functions.	Incorporate the concept of mitigation into day-to-day government functions, including continual monitoring of the action items identified in the 2022 update.
Incorporate goals into day-to-day development policies, reviews, and priorities.	Continue work with Department of Planning and Zoning and Building and Development to incorporate mitigation into day-to-day activities.

9. Annex Maintenance Procedures

The point of contact for the NOVA HMP Planning Team is the facilitator for the process of monitoring, evaluating, and updating the **NOVA HMP, Base Plan** and is responsible for initiating the annual activities, convening the Planning Team, and providing follow-up reports to designated entities defined in the method and schedule for the plan maintenance process, as outlined in **Section 3, Base Plan**.

Table 38: Loudoun County Plan Maintenance Responsibilities for the Northern Virginia Hazard Mitigation Plan, 2022 NOVA HMP Base Plan

Activity	Responsibilities
Monitoring the Plan	<ul style="list-style-type: none"> • Represent the jurisdiction during the monitoring process. • Collect, analyze, and report data to the NOVA HMP Planning Team • Maintain records and documentation of all jurisdictional monitoring activities. • Assist in disseminating reports to stakeholders and the public. • Promote the mitigation planning process with the public and solicit public input.
Evaluating the Plan	<ul style="list-style-type: none"> • Represent the jurisdiction during the evaluation process. • Collect and report data to the NOVA HMP Planning Team. • Maintain records and documentation of all jurisdictional evaluation activities. • Assist in disseminating information and reports to stakeholders and the public.
Updating the Plan	<ul style="list-style-type: none"> • Represent the jurisdiction during the planning cycle, including plan review, revision, and update process. • Collect and report data to the NOVA HMP Planning Team. • Maintain records and documentation of all jurisdictional plan review and revision activities. • Help disseminate reports to stakeholders and the public.

9.1. Maintenance of the Jurisdiction Annex

In addition to maintenance of the **NOVA HMP, Base Plan**, the Loudoun County mitigation planning coordinator (Assistant Coordinator- Planning) will facilitate the method and schedule for maintaining the **Jurisdiction Annex**.

9.1.1. Plan Maintenance Schedule

- **Monitor:** Annually and/or following major disaster(s)
- **Evaluate:** Annually and/or following major disaster(s)
- **Update:** Annual tasks over the five-year planning cycle; planning process in fifth year

Table 39: Loudoun County Jurisdiction Annex Maintenance Procedure

Activity	Procedure and Schedule	Outcome
Monitoring the Annex	<ol style="list-style-type: none"> Schedule the annual plan review with jurisdiction planning team. Review the status of all mitigation actions, using the <i>Mitigation Action Implementation Worksheet</i> (Section 3, Attachment A, NOVA HMP Base Plan). 	Produce an annual report that includes the following: <ul style="list-style-type: none"> Status update of all mitigation actions Summary of any changes in hazard risk or vulnerabilities and capabilities Summary of activities conducted for the Action Plan for Implementation and Integration
Evaluating the Annex	<ol style="list-style-type: none"> Schedule the annual plan evaluation with jurisdiction planning team. Evaluate the current hazard risks and vulnerabilities and hazard mitigation capabilities, using the <i>Planning Considerations Worksheet</i> (Section 3, Attachment C, NOVA HMP Base Plan). 	Submit the annual report to the NOVA HMP Planning Team Point of Contact.
Updating the Annex	<ol style="list-style-type: none"> Coordinate with Northern Virginia jurisdictions to identify the method and schedule for the five-year update of the NOVA HMP. Participate in the planning process. Provide input related to the plan components. Following FEMA Approvable Pending Adoption (APA) designation, adopt the updated plan. 	Adoption of the FEMA-approved plan every five years will maintain the jurisdiction's eligibility for federal post-disaster funding.

Mitigation actions presented in the Loudoun County Jurisdiction Annex may be reviewed, revised, and updated at any time. In addition, the *Loudoun County EOP*, p. 83, stipulates that "OEM will contact all agencies for post-disaster mitigation activities and notify them of their role in these operations." This will ensure that mitigation actions remain current and positioned for potential funding as it becomes available.

Loudoun County will continue to be a planning partner with multiple jurisdictions and regional entities to identify hazard mitigation opportunities that reduce risk of the hazards identified in this plan.

10. Annex Adoption

The Loudoun County Jurisdiction Annex will be adopted simultaneously with the adoption of the *Northern Virginia Hazard Mitigation Plan (2022 NOVA HMP)*.

11. Loudoun County Attachments

- Attachment 1: Adoption Resolution
- Attachment 2: Documentation of the Planning Process
- Attachment 3: Documentation of Public Participation
- Attachment 4: Mitigation Actions

11.1. Attachment 1: Adoption Resolution

[This page is a placeholder for the Adoption Resolution for this jurisdiction.]

11.2. Attachment 2: Planning Worksheets and Documentation

Capability Assessment

Jurisdiction: Loudoun County

Date: 9/22/21

Participants:

Name	Position/Title	Department/Agency
Kelly Myers	Assistant Coordinator-Planning	Loudoun County
Joe Dame	Emergency Management Coordinator	Town of Leesburg
Elizabeth Moore	Emergency Preparedness Specialist	Loudoun County
Nancy Freeman	Senior Mitigation Planner	IEM
Jessica Mason	Hazard Mitigation Planner	IEM

Planning and Regulatory

Planning and regulatory capabilities are the plans, policies, codes, and ordinances that prevent and reduce the impacts of hazards. Please indicate which of the following your jurisdiction has in place.

Plans	Yes or No? Year	Does the plan address natural and/or non-natural hazards? Does the plan identify projects to include in the mitigation strategy? Can the plan be used to implement mitigation actions?
Comprehensive/Master Plan: Loudoun County 2019 Comprehensive Plan https://www.loudoun.gov/4957/Loudoun-County-2019-Comprehensive-Plan	Yes, 2019	<ul style="list-style-type: none"> • Describes land-use trends and population growth, expected growth, and development patterns (Chapter 2, p. 7) • Land-use planning framework policy areas: urban, suburban, transition, rural and towns, and Joint Land Management Areas • Use plan to implement mitigation actions?
Capital Improvement Plan FGOEDC Item 05 Quarterly Report Capital Improvement Projects Q3 FY21 (3).pdf	Yes, 2021-2030	
Economic Development Plan: Economic Growth and Diversification Plan, August 24, 2017, GO Northern Virginia Regional Council https://www.dhcd.virginia.gov/sites/default/files/Docx/gova/region-seven/region-7-growth-diversification-plan.pdf	Yes—regional plan	<ul style="list-style-type: none"> • Does not address natural or non-natural hazards
Impact fees for new development: Regulatory authority https://law.lis.virginia.gov/vacode/title15.2/chapter22/section15.2-2329/ Land-Development-Application-Fees (loudoun.gov)	Yes—2016	<ul style="list-style-type: none"> • Allowed under Code of Virginia, §15.2-2329, Imposition of Impact Fees • Economic Development Support Fund: one-time seed money for projects that provide economic benefits to the county for capital development projects, purchasing real estate, programming support for activities identified in the Economic Success Plan
Local Emergency Operations Plan: Loudoun County Emergency Operations Plan, July 2019 https://www.loudoun.gov/DocumentCenter/View/115801/Emergency-Operations-Plan?bidId=	Yes	<ul style="list-style-type: none"> • “All-hazards” (p. 1-9) • 25 natural, technological and human-caused hazards listed on p. 1-12 • Operational plan, does not include projects

Plans	Yes or No? Year	Does the plan address natural and/or non-natural hazards? Does the plan identify projects to include in the mitigation strategy? Can the plan be used to implement mitigation actions?
Continuity of Operations Plan	Yes	Currently updating
Transportation Plan: Countywide Transportation Plan (2019 Comprehensive Plan) https://www.loudoun.gov/DocumentCenter/View/152287/CTP---Combined-with-small-maps-bookmarked	Yes	<ul style="list-style-type: none"> Projects are not hazard-oriented Chapter 8 describes multiple funding sources Chapter 9 describes implementation strategies
Stormwater Management Plan: Loudoun County Code, Chapter 1096, Stormwater Management Ordinance, adopted in 2003 https://codelibrary.amlegal.com/codes/loudouncounty/latest/loudounco_va/0-0-0-9717 Loudoun County Small Municipal Separate Storm Sewer System (MS4) Stormwater Management Program Plan, July 2018-June 2023	Yes	<ul style="list-style-type: none"> Purpose includes “control of flooding and standing water” Program Plan references erosion and sediment control (p. 4) Public education and outreach program and public involvement requirements described
Community Wildfire Protection Plan	No	
Other special plans (e.g., brownfields redevelopment, disaster recovery, Local Waterfront Redevelopment Plan, climate change adaptation, etc.): <i>Loudoun Health District, Pandemic Response Plan</i> , March 2020 https://www.loudoun.gov/DocumentCenter/View/179/Loudoun-Pandemic-Response-Plan?bidId=	Yes	<ul style="list-style-type: none"> Pandemic Response Plan, Attachment H: Educational Outreach Activities

Building Code, Permitting, and Inspection	Yes or No?	Are codes adequately enforced?
Building Code: https://www.loudoun.gov/5012/Building-Codes-Regulations	Yes–2015	Virginia Uniform Statewide Building Code
Building Code Effectiveness Grading Schedule (BCEGS) Score	Yes	We received a score of 4 in 2020. That was a regression from 2013 when we were scored a 3. This past June, I requested an appeal, and we were granted a score of 3 based on the new code going in effect July 1. I have not received the final score in writing yet. However, I do have an

Building Code, Permitting, and Inspection	Yes or No?	Are codes adequately enforced?
		email stating the adjustment will be made. I will follow up with ISO to get the final report and score.
Fire Department ISO rating: Public Protection Class (PPC) Ratings Changes Loudoun County, VA: Official Website	Yes	5–Rural 2–Suburban 10–No Fire Station Within 5 Mile Drive
Site Plan review requirements https://www.loudoun.gov/1315/Site-Plans	Yes	Website describes review requirements and process

Land Use Planning and Ordinances	Yes or No?	Is the ordinance an effective measure for reducing hazard impacts? Is the ordinance adequately administered and enforced?
Zoning ordinance https://www.loudoun.gov/zoningordinance	Yes–1993	<ul style="list-style-type: none"> Goals include adequate safety from crime, disaster evaluation, civil defense, transportation, water, sewage, flood protection, etc., and protect against loss of life, health, or property from fire, flood, panic and other dangers
Subdivision ordinance: Land Subdivision and Development Ordinance, Chapter 1241 https://www.loudoun.gov/DocumentCenter/View/18047/Land-Subdivision-and-Development-Ordinance?bidId=	Yes–2006	<ul style="list-style-type: none"> Does not address hazards or include mitigation actions related to the HMP hazards
Floodplain ordinance: Floodplain Management https://www.loudoun.gov/1505/Floodplains and Revised 1993 Loudoun County Zoning Ordinance, Section 4-1500, Floodplain Overlay District https://www.loudoun.gov/DocumentCenter/Home/Index/1524	Yes	<ul style="list-style-type: none"> Major Floodplain (SFHA), and Minor Floodplain, which continues upstream from the Major Floodplain Publishes the phone number for the County Department of Building and Development Floodplain Help Line
Natural hazard specific ordinance (stormwater, steep slope, wildfire): Mountainside Development Overlay District and Steep Slope Standards of the County Zoning Ordinance https://www.loudoun.gov/1378/Steep-Slopes-Mountainsides	Yes	<ul style="list-style-type: none"> Delineates safety hazards on this topography Reference to erosion and downstream flooding
Flood insurance rate maps	Yes, 2017	Yes

Land Use Planning and Ordinances	Yes or No?	Is the ordinance an effective measure for reducing hazard impacts? Is the ordinance adequately administered and enforced?
Acquisition of land for open space and public recreation uses	Yes	Plans in the County Comprehensive Plan
Other <ul style="list-style-type: none"> • Home Improvement Programs Loudoun County, VA: Official Website • FY 2022 Adopted Budget: Volume Two (loudoun.gov) 	Yes	<ul style="list-style-type: none"> • Loans and grants to help homeowners who meet certain criteria to make home repairs focusing on code violations and health and safety issues • Additional projects (Capital Improvement Projects listed FY 2022 Budget Vol. 2 Capital Improvement Program)
How can these capabilities be expanded and improved to reduce risk?		

Administrative and Technical

Identify whether your community has the following administrative and technical capabilities. These include staff and their skills and tools that can be used for mitigation planning and to implement specific mitigation actions. If your jurisdiction does not have local staff resources, please indicate if these are available through agreement with other entities or at the county level to provide the services or technical assistance.

Staff/Personnel Resources	Have Capability Y/N	Department/ Agency and Position	Effective Coordination?	Adequate Staffing?	Integrated into Mitigation Planning?
A. Planner(s) or engineer(s) with knowledge of land development and land management practices	Yes	Building and Development	Yes	Yes	Yes
B. Engineer/professionals trained in construction practices related to buildings and/or infrastructure	Yes	Building and Development General Services	Yes	Yes	Yes
C. Planners/Engineer(s) with an understanding of natural and/or manmade hazards	Yes	Building and Development	Yes	Yes	Yes
D. Floodplain manager	Yes	Building and Development	Yes	Yes	Yes
E. Surveyor(s)	No				
F. Staff with education or expertise to assess the community's vulnerability to hazards	Yes	Office of Emergency Management and the Department of Building and Development	Yes	Yes	Yes
G. Personnel skilled in GIS and/or Hazus	Yes	Fire and Rescue, Mapping Office, Office of Emergency Management	Yes	Yes	Yes
H. Scientist familiar with hazards of the community	No				
I. Emergency manager	Yes	Office of Emergency Management	Yes	Yes	Yes
J. Grant writer(s)	Yes	County Administration	Yes	Yes	Yes
K. Warning systems or services (automated callout, sirens, etc.)	Yes	DIT, Office of Emergency Management,	Yes	Yes	Yes

Staff/Personnel Resources	Have Capability Y/N	Department/ Agency and Position	Effective Coordination?	Adequate Staffing?	Integrated into Mitigation Planning?
		Department of Fire and Rescue, Sheriff Office			
How can these capabilities be expanded and improved to reduce risk?					

Safe Growth

This worksheet identifies potential gaps in your community's growth guidance instruments and improvements that could be made to reduce vulnerability to future development.

Comprehensive Plan		Yes	No
Land Use			
1. Does the future land-use map clearly identify natural hazard areas?		X	
2. Do the land-use policies discourage development or redevelopment within natural hazard areas?		X	
3. Does the plan provide adequate space for expected future growth in areas located outside natural hazard areas?		X	
Transportation			
1. Does the transportation plan limit access to hazard areas?		X	
2. Is transportation policy used to guide growth to safe locations?		X	
3. Are movement systems designed to function under disaster conditions (e.g., evacuation)?		X	
Environmental Management			
1. Are environmental systems that protect development from hazards identified and mapped?		X	
2. Do environmental policies maintain and restore protective ecosystems?		X	
3. Do environmental policies provide incentives to development that is located outside protective ecosystems?		X	
Public Safety			
1. Are the goals and policies of the comprehensive plan related to those of the FEMA-approved Local Hazard Mitigation Plan?		X	
2. Is safety explicitly included in the plan's growth and development policies?		X	
3. Does the monitoring and implementation section of the plan cover safe growth objectives?		X	

Comprehensive Plan	Yes	No
Zoning Ordinance		
1. Does the zoning ordinance conform to the comprehensive plan in terms of discouraging development or redevelopment within natural hazard areas?	X	
2. Does the ordinance contain natural hazard overlay zones that set conditions for land use within such zones?	X	
3. Do rezoning procedures recognize natural hazard areas as limits on zoning changes that allow greater intensity or density of use?	X	
4. Does the ordinance prohibit development within wetlands, floodways, and floodplains or enable fines for such development?	X	
Subdivision Regulations		
1. Do the subdivision regulations restrict the subdivision of land within or adjacent to natural hazard areas?		X
2. Do the regulations provide for conservation subdivisions or cluster subdivisions in order to conserve environmental resources?	X	
3. Do the regulations allow density transfer where hazard areas exist?		X
Capital Improvement Program and Infrastructure Policies		
1. Does the capital improvement program limit expenditures on projects that would encourage development in areas vulnerable to natural hazards?	X	
2. Do infrastructure policies limit extension of existing facilities and services that would encourage development in areas vulnerable to natural hazards?	X	
3. Does the capital improvement program provide funding for hazard mitigation projects identified in the FEMA-approved Local Hazard Mitigation Plan?	X	
Other		
1. Do small area or corridor plans recognize the need to avoid or mitigate natural hazards?	X	
2. Does the building code contain provisions to strengthen or elevate construction to withstand hazard forces?	X	
3. Do economic development or redevelopment strategies include provisions for mitigation of natural hazards?	X	

Comprehensive Plan	Yes	No
4. Is there an adopted evacuation and shelter plan to deal with emergencies from natural hazards?	X	

Financial

Identify whether your jurisdiction has access to or is eligible to use the following funding resources for hazard mitigation.

Funding Resource	Access/ Eligibility (Y/N)	Has the funding resource been used in the past and for what type of activities?	Could the resource be used to fund future mitigation actions?
Capital improvements project funding	Y	Yes, for general projects	Yes
Authority to levy taxes for specific purposes	Yes, as allowed by law	Yes, for special assessments and special tax districts that fund a specific community need, usually water/sewer	Yes, but must meet certain requirements
Fees for water, sewer, gas or electric services	No		
Impact fees for new development	Y	Yes	Yes
Storm water utility fee	Yes	Yes, one-time fee for potential failure of alternative septic systems that do not get repaired by the landowner	Yes
Incur debt through general obligation bonds and/or special tax bonds	Yes	Yes, for general projects	Yes, must meet certain requirements, such as having been through referendum, fall within debt limits, approved by board
Incur debt through private activities	No		
Community Development Block Grant	Yes	Yes	Yes
Other federal funding programs	Yes	Yes, FEMA Public Assistance (PA). Flood mitigation is an area where FEMA offers assistance; we recently applied but were not selected for funding. Other funding based on law, i.e., ARPA, CARES Act	Yes, when a federal emergency is declared for FEMA PA, others may be competitive or enacted by law
State funding programs	Yes	Yes	Yes, if available. Could be competitive
Public/private partnership funding sources	Yes	Yes, to build soccer stadium and garage	Yes
How can these capabilities be expanded and improved to reduce risk?			

Education and Outreach

Identify education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information.

Program/Organization	Yes/No	Describe program/organization and how it relates to disaster resilience and mitigation. Could the program/organization help implement future mitigation activities?
Local citizens groups or nonprofit organizations focused on environmental protection, emergency preparedness, access, and functional needs populations, etc.	Yes	Blue Ridge Center for Environmental Stewardship - ©2021 Loudoun Environmental Education Alliance (loudounnature.org) Loudoun Senior Interest Network Resources for the Elder Care Community in Loudoun County (loudounseniors.org) Awareness, Connections, Education, Solutions Accessible Community
Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education, household recycling, etc.)	Yes	Fire and Life Safety Programs Loudoun County, VA - Official Website
Natural disaster or safety-related school programs	Yes	School Programs Loudoun County, VA - Official Website
StormReady certification	Yes	The county has the certification. INOVA Health System and Leesburg Corner Premium Outlets are supporters. StormReady® and TsunamiReady® in Virginia (weather.gov)
Firewise Communities certification	No	
Public-private partnership initiatives addressing disaster-related issues		Loudoun Cares Salvation Army Loudoun Watershed Watch - Overseeing the Water Resources of Loudoun County, VA
Other		
How can these capabilities be expanded and improved to reduce risk?		

National Flood Insurance Program (NFIP) Survey Form

Jurisdiction: Loudoun County

Floodplain/NFIP Administrator: Maggie Auer

Phone: 703-777-0222

Date: 9/22/2021

Email: Maggie.Auer@loudoun.gov

Jurisdiction Participants: Towns of Hamilton, Leesburg, Middleburg, Lovettsville, Purcellville, Round Hill, Unincorporated Areas of Loudoun County

Please provide the information below to document your community's participation in and continued compliance with the NFIP, as well as to identify areas for improvement that could be potential mitigation actions. Indicate the source of information if different from the one included.

NFIP Topic	Source of Information	Comments
Insurance Summary		
How many NFIP policies are in the community? What is the total premium and coverage?	State NFIP Coordinator or FEMA NFIP Specialist	664, \$402,839 (as of 05/2020)
How many claims have been paid in the community? What is the total amount of paid claims? How many of the claims were for substantial damage?	FEMA NFIP or Insurance Specialist	93, \$1,839,126, N/A (as of 05/2020)
How many structures are exposed to flood risk within the community?	Community Floodplain Administrator (FPA)	550 building footprints, 150 w/addresses in SFHA
Describe any areas of flood risk with limited NFIP policy coverage	Community FPA and FEMA Insurance Specialist	Unknown
Staff Resources		
Is the Community FPA or NFIP Coordinator certified?	Community FPA	Yes, Certified Floodplain Administrator (CFM)
Is floodplain management an auxiliary function?	Community FPA	No, full-time position
Provide an explanation of NFIP administration services (e.g., permit review, GIS, education or outreach, inspections, engineering capability)	Community FPA	Permit & Plan Review, Zoning Enforcement, Review Engineering Analysis
What are the barriers to running an effective NFIP program in the community, if any?	Community FPA	None
Compliance History		
Is the community in good standing with NFIP?	State NFIP Coordinator, FEMA NFIP Specialist, community records	Yes

NFIP Topic	Source of Information	Comments
Are there any outstanding compliance issues (i.e., current violations)?		Yes
When was the most recent Community Assistance Visit (CAV) or Community Assistance Contact (CAC)?		2014–2015

11.3. Attachment 3: Documentation of Public Participation

Loudoun County residents were invited to participate in a survey asking for their experience with local hazards. *Loudoun Now*, a community news source, published an article requesting community input.



Loudoun Residents Asked to Take Hazard Survey


[2021-08-20 Loudoun Now](#)

County officials are encouraging Loudoun residents and business owners to help build community resilience to disasters by participating in the Northern Virginia Hazard Mitigation Survey.

Loudoun County and its towns are part of a regionwide effort to update the Northern Virginia Hazard Mitigation Plan. The plan identifies strategies for reducing or eliminating loss of life, injury, and property damage caused by disasters as well as the long-term risks that result from hazards such as floods, severe storms, tornadoes, wildfires, and winter weather.

In addition to preventing loss of life, injury and damage to buildings and infrastructure, hazard mitigation can prevent damage to a community's economic, social, and environmental well-being.

The survey asks questions about natural hazards they are concerned about or have directly experienced in the past five years, as well as for opinions on proposed mitigation strategies...



Hazard Mitigation Planning for Northern Virginia*

Disasters can happen any time, any where, and any place. They can cause loss of life; damage buildings and infrastructure; and have devastating consequences on a community's economic, social, and environmental well-being. Hazard mitigation planning is a process that identifies hazards and their risks to your community, and analyzes the vulnerability of people, property, the environment and the economy. The outcome of the planning process is a comprehensive mitigation strategy that presents sustained actions to reduce or eliminate disaster damages and the long-term risks that result from these hazards. In addition, many of these actions will build community resilience to withstand future hazard events.

This is your community's plan! To have value, the plan must represent the current needs and values of your community and be useful for officials, stakeholders and citizens. Consider the critical importance of mitigation to:

- ✓ Protect public safety and prevent loss of life and injury.
- ✓ Reduce harm to existing and future development.
- ✓ Prevent damage to a community's unique economic, cultural, historical, and environmental assets.

In March 2021, the four counties, and 15 cities and towns comprising the Northern Virginia region will initiate a collaborative planning effort to develop the 2022 update of the **Northern Virginia Hazard Mitigation Plan**. The benefits gained during this planning process, and the mitigation actions that will ultimately implement the **Plan**, will have great significance to your community's future sustainability.

Your participation is needed! You can support the planning effort by:

- ✓ Learning how hazards impact your community and how to reduce your vulnerability to various hazards such as flood, severe weather, and earthquake.
- ✓ Participating in the Hazard Mitigation Survey, providing information about hazard events and their impacts
- ✓ Verifying information related to community assets and vulnerabilities.
- ✓ Reviewing the plan components and providing input to ensure relevancy to your community.

*This planning project is funded by a FEMA grant provided through the Virginia Department of Emergency Management(VDEM).

2022 Northern Virginia Hazard Mitigation Plan Update

- Who is participating?
 - 4 counties and their towns
 - 5 cities in Northern Virginia
- How to participate –
 - Kick-Off meeting
 - Jurisdiction Meeting
 - Provide information
 - Review draft plan and provide input
- Timeline –
 - March 2021 to January 2022

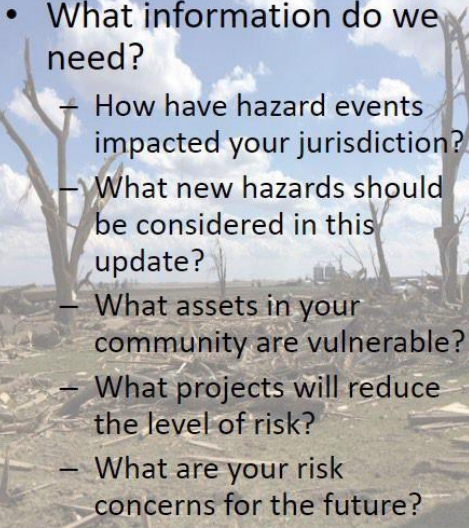
- 
- What information do we need?
 - How have hazard events impacted your jurisdiction?
 - What new hazards should be considered in this update?
 - What assets in your community are vulnerable?
 - What projects will reduce the level of risk?
 - What are your risk concerns for the future?

Figure 16: Promotional Flyer Distributed throughout the Planning Area

Below is a copy of the news release that Loudoun County sent out. It was shared with all the Towns was disseminated through other channels.

For Immediate Release
September 12, 2022

Media Contact: Glen Barbour, Public Affairs and Communications Officer
703-771-5086, Glen.Barbour@loudoun.gov

Loudoun Community Encouraged to Comment on Regional Hazard Mitigation Plan

The [Loudoun County Office of Emergency Management](#) encourages residents and business owners in Loudoun County to help build community resilience to disasters by providing comments on the proposed [Northern Virginia Hazard Mitigation Plan](#).

The plan is a multi-jurisdictional plan that includes Loudoun County and its incorporated towns as well as other Northern Virginia jurisdictions, including Arlington, Fairfax and Prince William counties.

The plan identifies strategies for reducing or eliminating loss of life, injury and property damage caused by disasters as well as the long-term risks that result from hazards such as floods, severe storms, tornadoes, wildfires and winter weather.

In addition to preventing loss of life and injury and damage to buildings and infrastructure, hazard mitigation can prevent damage to a community's economic, social and environmental well-being.

Members of the community can participate in the mitigation planning process by submitting their comments on the plan by 5:00 p.m., October 8, 2022, by email at NOVA2022PublicComment@iem.com.

11.4. Attachment 4: Mitigation Actions

Table 40: Previous Mitigation Actions

Project No.	Agency/ Department Mitigation Action	Lead Agency/ Department/ Organization	Hazard Type	Funding Source	Target Completion Date	Interim Measure of Success	Priority	Comments	Current Status	Comments to Justify Current Status	Projected Completion
2006-8	Maintain high quality aerial photography of the County	Office of Mapping/ Office of Emergency Management	All Hazards	Department of Homeland Security grants, UASI funding, County Funding	Ongoing	Continue to work with our local officials in stressing the importance of this initiative and identify funding to maintain the current capabilities	Low (Currently being done, but need to ensure it continues to be funded)	Complete-- but still a priority to maintain	Complete but still a priority to maintain	Need to Maintain	Continuation
2010-1	Meet with VDOT and develop a plan for adding flooding signage and gates for known trouble spots	Office of Emergency Management/ Loudoun County Sheriff's Office	Flood/High Wind/Severe Storm	Internal county funding, Federal Highway Administration grants, Tiger Grants	Ongoing	Within ninety days of endorsement of the plan have our kick-off meeting- within six months of our kick-off meeting have identified and vetted locations for action. Remaining period of time to identify funding sources and complete installation	High	Since 2010, we have met with VDOT and increased signage capability available for deployment notifying the public of road closed due to "high water". We have initiated conversation with VDOT regarding the installation of gates, but those conversations are in the infancy stage.	Complete but still need to maintain	Need to Maintain	Continuation

Project No.	Agency/ Department Mitigation Action	Lead Agency/ Department/ Organization	Hazard Type	Funding Source	Target Completion Date	Interim Measure of Success	Priority	Comments	Current Status	Comments to Justify Current Status	Projected Completion
2010-2	Evaluate Repetitive Loss and Severe Repetitive Loss properties within the County. Support mitigation of priority flood-prone structures through promotion of acquisition/ demolition, elevation, flood proofing, minor localized flood control projects, mitigation reconstruction and where feasible using FEMA HMA programs where appropriate	Office of Emergency Management	Flood/High Wind/Severe Storm	FEMA Unified Hazard Mitigation Assistance Grants, Hazard Mitigation Grant Program Repetitive Flood Claims Severe Repetitive Loss	Ongoing	Property owner interest and application to participate in FEMA Grant Program	High	Since 2010 Loudoun County has participated in the Risk Map program and have preliminary discussed these options in a variety of settings. Given the results of the Risk Map project, we will need to develop and implement strategies that continue the discussions and look at ways to minimize risk.		Need to Maintain	Continuation
2010-3	Review locality's compliance with the National Flood Insurance Program with an annual review of the Floodplain Ordinances and any newly permitted activities in the 100-year floodplain. Additionally, conduct annual review of repetitive loss and severe repetitive loss property list requested of VDEM to ensure accuracy. Review will include verification of the geographic location of each repetitive loss property and determination if that property has been mitigated and by what means. Provide corrections if needed by filling form FEMA AW-501	Office of Emergency Management	Flood/High Wind/Severe Storm	FEMA Unified Hazard Mitigation Assistance Grants, Hazard Mitigation Grant Program Repetitive Flood Claims Severe Repetitive Loss	Ongoing	Property owner interest and application to participate in FEMA grant program	High	This is part of the Risk Map project, which will yield additional requirements associated with this mitigation action.		Need to Maintain	Continuation

Project No.	Agency/ Department Mitigation Action	Lead Agency/ Department/ Organization	Hazard Type	Funding Source	Target Completion Date	Interim Measure of Success	Priority	Comments	Current Status	Comments to Justify Current Status	Projected Completion
2010-4	Collaboration with VDOT, transportation officials and law enforcement to develop a strategy for installation of permanent variable message boards for public messaging and traffic cameras for maintaining situational awareness	Office of Emergency Management/ Loudoun County Sheriff's Office	Flood/High Wind/Severe Storm/Tornado/Winter Storm	Internal county funding, Federal Highway Administration grants, Tiger Grants	Ongoing	Within ninety days of endorsement of the plan have our kick-off meeting-within six months of our kick-off meeting have identified and vetted locations for action. Remaining period of time to identify funding sources and complete installation	Medium	Through a partnership with VDOT, we have deployed mobile variable message boards to several strategic locations to enhance the ability of public messaging VDOT has increased the number of traffic cameras throughout the eastern portion of the County, which allows for collecting situational awareness. We are presently working through the County Attorney's Office regarding an agreement with VDOT through the Secure Partner's initiative	Internal county funding, Federal Highway Administration grants, Tiger Grants	Ongoing	Continuation
2010-5	Research possible vulnerable population registration systems to better identify and serve at risk citizens	Office of Emergency Management	All Hazards	Department of Homeland Security grants, UASI funding, County Funding	Ongoing	Continue ongoing work in this area. Within one year of endorsement of the plan be able to identify possible solutions and spend the remaining period of time working to identify funding sources to complete the project	Medium	Loudoun County implemented the County of Loudoun Evacuation Assistance Registry, which allows for the identification of those individuals at risk and needing assistance during an evacuation.	Complete but still need to maintain	Department of Homeland Security grants, UASI funding, County Funding	Continuation
2010-6	Determine feasibility of developing a drought preparedness and response plan	Office of Emergency Management	Drought	Department of Homeland Security grants, UASI funding, Internal County Funding	Ongoing	Research and identify applicable funding mechanisms to develop the plan	Medium	This initiative has not commenced as of yet and will be continued in the next planning cycle	Ongoing	Need to Maintain	Continuation

Project No.	Agency/ Department Mitigation Action	Lead Agency/ Department/ Organization	Hazard Type	Funding Source	Target Completion Date	Interim Measure of Success	Priority	Comments	Current Status	Comments to Justify Current Status	Projected Completion
2017-1	Continue working with VDOT regarding the development and implementation of gates to prevent drivers from crossing known flood prone roadways	Office of Emergency Management	Flood/High Wind/Severe Storm	Department of Homeland Security grants, TIGER grants, Transportation Grants, Commonwealth of Virginia	Ongoing	Upon approval of the plan we will convene representatives to discuss current progress and to further develop the project concept	High		Department of Homeland Security grants, TIGER grants, Transportation Grants, Commonwealth of Virginia	Need to Maintain	Continuation
2017-2	Evaluate Repetitive Loss and Severe Repetitive Loss properties within the County. Support mitigation of priority flood-prone structures through promotion of acquisition/ demolition, elevation, flood proofing, minor localized flood control projects, mitigation reconstruction and where feasible using FEMA HMA programs where appropriate	Office of Emergency Management	Flood/High Wind/Severe Storm	FEMA Unified Hazard Mitigation Assistance Grants, Hazard Mitigation Grant Program Repetitive Flood Claims Severe Repetitive Loss	Ongoing	Further timeframe will be identified as Loudoun County continues our participation in the Risk Map Process	High		FEMA Unified Hazard Mitigation Assistance Grants, Hazard Mitigation Grant Program Repetitive Flood Claims Severe Repetitive Loss	Need to Maintain	Continuation
2017-3	Review locality's compliance with the National Flood Insurance Program with an annual review of the Floodplain Ordinances and any newly permitted activities in the 100-year floodplain. Additionally, conduct annual review of repetitive loss and severe repetitive loss property list requested of VDEM to ensure accuracy. Review will include verification of the geographic location of each repetitive loss property and determination if that property has been mitigated and by what means. Provide corrections if needed by filling form FEMA AW-501	Office of Emergency Management	Flood/High Wind/Severe Storm	FEMA Unified Hazard Mitigation Assistance Grants, Hazard Mitigation Grant Program Repetitive Flood Claims Severe Repetitive Loss	Ongoing	Further timeframe will be identified as Loudoun County continues our participation in the Risk Map Process	High		Ongoing	Further timeframe will be identified as Loudoun County continues our participation in the Risk Map Process	Continuation

Project No.	Agency/ Department Mitigation Action	Lead Agency/ Department/ Organization	Hazard Type	Funding Source	Target Completion Date	Interim Measure of Success	Priority	Comments	Current Status	Comments to Justify Current Status	Projected Completion
2017-4	Collaboration with VDOT and transportation officials to continue expanding the traffic cameras to maintain the ability for situational awareness	Office of Emergency Management	Flood/High Wind/Severe Storm/Tornado/Winter Storm	Internal county funding, Federal Highway Administration grants, Tiger Grants	Ongoing	Upon approval of the plan convene a meeting of stakeholders to determine status and to develop the project scope	Medium		Need to Maintain	Continuation	Continuation
2017-5	Determine feasibility of developing a drought preparedness and response plan	Office of Emergency Management	Drought	Department of Homeland Security grants, UASI funding, Internal County Funding	Ongoing	Research and identify applicable funding mechanisms to develop the plan	Medium		Need to Maintain	Continuation	Continuation

Table 41: Non-Natural Hazard Mitigation Actions for County and Participants

#	Agency/ Department Mitigation Action	Lead Agency/ Department/ Organization	Active Violence	Civil Unrest	Communications Disruption	Cyberattack	Hazardous Materials	Pandemic/Public Health	Terrorism	Funding Source	Target Completion Date	Interim Measures of Success	Priority	Comments
LC-1	Cybersecurity Assessment: Improvements	Loudoun Water				x				Loudoun Water Capital Improvement Plan	Ongoing	Cybersecurity assessment program has recently matured. Assessments will be conducted every 3 years to maintain optimal cybersecurity.	Medium	Continued assessment/implementation of a multi-faceted cybersecurity program, including a cybersecurity master plan, cybersecurity awareness training, continuity of operations planning and exercises, cybersecurity policies and procedures, intrusion detection and prevention technology, data loss prevention technology, and advanced persistent threat detection.
LC-2	Community Systems Risk Assessment	Loudoun Water				x			x	Loudoun Water Capital Improvement Plan	2025	2–3 Community Risk Assessments will be completed every year for 4 years. Ongoing, on target.	Medium	Risk assessment for the community systems like the water risk and resiliency assessment that was completed in 2020. This will include scoring and analyzing likelihood and consequences of failure of critical wastewater assets and providing a risk score. Threats analyzed will include both natural hazards and malevolent acts. Ideas for mitigation of risk will also be included.
LC-3	Wastewater Risk Assessment	Loudoun Water					x	x	x	Loudoun Water Capital Improvement Plan	2023	Design is being completed. Not started- on target.	High	Risk assessment for the central wastewater system like the water risk and resiliency assessment that was completed in 2020. This will include scoring and analyzing likelihood and consequences of failure of critical wastewater assets and providing a risk score. Threats analyzed will include both natural hazards and malevolent acts. Ideas for mitigation of risk will also be included.
LC-4	Public Safety Radio Town Coverage Sites	Department of Fire and Rescue, Sheriff's Office, Department of Information Technology	x	x	x	x	x	x	x	Loudoun Water Capital Improvement Plan	Ongoing	Phase I included a study to identify where and how many additional towers are needed to provide optimal coverage and has been completed. Quotes are being requested to begin Phase II (construction of new towers). Construction of new towers is expected continue every two years.	High	This project consists of two phases. Phase I will conduct a study which will identify how many and where additional towers may be needed, and if existing tower locations should be relocated for optimal coverage. Phase II will construct new towers or relocate existing towers.

#	Agency/ Department Mitigation Action	Lead Agency/ Department/ Organization	Active Violence	Civil Unrest	Communications Disruption	Cyberattack	Hazardous Materials	Pandemic/Public Health	Terrorism	Funding Source	Target Completion Date	Interim Measures of Success	Priority	Comments
LC-5	Public Safety School Emergency Radio Coverage	Public Schools, Sheriff's Office, Department of Information Technology	x	x	x	x	x	x	x	Capital Improvement Projects	FY 2026	Phase I (Coverage Study) has been completed. Phase II will install and replace the Bi-Directional Amplifiers (BDA) identified in the study.	Medium	This project consists of two phases. Phase I will conduct a coverage study to determine needs and identify schools that need additional equipment to meet coverage requirements. Phase II will install and replace the BDAs identified in the study. This project provides funding to purchase and install BDAs in public school buildings to provide Public Safety radio coverage for the school resource officers. Funding is based on a coverage study that was administered by the Department of Information and Technology which identified the location of schools that needed boosters and determined the proper replacement schedule of existing BDAs. The project budget was revised during the FY 2022 CIP budget development process to include planned funding for the remaining phases of project implementation for FY 2022, FY 2023, FY 2024, FY 2025, and FY 2026.
LC-6	Backup Emergency Communications Center	Department of Fire and Rescue, Sheriff's Office, Building and Development	x	x	x	x	x	x	x	Capital Improvement Projects	FY 2025	Schedule a kickoff meeting.	Medium	This project provides funding for relocation of the Backup Emergency Communications Center (ECC) to a modern, technically redundant, secure facility. This migration could be a step whereby the technology and operations are moved to a data center. The existing ECC facility is aging and has been identified on the county's Technology Roadmap as a key backup facility that must be migrated to a modern data center due to the critical nature of the work performed in the facility.
LC-7	Data Center and Fiber Plant Relocation	Department of Information Technology (DIT)	x	x	x	x	x	x	x	Capital Improvement Projects	FY 2023	Continue migration of data center. Once complete, ensure the stability of the new center before collapsing existing facilities	High	This project provides funding to continue the migration of the county's data center facilities to a private, fit-for-purpose data center within Loudoun County. Once complete, DIT will collapse the existing, aging data center facilities which present a significant risk to continuity of operations.

#	Agency/ Department Mitigation Action	Lead Agency/ Department/ Organization	Active Violence	Civil Unrest	Communications Disruption	Cyberattack	Hazardous Materials	Pandemic/Public Health	Terrorism	Funding Source	Target Completion Date	Interim Measures of Success	Priority	Comments
LC-8	Public Safety: 911 Phone Switch Replacement	Department of Fire and Rescue, Sheriff's Office, Department of Information Technology (DIT)	x	x	x	x	x	x	x	Capital Improvement Projects	FY 2024	Develop scope of the plan and schedule kickoff meeting.	High	This project provides funding to replace the county's current E-911 phone switch. All emergency communications in the county transmit through the E-911 phone switch, which makes it an essential piece of equipment for the health and safety of Loudoun's citizens. The current E-911 phone switch was installed in the ECC and became fully operational in July 2015. The estimated lifespan for this mission-critical system is seven years.
LC-9	Public Safety: Radio Tower Expansion Program	Department of Fire and Rescue, Sheriff's Office, Department of Information Technology (DIT)	x	x	x	x	x	x	x	Capital Improvement Projects	Ongoing	The first phase, identifying locations for additional towers, has been completed. Installation of new towers will be ongoing every two years.	High	This project provides funding for the installation of additional Public Safety Radio Towers to provide required radio coverage for First Responders, based on the findings of a coverage study that was managed by the DIT. The first phase of this project identified the need for nine additional towers in various locations throughout the county. The second phase includes the installation of the new towers as identified in the coverage study which will begin in FY 2021 and continue every two years. Due to population growth within the county, it is expected that additional Public Safety Radio Towers are needed to provide the required radio coverage for First Responders. Future funding for this program will be re-evaluated based on updated requirements.
LC-10	Broad Run Farms Waterline Extension	Department of General Services					x					Currently in design and bidding phase	High	EPA is using Federal Funds to extend water service to 142 parcels in the Broad Run Farms community in Sterling. Capital Improvement Funds are extending water mains to the remaining 311 parcels. The Hidden Lane Landfill is an Environmental Protection Agency (EPA) Superfund Site in Broad Run Farms. The Board of Supervisors has authorized an extension of public waterlines throughout the subdivision in response to groundwater contamination from the Hidden Lane Landfill.



[Link to the Loudoun County 2019 Comprehensive Plan](https://www.loudoun.gov/5221/Board-of-Supervisors-Comprehensive-Plan-)

<https://www.loudoun.gov/5221/Board-of-Supervisors-Comprehensive-Plan->

Home | Departments & Offices | Planning & Zoning | Planning | Loudoun County Comprehensive Plan | Board of Supervisors Comprehensive Plan Review

Board of Supervisors Comprehensive Plan Review

The Board of Supervisors began its review of the 2019 draft Comprehensive Plan after it was certified by the Planning Commission.

- [Loudoun County 2019 Comprehensive Plan, Loudoun 2040 Comprehensive Plan \(Certified Draft, March 13, 2019\) \(PDF\)](#)
- Letter from the Planning Commission to the Board of Supervisors: [Transmittal of Plan \(PDF\)](#)

Note: On April 24, 2019, the Board of Supervisors voted to change the name of the draft Loudoun 2040 Comprehensive Plan to the draft Loudoun County 2019 Comprehensive Plan.

2019 Board of Supervisors Comprehensive Plan Meetings

In addition to the June 20, 2019, business meeting, the Board of Supervisors held two public hearings and eight work sessions on the draft Comprehensive Plan. The dates serve as links to related documents for those meetings.

Date	Meeting Type	Task
April 3, 2019	Work Session	Model Results Presentation
April 24, 2019	Public Hearing	Public Input
April 27, 2019	Public Hearing	Public Input
May 1, 2019	Work Session	Plan Review
May 8, 2019	Work Session	Plan Review
May 20, 2019	Work Session	Plan Review
May 29, 2019	Work Session	Plan Review
June 1, 2019	Work Session	Plan Review
June 5, 2019	Work Session	Plan Review
June 15, 2019	Work Session	Plan Review
June 20, 2019 (The item is posted here as part of the meeting packet. See item #03 and attachments.)	Business Meeting	Adoption of 2019 Comprehensive Plan

Select Language



SECTION B – APPENDIX

BUDGET NARRATIVE

SECTION – OUTLINE

- Project Budget Narrative
- Budget Narrative Template
- Authorization to request funding from the Fund from governing body or chief executive of the local government
 - Detailed budget and narrative for all costs

(Kimley-Horn Scope of Services to develop a Bull Run Watershed Management Plan)



Project Budget Narrative



Project Budget Narrative

A detailed budget narrative is included below and contains the required information outlined in the 2023 Funding Manual for the Virginia Community Flood Preparedness Fund.

Estimated total project cost: The total identified project cost to complete with Bull Run Watershed Management Plan is \$495,651.75.

Amount of funds requested from the Fund: The total amount of grant assistance sought from the Fund is \$247,825.87. A detailed breakdown of how this funding is proposed to be allocated is shown in this Appendix as an attached Scope of Services.

Amount of funds available: The amount of funds available through this project's funding source is 50% of the total estimated project cost of \$495,651.75. Attached in this Appendix is the following documentation:

- Loudoun County Grant Application Summary Form for the Bull Run Watershed Management Plan
- Loudoun County Approved 2024 Budget Documentation Showing Source of Funds

Authorization to request for funding: Included in this Appendix is the Loudoun County internal Grant Application form that is signed by the County Budget Analyst, County Grants Coordinator, and County administration which authorizes the request for funding for this project.



Loudoun County – Bull Run Watershed Management Plan
Community Flood Preparedness Fund (CFPF)
Grant Application Package – Section B - Appendix

Budget Narrative Template

Appendix B: Budget Narrative Template

<p>Applicant Name: Loudoun County Department of General Services Community Flood Preparedness Fund & Resilient Virginia Revolving Loan Fund Detailed Budget Narrative Period of Performance: January 1, 2024 through December 31, 2024 Submission Date: November 10, 2024</p>									
Grand Total State Funding Request									\$247,825.88
Grand Total Local Share of Project									\$247,825.88
Federal Funding (if applicable)									\$
Project Grand Total									\$495,651.75
Locality Cost Match									% 50
Breakout By Cost Type	Personnel	Fringe	Travel	Equipment	Supplies	Contracts	Indirect Costs	Other Costs	Total
Federal Share (if applicable)									
Local Share						247,825.88			247,825.88
State Share						247,825.87			247,825.87
Pre-Award/Startup									
Maintenance									
Total	\$	\$	\$	\$	\$	\$ 495,651.75	\$	\$	\$495,651.75



**Authorization to request funding
from the Fund from governing body
or chief executive of the local
government.**

Grant Application Summary Form

Bull Run Watershed Management Plan

Basic Information

Name of grant: Community Flood Preparedness Fund Grant (CFPF) Dept. name: General Services

Dept. Head signature Ernest N. Brown Digitally signed by Ernest N. Brown
Date: 2023.10.06 16:58:17 -04'00' Date 06OCT2023

Name of grant program manager/staff contact: Dennis Cumbie Ext. 8699

Amount of grant funding \$250,000 Grant application due by: 11/12/2023

Grantor: VA DCR State Federal Grant Type: New Continuation

Local match required?: yes no Type and amount of local match: \$250,000 cash in-kind

Describe the authorized uses of funds: (Salary & benefits, Supplies, Contractual Services Travel, Other)
Development of a Watershed Management plan for the Bull Run Watershed.

Local match funds available in existing department appropriations: yes, index code
106421 (C00003) and 106420 (N02002)

Does this grant involve the receipt or purchase of equipment? yes no

If so, briefly describe: _____

Grant time period: 1/01/2024 to 01/01/26

Are there any provisions to renew beyond this time period? yes no

If yes, what are they and how will they be funded? The grant period can be extended if approved by DCR..

Are there any special conditions or provisions related to "maintenance of effort" (conditions or provisions that require the County to maintain this program after grantor funding is no longer available? yes no

If yes, what are they? The watershed management plan will be a living document and can be updated as changes in the watershed occur or better data becomes available in the future.

Are there any other special conditions or provisions? yes no

If yes, what are they? _____

of FTE funded through the grant: 0 Preliminary job classifications: _____

Grant Program Information

Brief narrative of program to be provided using grant funds: This grant and matching funds will go toward the development of a Watershed Management Plan for the Bull Run Watershed. The Plan will be used by DGS to identify local TMDL projects and to implement the watershed management item in the Environment and Energy Work Plan. This effort would build upon a successful citizen and Environmental Commission led effort to expand watershed management planning in the County and includes a significant public outreach component.

Is this grant an expansion of an existing program, if so what index codes are associated? No If this is a new grant, identify the program code/ user code where the new index codes will be setup. _____

How does this program fit in the context of your department's management plan? By helping to achieve required nutrient reductions within the MS4 Permit. Meeting the goals of the Environmental Commission as represented in the new Watershed Management Plan item in the Environment and Energy Work Plan approved by the Board of Supervisors on September 5, 2023.

Is this (or a similar) program provided by any other County or school agency? _____yes _____No _____no

Impact on and Need for Resources

How will the grant program manager's workload be affected by this grant? This will be one additional project to track. However, implementation of the grant will be done by General Services staff.

What staff in other departments will be needed to implement or support this program?

Have you contacted those departments to discuss this grant? _____yes _____NA _____no

Is your existing office space sufficient to accommodate the new staff? _____yes _____no

Will additional office space be needed? _____yes _____x_____no

If yes, how much office space? _____

Will you need any reconfiguration of existing office space? _____yes _____x_____no

Will any new or additional systems furniture be needed: _____yes _____X_____no

Will a County vehicle be needed: _____yes _____x_____no If yes, how often? _____

What new or additional office equipment or furniture is needed? _____none _____x_____

How many new telephones and/or phone lines are needed? _____none _____x_____

What additional computer hardware or software will be needed? _____none _____x_____

Will the hardware or software be supplied through the grant? _____yes _____x_____no

If yes, will the hardware/software be updated/replaced (using grant funds) as needed or required? _____yes _____no


Will any reconfiguration of existing computer hardware be needed? _____yes _____x_____no

Will any of the following be needed: Mainframe access? _____yes _____X_____no
E-mail? _____yes _____x_____no
Voicemail? _____yes _____x_____no

Do not write in this space

Budget Analyst Recommendation: approve disapprove

Budget Analyst Comments: Confirmed no concerns from Stormwater Capital Budget Analyst (Chris Hetland).

Budget Analyst Signature:  Date: October 19, 2023

Grants Analyst Recommendation: approve disapprove X

Grants Analyst Comments: _____

Grants Analyst Signature: Barb Lawrence Date: 10/20/23

County Administrator Decision: approve disapprove

County Administrator Signature: Elaine Crawford Digitally signed by Elaine Crawford
Date: 2023.10.23 15:07:49 -04'00' Date: 10/23/23



General Services

Transit and Commuter Services

Provides a complement of administrative oversight and operations for the County’s public transit services provided through a contractor. Transit services include: local fixed route transit service including connections to Metrorail Stations, paratransit service, and Commuter bus service to the greater Washington, D.C. area. Represents the County at regional organizations with an interest in transit services and funding, along with serving as the county liaison to the Washington Metropolitan Area Transit Authority for mass transit services. Manages grant funded programs for transit operations and capital investments. This program was moved from the Department of Transportation and Capital Infrastructure (DTCI) mid-year FY 2023.

**REMAINING \$50,000
WILL COME FROM
THIS FUND**

Budget Analysis

Department Financial and FTE Summary¹

	FY 2021 Actual	FY 2022 Actual	FY 2023 Adopted	FY 2024 Adopted	FY 2025 Projected
Expenditures					
Personnel	\$15,160,852	\$16,888,732	\$20,098,469	\$22,416,329	\$23,088,819
Operating and Maintenance	38,145,170	31,795,331	47,070,395	78,633,966	79,420,306
Capital Outlay	383,964	538,109	674,550	1,036,055	0
Other Uses of Funds	9,359,981	9,121,535	6,515,868	6,430,282	6,430,282
Total – Expenditures	\$63,049,967	\$58,343,708	\$74,359,282	\$108,516,632	\$108,939,406
Revenues					
Fines and Forfeitures	\$1,797	\$3,749	\$600	\$600	\$600
Use of Money and Property	756,773	343,085	703,216	582,147	582,147
Charges for Services	12,022,801	11,457,736	11,786,070	15,445,487	15,445,487
Miscellaneous Revenue	11,557	97,002	11,200	523,032	523,032
Recovered Costs	58,520	0	0	330,655	330,655
Intergovernmental – Commonwealth	65,394	83,446	60,000	5,285,610	5,285,610
Intergovernmental – Federal	898,773	0	0	103,012	103,012
Total – Revenues	\$13,815,615	\$11,985,018	\$12,561,086	\$22,270,543	\$22,270,543
Local Tax Funding	\$49,234,351	\$46,358,690	\$61,798,196	\$86,246,089	\$86,668,863
FTE	142.53	158.53	175.05	184.05	184.05
Central Services FTE²	3.53	3.53	4.30	4.30	4.30

¹ Sums may not equal due to rounding.

² Central Services positions only included for illustrative purposes; these positions are budgeted in the Central Services Fund, the cost of which are distributed across department operating budgets.

**APPROVED
BUDGET TOTAL**



Summary of Adopted Resource Requests

Department	Request Name	Dept Priority	Local Tax Funding	FTE
General Services	Composting	Board Priority	105,100	0.00
General Services	Internal Support Services	1	187,555	2.00
General Services	Environmental Work Plan and Energy Strategy	Board Priority	1,080,783	1.00
Housing and Community Development	Administrative Assistant/Customer Support	Board Priority	100,867	1.00
Housing and Community Development	Housing Program Specialist	Board Priority	116,693	1.00
General Services	Glass Recycling Expansion - Maintenance Helper	Board Priority	202,773	1.00
Building and Development	Human Resources/Payroll Liaison	1	89,242	1.00
Planning and Zoning	Business Analyst	1	147,959	1.00
County Administration	Equity and Inclusion Specialist	1	126,656	1.00
Commonwealth's Attorney	Executive Assistant	1	107,648	1.00
Total Prioritized Resource Requests			\$14,978,734	82.00
Total Resource Requests			\$20,788,062	127.00



**PROPOSED
BUDGET MATCHES
APPROVED
BUDGET. ITEMIZED
ON THIS SHEET.**

Resource Requests by Fu

Board of Supervisors Priority: Environmental Work Plan and Energy Strategy (DGS) Increase Option #15

Personnel:	O&M:	Capital:	Reallocation:	Revenue:	LTF:	FT pos.	PT pos.	FTE:
\$119,927	\$740,856	\$220,000	\$0	\$0	\$1,080,783		0	1.00

Details		Overview
Service Level:	Enhanced Service Level Request	<ul style="list-style-type: none"> As part of the County's Environmental Commission Work Plan,¹ the itemized projects are requested to meet the FY 2024 projected work plan: - Energy Equity Projects – \$100,000 - Implement Watershed Management Projects – \$50,000 - Environmental Information Hub Development – \$50,000 - Zero Emissions Vehicles (ZEVs) – \$200,000 - Green Bank – \$75,000 - New Watershed Management Plan (WMP) – \$200,000 - Tree Canopy Baseline Analysis – \$50,000 - Wildlife Crossings – \$50,000 - Environmental Justice Needs Assessment – \$40,000 - Environmental Commission Public Engagement – \$10,000 <ul style="list-style-type: none"> In order to implement the Board's Energy Strategy and to oversee the long-term planning for the Strategy, this request includes an energy program manager (approximately \$200,000 of LTF to include personnel, vehicle, and other O&M). Existing staff would be responsible for the Environmental Work Plan. Performance measures are dependent on this position being approved by the Board of Supervisors. If the resource request is not funded, action on the Environmental Work Plan and the County Energy Strategy (and therefore the Board's 2020-2023 Strategic Environmental Initiatives) will be limited to what can be accomplished within existing resources.
Mandates:	Not mandated, but necessary for compliance with federal, state, or local laws	
PM Highlight:	None	
Program:	Environmental and Energy Work Plan - Environmental Activities Division	
Positions:	1 Energy Program Manager	
Theme:	Board Priority	
One-time LTF:	\$694,156	
Recurring LTF:	\$386,627	

**\$200,000
ALLOCATED
FOR NEW
WATERSHED
MANAGEMENT
PLAN**

Board of Supervisors Priority: Glass Recycling – Maintenance Helper (DGS) Increase Option #18

Personnel:	O&M:	Capital:	Reallocation:	Revenue:	LTF:	FT pos.	PT pos.	FTE:
\$65,265	\$66,453	\$71,055	\$0	\$0	\$202,773	1	0	1.00

Details		Overview
Service Level:	Enhanced Service Level Request	<ul style="list-style-type: none"> On July 19, 2022, the Board of Supervisors directed staff to propose expanding the Glass Recycling Program beyond the existing County-operated recycling drop off centers in the FY 2024 budget process and directed the County Administrator to include a proposal for a glass only recycling site in the 20147 zip code.² The ratio of staff resources needed for the recycling drop off center and Glass Recycling Collection programs is one employee per five collection sites in order to achieve sufficient upkeep, maintenance, and general cleanliness. If this position is not funded, the additional glass only recycling site will not move forward as there will not be enough staff to maintain and provide upkeep.
Mandates:	Not mandated, but necessary for compliance with federal, state, or local laws	
PM Highlight:	None	
Program:	Waste Management Division	
Positions:	1 Maintenance Worker	
Theme:	Board	
One-time LTF:	\$111,531	
Recurring LTF:	\$91,242	

¹ July 27, 2022, Board of Supervisors Environmental Summit, Item 2, Environment and Energy Work Plan

² July 19, 2022, Business Meeting, Item 7, Feasibility Study of County Operated Glass Recycling in Ashburn



Detailed budget and Narrative for All Costs

**(Kimley-Horn Scope of Services to develop a Bull Run
Watershed Management Plan)**



November 2nd, 2023

Chris Stone, CFM, PG
Stormwater Chief
801 Sycolin Road, SE
Suite 300
Leesburg, VA 20175

Re: Professional Services for the Bull Run Watershed Management Plan Development

Dear Chris:

Kimley-Horn and Associates, Inc. (“Kimley-Horn” or “Consultant”) is pleased to submit task order proposal to Loudoun County (“Client”) for the development of a Watershed Master Plan for the Bull Run Watershed. These services will be performed underneath contract RFQ 338784B-C – Year 3, Engineering Services for the Loudoun County Stormwater Management Program, executed by Loudoun County and Kimley-Horn on May 1st, 2021.

TASK 100 – DATA COLLECTION AND EXISTING CONDITIONS

Kimley-Horn will compile the best publicly available data for use in the development of the IFM within the Bull Run Watershed.

Data sources will consist of:

- Loudoun County Publicly Available Geospatial Data
- Homeland Infrastructure Foundation-Level Data (HIFLD)
- Loudoun County LiDAR Data
- Multi-Resolution Land Characteristics Consortium (MRLC) Land Cover Data
- NRCS Web Soils Survey
- Virginia Geographic Information Network (VGIN) Data Hub
- Conserve VA
- Federal Emergency Management Agency (FEMA) Resilience Analysis and Planning Tool (RAPT)
- EPA Environmental Justice Screening Tool (EJ Screen)
- Virginia Flood Risk Information System (VFRIS)

Existing Features Basemap Development

Kimley-Horn will generate a GIS Basemap consisting of environmental, flood risk, infrastructure and land use features from the data sources outlined in this proposal. The available data will be used for the tasks within this proposal to assist in the planning, assessment and prioritization of potential resiliency projects, and validation of predicted flood extents. This task assumes that up to five (5) GIS figures will be developed as supporting documentation in the WMP based on this data. Figures may consist of the following:

- Existing Environmental Features Map
- Existing Flood Risk Map
- Existing Stormwater Infrastructure Map

- Resiliency Planning Considerations Map (Conserve VA, RAPT, EJ Screen, VFRIS)
- Existing Zoning / Land Use Map

Stormwater Pond Plan Review and Feature Identification

Kimley-Horn will identify up to twenty-five (25) stormwater ponds within the Bull Run watershed of Loudoun County for incorporation into the IFM. Kimley-Horn will initially sort all existing ponds based on total drainage area and impervious acres to perform a rapid assessment of facilities which have the potential to manage the largest peak flows during the 100-YR design storm. A review of existing BMP type, and whether it is currently reported as a BMP, will be included as part of this assessment. Kimley-Horn will also review previously provided plan data within the Bull Run watershed to determine additional data needs for these facilities. A list of these facilities will be provided to the County, identifying which facilities are in need of data in order to generate stormwater models, and which facilities are recommended for inclusion in the IFM. The intent of this exercise is to model facilities which both have the potential to reduce peak flood flows downstream and may provide opportunities for the County to earn POC reductions to apply to their Chesapeake Bay and Bull Run TMDLs.

Acceptable data sources include:

- Loudoun County Approved Design Plans
- Loudoun County Approved As-Builts
- Loudoun County Bathymetric Surveys

Kimley-Horn assumes that up to ten (10) stormwater ponds will need stage-storage curves. For these facilities, contours from the County provided data sources will be traced in Bluebeam (or equivalent PDF software) and a stage storage curve will be derived. Kimley-Horn will then identify the open channels within Bull Run for incorporation into the IFM. Open channels will be based on:

- Modeled streams within the Bull Run Watershed where the County can provide the effective HEC-RAS model for
- Unmodeled streams which has been digitized by the EPA as part of their impairment assessment

Stream centerlines which are anticipated to be modeled have been provided in Attachment A.

Once the open channels that meet the criteria above have been identified, Kimley-Horn will review County documented in-line (with respect to the stream) storm drainage culverts in order to establish a fully connected open channel network. For systems where in-line stream culvert data is not documented, Kimley-Horn will prepare a data request to the County for this information. If the County does not have access to this data, and coordination with VDOT is required, it is assumed that Kimley-Horn will provide the County with the location of the culvert(s) and the specific data being requested, but the County will lead efforts in requesting this information from VDOT.

Kimley-Horn will then identify and compile known gage data throughout the County (sourced from the County or USGS) in an effort to validate flows generated as part of the IFM. Based on a preliminary review of USGS gage data, it does not appear that there are any existing gages within the Bull Run Watershed of the County, or immediately downstream in Fairfax County; therefore, any gage data will be based on existing gages operated by the County or other external agencies.

Emergency Management Division Coordination

Kimley-Horn will review the RAPT tool, data from HIFLD and the County to identify and document locations of critical infrastructure throughout the Bull Run Watershed. Once this preliminary review is complete, Kimley-Horn will setup a meeting with the Loudoun County Office of Emergency Management to discuss and identify known flooding locations throughout the Bull Run Watershed, along with any additional locations of critical infrastructure. If photo documentation of flooding exists, Kimley-Horn will request these records at this time.

Acceptable flood risk will be defined based on standard level of service requirements in accordance with the FSM and VDOT Drainage Manual. Examples of critical infrastructure may consist of hospitals, schools, substations, public safety locations, and emergency access routes.

Kimley-Horn will digitize these flood and infrastructure locations in ArcGIS and will leverage this data as part of model validation during Task 200.

Water Quantity and Quality Data Collaboration Efforts

Kimley-Horn will download and compile water quality data from the EPA 303d list using resources such as EPA My Water Way. Kimley-Horn will also request available data on the under development TMDL for Sand Branch from the County.

Kimley-Horn will reach out to the following organizations in an effort to collaborate on water quality and quantity data for the purposes of the Bull Run WMP:

- Northern Virginia Regional Commission (NVRC)
- Occoquan Watershed Monitoring Laboratory
- Loudoun Wildlife Conservancy

Kimley-Horn will request available data on the Occoquan Watershed Model from NVRC, including input parameters, pollutant loads, and data sources. This data, along with information compiled from the County, the Occoquan Watershed Monitoring Laboratory, and the Loudoun Wildlife Conservancy will be leveraged to compare quantifiable water quality data within Loudoun County's Bull Run Watershed against estimated loads and improve the accuracy of the water quality model developed as part of Task 300.

TASK 200 – EXISTING HYDROLOGY DEVELOPMENT

Using the County's latest available LiDAR data, Kimley-Horn will delineate the drainage areas for the open channels throughout Bull Run leveraging PCSWMM's watershed delineation tool; delineated subbasins will be compared against Loudoun County mapped outfall drainage areas and digitized stormwater infrastructure to correct any poorly represented watershed boundaries. Subbasin delineations will be developed for open channels with a minimum drainage area of 100 acres. Subbasins will then be developed at intervals no greater than every 2,000 feet; where large flow changes are anticipated due to confluences or new inflows, additional subbasins will be delineated.

Kimley-Horn will then develop the SWMM Hydrology for these drainage basins as outlined in the EPA SWMM Volume 1 Hydrology Manual. This task will include the development of the following attributes:

Percent Impervious

Kimley-Horn will estimate the percent impervious based on the County's latest impervious data. This data will be a composite of impervious features compiled from the following GIS data:

- Loudoun Road Casings
- Loudoun Buildings
- Loudoun Park and Ride Lots
- Miscellaneous Cultural Polygons
- Large water bodies (Ponds, Lakes, etc.)

Both artificial turf fields and sidewalks and trails will be further evaluated for incorporation into the impervious database. Sidewalks and trails data are only digitized as polylines by the County, therefore a buffer will be applied to this feature class to assume constant 4' widths where present. Artificial turf fields may be considered impervious on a case by case basis.

The latest Loudoun County aerial imagery will be compared against these data sets to identify any missing impervious areas. These areas will be communicated to the County, and a request for digitization of these areas will be placed with the County for accurate modeling.

This analysis will assume the following:

- Existing rooftop downspouts shall be assumed to be disconnected and flow over pervious areas.
- Driveways drain directly to the street and will be considered hydraulically connected impervious area.

Subcatchment Length and Width

Kimley-Horn will develop time of concentration flow paths for each Subbasin to estimate overland flow lengths. Kimley-Horn will estimate the sub catchment width by dividing the area of the basin by the average maximum length of overland flow.

Overland Flow Slope

Kimley-Horn will initially estimate the overland flow slope of the sub catchment as the change in elevation divided by the length of overland flow. Kimley-Horn will also estimate the average watershed slope using the slope along this line.

Mannings Coefficient

Kimley-Horn will apply unique impervious and pervious mannings coefficients to each sub catchment surface type to represent the resistance that the overland flow will encounter as it is conveyed through the subcatchment. Mannings coefficients will be based on Table G-1 of Volume II Hydraulics of the EPA SWMM User Manual. A list of appropriate mannings coefficients for various land covers will be provided to the County for review and input.

Depression Storage

Impervious depression storage will be estimated using a typical value of 0.10 and initial pervious depression storage will be represented using a typical value of 0.20.

Infiltration Method

The default infiltration method will be the modified Green Ampt method. Hydraulic conductivity will be estimated using NRCS soil classifications, suction head will be calculated as outlined in Volume 1 of the EPA SWMM Reference Manual, and initial deficit will be derived from the soil type and Table 4-8 of Volume 1 of the EPA SWMM Reference Manual.

Loudoun County Regression Equation

Kimley-Horn will also generate peak flows for each Subbasin based on the Loudoun County Regression Equation in accordance with the FEMA Region III Hydrologic Analysis of Loudoun County, Virginia, 2013 report. Subbasins which do not meet the following limitations of the regression equations will have their flows estimated based on the PCSWMM Hydrology methodology:

- Drainage Areas = 0.28 to 332 square miles
- Impervious Area = 0 to 41.1 percent
- Channel Slope = .001 to .04 foot/foot
- D Soil = 0 to 70.67%

The generated flows from the Loudoun County Regression Equation will be used to assist in the remapping of the flood overlay districts within Bull Run Watershed of Loudoun County.

Water Quality Modeling Setup

Kimley-Horn will setup water quality loading factors to develop Phosphorus, Nitrogen and Total Suspended Sediment (TSS) loads from individual sub catchments based on regulated and unregulated areas. The land use data developed as part of this task will be associated with loading rates consistent with the Potomac River Basin as outlined in the Guidance Memo No. 20-2003 – Chesapeake Bay TMDL Special Condition, dated February 2021. Kimley-Horn will compare these loads against those generated in the Occoquan Watershed Model; if these loads differ, Kimley-Horn will develop two (2) alternative loading scenarios, to allow the County to estimate load opportunities for complying with the following TMDLs:

- Chesapeake Bay TMDL Action Plan
- Bull Run TMDL Action Plan

Water quality loads will be used to assess watershed improvements as part of Task 600 to identify opportunities which both provide flood resiliency and water quality improvements.

TASK 300 – PCSWMM MODEL DEVELOPMENT

Hydraulic Routing Setup

Kimley-Horn will import the existing County HEC-RAS model into PCSWMM as the basis for the Bull Run watershed model. Unmapped open channels which were identified as part of Task 100 will be imported from GIS, along with any connecting storm infrastructure (i.e culverts, bridges) to develop the link-node layout within the Loudoun County Bull Run watershed.

A Digital Terrain Model (DTM) will be used as the basis for all topographical data. Kimley-Horn will review the culvert, road and bridge data imported from HEC-RAS against this DEM to ensure accuracy. Kimley-Horn will also request plan data for all culvert, road and bridge crossings within the model from the County and/or VDOT to validate the accuracy of modeled capacities at all critical infrastructure locations. Where plan data references the NGVD29 datum, the FEMA Flood Insurance Study Report will be used to convert the datum based on geographic location.

Kimley-Horn will develop transect cross-sections at intervals of no less than three-hundred (300) feet, or at locations where there are significant changes to the floodplain or channel geometry. Transects will span beyond the five-hundred year floodplain limits to provide opportunity for future rainfall modeling with more intense storm events.

Kimley-Horn will populate the following information into the PCSWMM model for analyzing surface runoff:

- Boundary data – input rainfall time series based on the NOAA C curve (1, 2, 10, 25, 50, 100, 500)
- Subcatchment Data
- Node (manhole, inlet, outlet, storage node, weir)
 - Type (junction, outlet or basin)
 - Horizontal & Vertical Information
 - Depth
- Link (Conduit)
 - Upstream and Downstream Nodes
 - Shape and dimensions
 - Material
 - Roughness
 - Upstream and Downstream inverts
- Tailwater Conditions

After the base hydraulics model is built, Kimley-Horn will develop the following PCSWMM scenarios to evaluate the system's capacity under various design storm events:

- 1-YR 24-HR
- 2-YR 24-HR
- 10-YR 24-HR
- 25-YR 24-HR
- 50-YR 24-HR
- 100-YR 24-HR
- 500-YR 24-HR

Pond Model Integration

Kimley-Horn will review the DTM generated at each pond for incorporation into the model and generate stage-storage curves using the standard PCSWMM work-flow for generating pond-storage curves from contour polylines. Generated stage-storage curves will be compared against those documented in the approved plans reviewed as part of Task 100. Where storage capacity is within a reasonable range (+/- 10%) of the design plans, Kimley-Horn will modify the impoundment as part of the 2D model with its corresponding stage – discharge curve. In cases where the calculated storage capacity is greater than a

10% deviation from the approved design plans, it will be assumed that the facility has silted in and cannot be modeled as a physical impoundment within the DTM. In cases where this occurs, the DTM will be manually edited to “fill” in the impoundment and eliminate the topographic representation of the pond. In its place, a storage node and outfall device will be built into the model to route pond performance and storage capacity. It is assumed that this DTM editing process will only need to be performed for in-line stormwater facilities; all other instances where the DTM varies will be addressed through routing subcatchments directly to the storage-nodes. It is assumed that all ponds are in functional condition for the purpose of this model.

Kimley-Horn will generate a list of ponds which appear to be silted in or inadequate to the County for further consideration as part of its maintenance program.

Hydraulic Boundary Conditions

Kimley-Horn will route the flows using the dynamic wave routing method through a 1D/2D SWMM model (PCSWMM) for these design storm events to understand existing flood risk and location where existing transportation infrastructure does not meet the intended level of service (LOS); level of service requirements will be based on Table 6-1 from the VDOT Drainage Manual.

Tailwater conditions will be based on normal depth for all design storms where no additional data is available. In instances where the 100-YR and 500-YR water surface elevations are documented as part of FEMA studies or approved floodplain studies, these known water surface elevations shall be used.

Model calibration will involve a review of generated flood depths and flows against gage station records, confirmation of modeled flooding against known flooding in documented areas, and efforts by NOAA as part of their flood inundation mapping initiative (if completed in Loudoun at the time of this effort).

TASK 500 – EXISTING CONDITION RESILIENCY ASSESSMENT

Flood Risk Assessment

Kimley-Horn shall identify flood risk along the identified open channels, and at road crossings, within the study limits of the Bull Run Watershed within Loudoun County. Flood risk shall be illustrated with flood depth rasters and GIS figures for County review and documentation in the WMP as part of Task 1000. Kimley-Horn will also provide digital deliverables of the rasters to the County for potential use in ArcGIS online interactive maps.

The following flood risks will be reviewed:

- Locations where existing roadway infrastructure does not meet the intended level of service as defined in Task 300
- All buildings that fall within the modeled 100-YR floodplain
- Critical infrastructure identified as part of Task 100

Locations which are identified as at risk for flooding will be documented at opportunities for flood resiliency projects to be considered as part of Task 600. Kimley-Horn will generate a GIS map identifying these locations and include this as an Appendix in the WMP developed as part of Task 900.

Pond Capacity Assessment

Kimley-Horn will review the performance of the existing stormwater ponds integrated into the model to assess facilities where excess, or inadequate, capacity may exist. Locations where existing stormwater ponds do not currently convey the 100-YR 24-HR design storm without overtopping will be documents for further review by the County. Similarly, in locations where existing ponds have excess capacity, these stormwater facilities will be flagged for further consideration for retrofits during Task 800.

Pollutant Load Assessment

Kimley-Horn will summarize pollutant loads generated in subbasins through the Bull Run watersheds. Attribute data associated with these loads will be exported from PCSWMM into ArcGIS for development into GIS figures for the WMP. Two separate heat maps will be generated for illustrating this parameter: (1) a heat map illustrating maximum pollutant loads throughout the watershed and (2) a normalized heat map illustrating maximum pollutant loads / acre to identify critical locations within the watershed which experience atypically high pollutant loads.

Pollutant load assessments will be imposed against impaired streams to identify critical management areas for future BMPs.

Stream Stability Assessment

Kimley-Horn will leverage PCSWMM in-stream erosion potential tools to estimate the following parameters along open channels:

- Cumulative Erosion Index (Velocity)
- Cumulative Effective Work Index (Shear Stress)

It is assumed that these estimates will be leveraged as indices for potential erosion along open channels. The accuracy of the available topographic data will significantly impact the accuracy of the measurements collected. Kimley-Horn will use the best available data to identify reaches within the watershed which may be experiencing unstable flow conditions, indicating the presence of bed and/or bank erosion. Kimley-Horn will flag reaches for consideration in feasibility assessments as part of Task 800.

Assumptions:

TASK 600 – BMP PRIORITIZATION ASSESSMENT

Kimley-Horn will develop a table summarizing approved BMPs as outlined in the BMP Clearinghouse and Guidance Memo No. 20-2003 within Virginia for potential to be implemented throughout the Bull Run Watershed. Co-benefits for BMPs will be identified which document additional environmental considerations associated with their implementation.

Co-benefits are anticipated to consist of:

- Habitat and Biodiversity
- Stream Health
- Fish Habitat
- Tree Canopy

- Climate Resiliency
- Flood Risk Mitigation
- Removal of Bacteria
- Groundwater Recharge / Infiltration Capacity
- Nutrient Uptake / Pollutant Removal

Kimley-Horn will develop tabular summaries of the above co-benefits for review by the County and public. The co-benefits summary tables will be leveraged by the County and the public to help identify and guide preferred BMPs for resiliency and water quality enhancements to the watershed. The reviewed BMPs will be prioritized based on their effectiveness in specific applications and ranked based on preference for incorporation into future land development opportunities.

Kimley-Horn will then meet with the County to develop an evaluation matrix rubric which considers key considerations for prioritizing projects; this effort will include both identification of key criteria, and appropriate weights for developing a prioritization matrix for project selection. This effort will aide in identifying key site criteria for consideration as part of Task 700 for evaluating project feasibility.

TASK 700 – NATURE-BASED SOLUTIONS (NBS) FEASIBILITY ASSESSMENTS

Based on the existing conditions assessment performed as part of Task 500, and the prioritized BMP opportunities outlined in Task 600, Kimley-Horn will perform a desktop-based opportunity assessment for project implementation opportunities.

The following project types will be prioritized for identification at the County-wide level for potential implementation (note that the order of this list is not indicative of the likelihood of implementation):

- Regional Ponds Retrofits and Pond Infrastructure Upgrades
- Stream Restoration Practices in Conjunction with Floodplain Improvement Projects
- Land Conversion
- Floodwall Implementation Projects
- Land Acquisition Techniques
- Restoration of Floodplains
- Nature-based Approaches Aimed at Increased Resilience

Kimley-Horn will identify up to twenty (20) BMP (structural and non-structural) opportunities and up to ten (10) stream restoration opportunities for consideration. Project locations will be primarily focused on the following types of parcels:

- County-Owned Lots
- HOA Owned Common Lots
- Flood-prone Areas on Privately Owned Lots

Kimley-Horn will conduct an opportunities and constraints analysis for each potential project to determine its feasibility. The feasibility assessment will consider:

- Constraints (utilities, access, easement, ownership)
- Resiliency Potential

- Crediting Potential
- Topographic Assessments for Upstream and Downstream flow conveyance
- Preliminary Facility Footprint and Configuration

Each opportunity and constraints assessment will be performed in ArcGIS and documented with a retrofit assessment figure including a short narrative and an outline of potential project opportunities and constraints. Kimley-Horn will submit these projects to the County for consideration and initial review, and further identification of additional limitations or constraints.

The identified projects will be scored using the prioritization matrix developed under Task 600 and the top fifteen (15) projects will be selected for site visits and further refinement. Site visits will be performed to collect site photos, identify additional site constraints, and refine preliminary concept layouts to validate feasibility. Photo collection will be done using GPS grade data collection tools to ultimately develop a photo-location map for opportunities reviewed in-field. For stream restoration opportunities, site visits will also include full BANCS assessments to assess real time erosion potential. It is assumed up to five (5) prioritized projects will be stream restorations; if additional stream restoration opportunities are determined to move forward, Kimley-Horn will coordinate with the County to request additional funds for the rapid BANCS assessment of these assets.

The BANCS Assessment consists of the following studies:

- Bank Erosion Hazard Index (BEHI)
- Near Bank Stress (NBS)

Bank Erosion Hazard Index

The BEHI Method for assessing stream bank erosion potential assigns point values to characteristics of stream bank condition. These scores will be used to inventory stream bank condition over large areas and prioritize stream restoration efforts. Kimley-Horn will utilize a Trimble R1 submeter GPS along with Arc Collector to collect information efficiently and accurately for each of the stream parameters shown in Table 1 and Figure 1.

Table 1: BEHI Parameters

Bank length	Length of bank consisting of similar BEHI characteristics
Bank height	Height from toe of bank to top of bank
Bankfull height	Height from toe of bank to bankfull
Rooting depth	Depth of roots from top of study bank down
Root density	Percentage of study bank with roots
Bank angle	Angle of the bank
Bank surface protection	Percent vegetation/roots protecting study bank
Bank materials	Material consistency (Silt, Sand, Clay, Boulder, gravel)
Bank material stratification	Bank materials layered in study bank

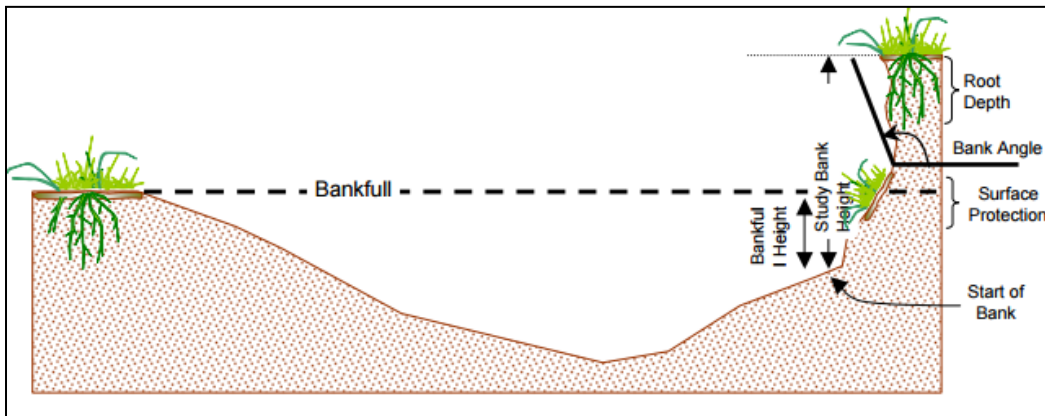


Figure 1: Bank Erosion Hazard Index (BEHI) Data Collection Graphic

Kimley-Horn will record the results on the BEHI Worksheet 3-11 (Rosgen). An erodibility rating will be assigned for each study bank corresponding with those shown in Table 2.

Table 2: BEHI Score and Rating Table

Total BEHI Score	Erodibility Rating
5-9.5	Very Low
10-19.5	Low
20-29.5	Moderate
30-39.5	High
40-45	Very High
46-50	Extreme

Near Bank Stress (NBS) Assessments

Kimley-Horn will also perform NBS assessments in the same general location as the BEHI assessments. The NBS is a protocol for estimating energy distribution in the near-bank region (1/3 of channel cross-section) associated with the bank being evaluated. Kimley-Horn will utilize NBS methods 2 and 5 for determining each study bank’s NBS rating.

Method 2 utilizes a ratio between an outer bend’s Radius of Curvature and the Bankfull Width. For each NBS assessment the following parameters will be collected and/or calculated to develop NBS scores:

- Radius of Curvature - the distance measured from the outside of the bankfull channel to the intersection point of two lines that perpendicularly bisect the tangent lines of each curve departure point
- Bankfull Width – The surface width of the stream measured at the bankfull stage

The resulting ratio corresponds to the NBS erodibility rating shown in Table 3.

Table 3: NBS Method 2 Ratio vs Rating Table

Near Bank Stress (NBS) Ratings	Ratio
Very Low	>3.00
Low	2.21 - 3.00
Moderate	2.01 - 2.21
High	1.81 - 2.00
Very High	1.50 - 1.80
Extreme	<1.50

Kimley-Horn will utilize NBS Method 5 for study banks which are not outer bends. Method 5 is a ratio between the Near Bank Max Depth and the Near Bank Mean Depth.

- Near Bank Max Depth – The maximum depth from a stream’s invert to the bankfull stage in the stream’s near bank region (2/3 of channel cross-section)
- Near Bank Mean Depth – The average of the depth measurements from a stream’s invert to the bankfull stage in the stream’s near bank region (1/3 of channel cross section).

The resulting ratio corresponds to the NBS erodibility rating shown in Table 4.

Table 4: NBS Method 5 Ratio vs Rating Table

Near Bank Stress (NBS) Ratings	Ratio
Very Low	<1.00
Low	1.00 - 1.50
Moderate	1.51 - 1.80
High	1.81 - 2.50
Very High	2.51 - 3.00
Extreme	>3.00

The above-listed parameters will be collected using a Trimble R1 submeter GPS and Arc Collector to collect information efficiently and accurately for each parameter. Kimley-Horn will record information on Worksheet 3-12 (Rosgen) - Estimating Near Bank Stress.

Soil Sampling & Nutrient Concentration Analysis

Kimley-Horn will collect up to ten (10) soil samples from the stream banks using a 4” soil sampling auger and performed in general accordance with the *Bulk Density and Soil Nutrient Concentration Methods Guidance* outlined in Chesapeake Stormwater Network (CNS) publication *A Unified Guide to Crediting Stream and Floodplain Restoration Practices in the Chesapeake Bay Watershed*. Soil samples will be spaced 200’ to 500’ apart. Kimley-Horn will collect samples from each soil horizon found in the stream bank (O, A, B, C, etc.), create a composite sample, and store in a ziploc bag for shipping to the laboratory. Kimley-Horn will photo document the stream bank where the soil sample was collected, and GPS locate each sample location using a Trimble R1 submeter GPS and Arc Collector. Soil samples will be sent to the

Waypoint Analytics to determine Bulk Density and Nitrogen (TN) and Phosphorous (TP) nutrient concentrations.

Predicted Stream Bank Erosion & Stream Restoration POC Load Reduction Credit Estimates

After completing the BEHI and NBS field assessments, Kimley-Horn will utilize the Spreadsheet Tool for Erosion Rate Estimates (Appendix A. Bank Erosion Summary Table w-BEHI and NBS – with TMDL Phase 6 revisions) as outlined in publication “*A Unified Guide to Crediting Stream and Floodplain Restoration Practices in the Chesapeake Bay Watershed.*” Kimley-Horn will also utilize the Colorado streambank erosion prediction curve and the BEHI and NBS erodibility ratings associated with that curve to predict the streambank erosion for each study bank and the total streambank erosion for the assessment reach. The Colorado curve and erodibility ratings are already built into the Spreadsheet Tool for Erosion Rate Estimates. Virginia DEQ utilized the Spreadsheet Tool for Erosion Rate Estimates for SLAF in 2023 (Attachment A). The total bank erosion calculations will be summarized using a variation of the Bank Summary worksheet from Spreadsheet Tool for Erosion Rate Estimates to show the total predicted streambank erosion in tons/year/foot. Kimley-Horn will estimate the potential POC load reduction credits associated with restoring the stream as described in “*A Unified Guide for Crediting Stream and Floodplain Restoration Projects in the Chesapeake Bay Watershed.*”

Kimley-Horn will prepare a PDF graphic showing the following items:

- Map showing BEHI and NBS ratings along stream banks
- Map showing BEHI and NBS data collection locations
- Appendix A. Bank Erosion Summary
- Nutrient sampling locations

TASK 800 – RESILIENCY MODELING SCENARIOS

Kimley-Horn will develop a proposed conditions PCSWMM model which considers the following development scenarios:

- Scenario A: Present-Day Land Cover with NBS Integration
- Scenario B: Comprehensive Plan Scenario without NBS Integration
- Scenario C: Comprehensive Plan Scenario with NBS Integration

Scenario A

The existing conditions model developed as part of Task 400 will be modified to incorporate the fifteen (15) projects identified as part of Task 700. It is assumed that all improvements will be built within a single model, with improvements being implemented systemically from upstream to downstream within the Watershed. This scenario will not consider comprehensive land cover conditions.

No modeling will be performed for stream restoration opportunities at this time. It is assumed any improvements from stream restoration opportunities will be further evaluated during concept planning or design for those individual projects.

Scenario B

The existing conditions model developed as part of Task 400 will be modified to consider comprehensive plan land cover throughout the watershed. Kimley-Horn will review the County's comprehensive plan and develop a conversion table to assign land cover changes to the watershed which reflect the comprehensive plan's buildout conditions. The table will be submitted to the County for review and updated based on feedback to more accurately assign open space/forested area, managed turf and impervious percentages. As part of the final WMP, a table will be developed summarizing assumed land cover percentages for each development type. Kimley-Horn will model the increase in flood inundation extents and update the water quality pollutant loads as a result of these changes to land cover. Actual infrastructure improvements, such as roads, will not be captured in the model.

Scenario C

The comprehensive buildout model developed as part of Scenario B will be modified to incorporate the fifteen (15) projects identified as part of Task 700 to assess how these improvements will be impacted by proposed land use changes. For stormwater management facilities, alternative configurations to meet larger runoff quantities will be modeled to understand facility footprints under ultimate buildout conditions.

For each of these scenarios, a summary table will be generated outlining the following parameters resulting from these improvements (where applicable):

- Runoff reduction volume
- Runoff storage volume
- Impact to critical infrastructure
- Nutrient credit reductions

For Scenarios B and C, recommendations will be quantified and discussed in the WMP which outline:

- Recommended treatment mechanisms and requirements to avoid reductions in watershed water quality
- Total storage volumes required to limit flood extents to present-day conditions

Note that comprehensive plan scenarios will only be ran for the 100-YR and 500-YR design storms. It is assumed that development standards for stormwater management will mitigate design storms up to the 10-YR, and improve conditions for events between the 10-YR and 100-YR.

TASK 900 – PROJECT COSTS, FUNDING AND PRIORITIZATION

Based on the results of Tasks 700 and 800, Kimley-Horn will develop Engineer's Estimates of Probable Construction Costs (EOPCC) for the fifteen (15) projects identified for consideration. EOPCCs will be based on concept level planning from modeling iterations. Costs may not be representative of actual construction costs based on ultimate design.

Kimley-Horn will review potential grant funding opportunities and identify sources such as CFPF, the Stormwater Local Assistance Fund and the County's Capital Improvement Plan (CIP) budget. Kimley-Horn will also research and evaluate other local, state and federal grant opportunities which may be suitable for project implementation and summarize these in the WMP for future consideration.

The prioritization matrix will be further refined to include considerations such as resiliency impact, cost and funding opportunity. The projects will then be ranked based on the weightings considered as part of Task 600 as part of the final evaluation.

Kimley-Horn will review available funding opportunities, along with the County's budget, to develop a new five (5) and ten (10) year CIP for the Bull Run Watershed. This project implementation schedule will be drafted such that it will be representative of past efforts by the County (i.e. estimated capacity of the County and consultants to design, manage and construct these projects will be assumed to be similar to those in the past).

TASK 1000 – WATERSHED MANAGEMENT PLAN DEVELOPMENT

Kimley-Horn will review previously published County WMP, and Fairfax County's Bull Run and Cub Run WMPs, as reference points for the layout, feel and content of this deliverable. Using these documents in conjunction with the information generated from this scope of work, Kimley-Horn will prepare a draft WMP outline that best represents the intent and purpose the following EPA Nine Elements to Watershed Management.

1. Identify causes of impairment and pollutant sources that need to be controlled in order to achieve load reductions
2. Estimate load reductions expected from management measures
3. Describe nonpoint source management measures that will need to be implemented to achieve load reductions from Step 2, and describe critical areas in which those measures will be needed to implement this plan
4. Estimate the amounts of technical and financial assistance needed, associated costs, and funding sources
5. Implement an information and education component to enhance public understanding of the projects, with ongoing collaboration throughout the process
6. Develop a schedule for implementation of the nonpoint source management measures identified herein
7. Describe interim measurable milestones for determining whether nonpoint source management measures or other controls are being implemented
8. Develop criteria for evaluating the effectiveness of projects
9. Establish a monitoring plan for long-term project evaluation

Kimley-Horn will then meet with the County to solicit feedback on the draft outline with the intent of finalizing an outline that effectively communicates the information generated from this scope of work consistent with the EPA Nine Elements to Watershed Management while also incorporating successful elements from previously published County WMP and identifying those elements that may need additional care from the previously published County WMP.

After completing the outline in conjunction with the County's input, Kimley-Horn will prepare the WMP that effectively summarizes the analytics and methodologies leveraged as part of this scope of work. The final WMP will serve as a framework for the County to guide project implementation throughout the Bull Run Watershed and a criteria for developing and maintaining a living model to proactively plan for future development and infrastructure projects. Where existing efforts do not meet those outlined in the EPA's Nine Steps, narratives will be provided which detail future opportunities to enhance this document.

As part of this WMP, documentation of existing County requirements for the design of stormwater management facilities associated with development in the watershed through VSMP requirements will be reviewed. Kimley-Horn will summarize the anticipated changes to the Virginia Runoff Reduction Management Spreadsheet (VRRM) as a result of Virginia Tech's latest efforts to update the methodology as part of version 4. A summary of the untreated pollutant of concerns within the watershed based on version 3.0 and version 4.0 will be developed to inform the County's policy on regulating private development within this actively developing watershed.

TASK 1100 – PUBLIC INVOLVEMENT

Public involvement is anticipated to be an ongoing process throughout the development of this WMP. Public meetings and coordination are anticipated at the following milestones:

Meeting #1 - Initial Public Meeting

At the conclusion of Task 100, Kimley-Horn and the County will host a public meeting to showcase existing conditions [based on publicly available data] in the Bull Run Watershed. This presentation will educate the public on the overall approach of this project, the anticipated outcomes, and an overview of additional opportunities for community feedback. The presentation will highlight the concept behind nature-based solutions and resiliency projects, and outline examples of public-private partnerships that the County has implemented successfully in the past. The known flooding location map generated as part of Task 100 with the Loudoun County Office of Emergency Management will be shared with the public and feedback will be requested to identify any additional areas with known instances of recurring flooding.

Meeting # 2 – Feasibility Assessments Update

After the initial feasibility assessment is performed in Task 600, Kimley-Horn and the County will host a public meeting to provide an update to the community on the efforts completed to date. Initial modeling results will be shared with residents to provide a forum for public-driven validation of the model results. Feedback will be solicited on preferred BMPs and on the feasibility assessments. Stakeholders and representatives of private HOAs where opportunities have been identified will be asked to weigh in to further gauge the potential for actual implementing these projects.

Meeting # 3 – Draft WMP Presentation

At the conclusion of Task 900, Kimley-Horn and the County will host a public meeting to present to the community the results of the proposed draft WMP for the Bull Run Watershed. The meeting will educate residents on all efforts performed to date, actionable outcomes and next steps. It is anticipated the document will be open to public comment with feedback solicited for incorporation into the Final WMP.

TASK 1200 – MEETINGS AND COORDINATION

This task includes the anticipated project meetings and coordination with the County and various stakeholders, and routine project management activities including but not limited to internal staffing, setting milestone schedules, and preparing monthly invoices.

Internal County coordination shall consist of the following departments:

- Project Meetings with DGS

- The Environmental Commission
- Building and Development Floodplain Department,
- The Department of Transportation and Capital Infrastructure,
- Loudoun County GIS Staff,
- Department of Finance and Procurement (Grants Coordinator)

Also included in this task is routine project management activities including but not limited to internal staffing, setting milestone schedules, and preparing invoices.

Kimley-Horn also anticipates coordination with the following external agencies:

- NVRC
- Occoquan Watershed Monitoring Lab
- Loudoun Wildlife Conservancy
- Fairfax County

The following table summarizes assumed effort with these agencies and organizations:

Entity	Hours
Project Meetings	40 [Includes time for regular project meetings on efforts and general coordination on overall progress]
The Environmental Commission	10 (Includes attendance at up to 3 committee meetings in person and miscellaneous coordination)
Building and Development Floodplain Department,	20 [Includes up to 2 virtual meetings and 2 in-person meetings with the Floodplain Group, and miscellaneous coordination]
The Department of Transportation and Capital Infrastructure,	10 [Includes up to 2 virtual meetings to discuss the overall approach and effort being performed, and data request needs]
Loudoun County GIS Staff,	10 [Includes up to 2 meetings to discuss data visualization and formatting, and coordination on sharing of data, and miscellaneous coordination]
Department of Finance and Procurement (Grants Coordinator)	4 [Includes up to 2 meetings on additional grant research opportunities]
NVRC	8 [Includes up to 2 meetings on the overall approach of the existing Occoquan Model and integration opportunities, as well as miscellaneous coordination]
Occoquan Watershed Monitoring Lab	4 [Includes up to 1 virtual meeting on data needs and requests]
Loudoun Wildlife Conservancy	6 [Includes up to 2 meetings on data requests and existing monitoring efforts]
Fairfax County	8 [Includes up to 2 virtual meetings on data requests, existing modeling efforts, and WMP lessons learned]
Total Hours	120

All meetings dedicated to public outreach are included in Task 1100. Should additional meetings and coordination be required beyond those stated above, Kimley-Horn will prepare an Amendment outlining the additional scope and fee for these meetings and coordination.

Schedule:

Upon receipt of formal notice-to-proceed, Kimley-Horn will develop a project schedule with the County to complete the requested work by no later than December 31st, 2025.

Deliverables:

Assumptions:

- It is assumed that the County will perform plan research for missing pond or storm sewer culvert data. This analysis assumes existing research from the Bull Run watershed will contain 1/3 of the 25 facilities.
- It is assumed that existing Stormwater GIS data for connecting culverts is accurate. If field validation is required, a separate task order for surveying services will be submitted for County review.
- It is assumed that the County will provide access to all existing water quality data and will provide points of contacts for stakeholder organizations.
- No FEMA submissions will be performed as part of this effort.
- All ponds which will be modeled will rely on previously digitized/delineated drainage areas within the County's database. Kimley-Horn will only perform a brief review of the drainage areas to ensure existing delineations remain appropriate.
- Loudoun County will provide a high resolution DTM for the Bull Run Watershed after post-processing of the latest LiDAR data. Kimley-Horn will not generate this file.
- Kimley-Horn will not generate ArcGIS online interactive maps as part of this proposal.
- Existing ponds will not be assessed for dam breach analyses or hazard classification.
- Ponds will not be reviewed for conformance with dam safety standards. Probably maximum flood events will not be evaluated as part of this analysis.
- It is assumed that the County will coordinate property entry with any non-County owned landowners with potential project implementation opportunities. If access is not granted, the feasibility assessment will be restricted to a desktop review.
- Rapid BANCS assessments shall not be a substitute for a full BANCS analysis.
- All project crediting will be performed in accordance with Guidance Memo No. 20-2003, and "Recommendations of the Expert Panel to Define Removal Rates for Urban Stormwater Retrofit Projects", as appropriate.
- The EOPCC will be based upon our understanding of local costs, historical bid averages, and similar project experience. Kimley-Horn does not control the cost of labor, materials, equipment or services furnished by others, methods of determining prices, or competitive bidding or market conditions; therefore any opinions rendered as to costs, including but not limited to opinions as to the costs of construction and materials, shall be made on the basis of our experience and represent our judgment as an experienced and qualified professional, familiar with the industry. Kimley-Horn cannot and does not guarantee that proposals, bids, or actual costs will not vary from its opinions of cost.

- The County will make the arrangements for the meeting locations included in Task 1100 and coordinate with any facility owner. The County will be responsible for any and all fees associated with the location.
- The County will provide notice to the public in advance of all public outreach activities.
- The WMP is not intended to act as a Zoning Ordinance update or Facilities Standards Manual update. Any recommendations that result from this report will be reviewed by the County and only considered for future efforts outside of this proposal.
- All models prepared for the County will be the property of the County. Kimley-Horn will not be responsible for modifications made to the model after completion of this task order.
- All modeling efforts will comply with those outlined in FEMA’s Guidance for Flood Risk Analysis and Mapping Guidance Documents.
- Any permits, permit application fees, review fees, or bonds required will prepared by others.
- This proposal and the accompanying cost estimate are valid for a period of 60 days and will expire if not accepted within that timeframe.

Exclusions:

Services that are not currently anticipated as part of this project and are therefore outside the scope of this task order proposal include the following:

- FEMA Coordination
- Design Phase Services
- Construction Phase Services
- Environmental Permitting
- All other services not explicitly stated in this scope of work

Fee and Expenses

Kimley-Horn will perform the following services as specifically requested by the County under this Scope of Services on a lump sum basis fee not to exceed \$495,651.75.

Task 100	County-Wide Data Collection And Existing Conditions	\$29,332.49
Task 200	Existing Hydrology Development	\$75,517.34
Task 300	PCSWMM Model Development	\$60,397.06
Task 400	Existing Condition Resiliency Assessment	\$33,248.00
Task 500	BMP Prioritization Assessment	\$13,887.48
Task 600	Nature-Based Solutions Feasibility Assessments	\$84,540.46
Task 700	Resiliency Modeling Scenarios	\$54,210.87
Task 800	Project Costs, Funding And Prioritization	\$35,865.96
Task 900	Watershed Management Plan Development	\$42,398.56
Task 1000	Public Involvement	\$31,425.93
Task 1100	Meetings And Coordination	\$34,827.60

Kimley-Horn will utilize the rate schedule as provided for in the County contract RFQ 338784B-C, Year 3. A detailed cost estimate (Attachment B) is provided with this proposal.

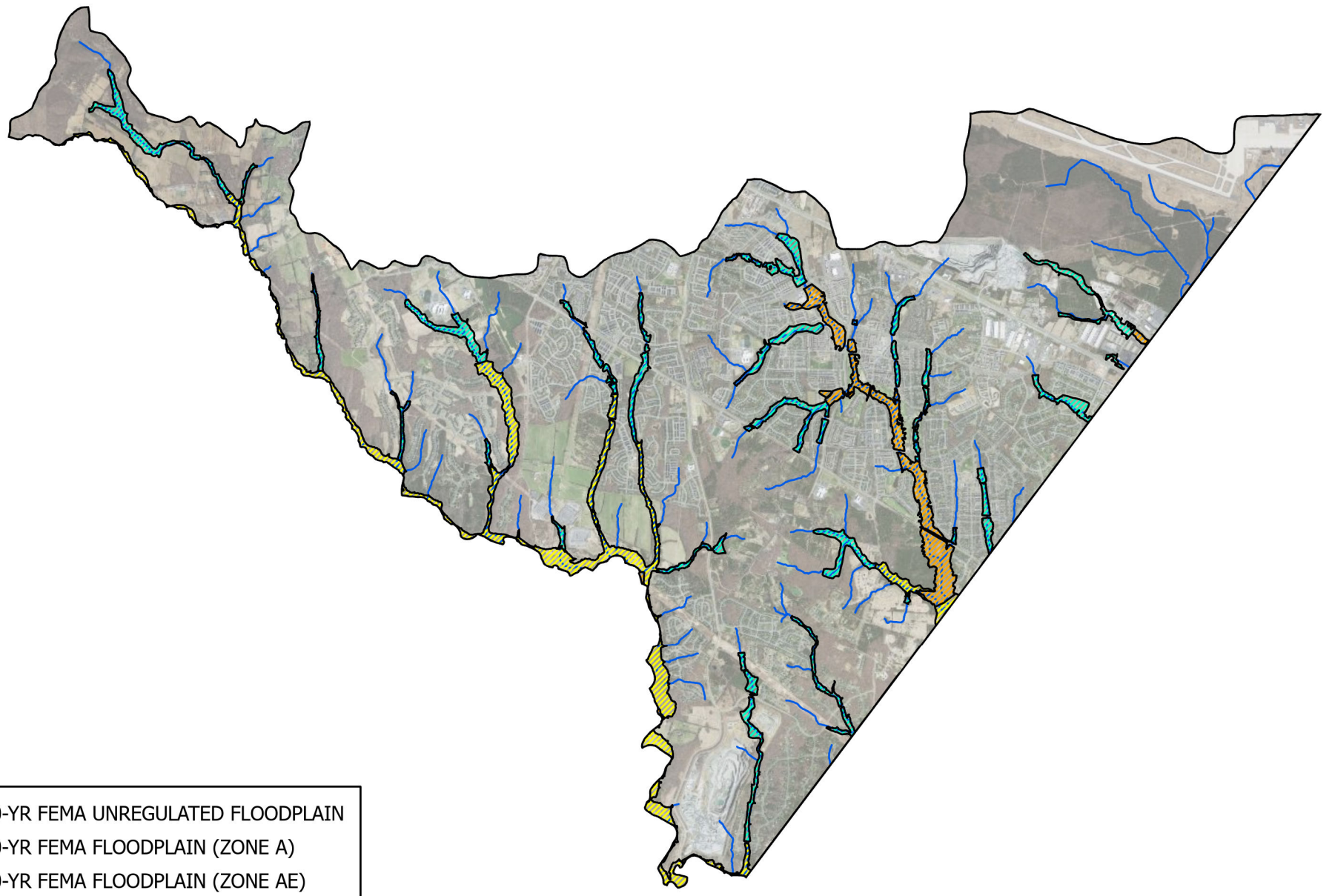
Closure





To proceed with the services, please have an authorized person sign this proposal below and return to us. Fees and times stated in this proposal are valid for thirty (30) days after the date of this letter.

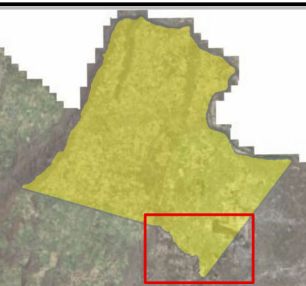
We appreciate the opportunity to provide these services. Please contact me if you have any questions.

Sincerely,

KIMLEY-HORN AND ASSOCIATES, INC.



-  100-YR FEMA UNREGULATED FLOODPLAIN
-  100-YR FEMA FLOODPLAIN (ZONE A)
-  100-YR FEMA FLOODPLAIN (ZONE AE)
-  STREAM CENTERLINE



BULL RUN WATERSHED IMPAIRED STREAMS AND FLOODPLAINS

Loudoun County
VIRGINIA



0 1.25 Miles

Aerial Data Source:VDOT Spatial Intelligence Group, Virginia Geographic Information Network (VGIN)

Coordinate System: NAD 1983 StatePlane Virginia North FIPS 4501 Feet

RFQ 338784-C
Engineering Services for the Loudoun County Stormwater Management Program

BULL RUN WATERSHED MANAGEMENT PLAN
11/3/2023

TASK	TASK DESCRIPTION	Principal	Sr Project Manager	Project Manager	Sr Engineer	Engineer III	Engineer II	Sr Landscape Architect	Landscape Architect	Sr Environmental Scientist	Environmental Scientist	GIS Programmer	Analyst II	Analyst I	Administrative	Total Hours	Labor Total	Total Miles For Each Task	Mileage Cost	KH Expenses	Sub Expenses	Sub Markup	Expense Total (Includes 10% Sub Markup)	Total Fee
		\$275.81	\$243.36	\$216.32	\$194.69	\$173.06	\$151.42	\$194.69	\$151.42	\$194.69	\$151.42	\$173.06	\$124.38	\$113.57	\$86.53				\$0.63			10%		
100	COUNTY-WIDE DATA COLLECTION AND EXISTING CONDITIONS	0	0	6	12	28.5	0	0	0	0	32	0	128	0	0	206.5	\$29,332.49		\$0.00			\$0.00	\$0.00	\$29,332.49
200	EXISTING HYDROLOGY DEVELOPMENT	0	0	32	66	164	0	0	0	0	138	0	52	0	0	452	\$75,517.34		\$0.00			\$0.00	\$0.00	\$75,517.34
300	PCSWMM MODEL DEVELOPMENT	0	0	36	66	170	0	0	0	0	42	0	32	0	0	346	\$60,397.06		\$0.00			\$0.00	\$0.00	\$60,397.06
400	EXISTING CONDITION RESILIENCY ASSESSMENT	0	0	18	0	54	0	0	0	0	50	0	100	0	0	222	\$33,248.00		\$0.00			\$0.00	\$0.00	\$33,248.00
500	BMP PRIORITIZATION ASSESSMENT	0	0	0	20	0	0	0	0	0	20	0	56	0	0	96	\$13,887.48		\$0.00			\$0.00	\$0.00	\$13,887.48
600	NATURE-BASED SOLUTIONS (NBS) FEASIBILITY ASSESSMENTS	30	0	20	110	63	0	0	0	0	122	0	168	0	0	513	\$84,288.46	400	\$252.00			\$0.00	\$252.00	\$84,540.46
700	RESILIENCY MODELING SCENARIOS	0	0	8	54	242.5	0	0	0	0	0	0	0	0	0	304.5	\$54,210.87		\$0.00			\$0.00	\$0.00	\$54,210.87
800	PROJECT COSTS, FUNDING AND PRIORITIZATION	0	0	8	40	84	0	0	0	0	78	0	0	0	0	210	\$35,865.96		\$0.00			\$0.00	\$0.00	\$35,865.96
900	WATERSHED MANAGEMENT PLAN DEVELOPMENT	0	0	8	40	60	0	0	0	0	60	0	80	0	40	288	\$42,398.56		\$0.00			\$0.00	\$0.00	\$42,398.56
1000	PUBLIC INVOLVEMENT	9	0	9	24	36	0	0	72	0	0	0	0	0	60	210	\$31,425.93		\$0.00			\$0.00	\$0.00	\$31,425.93
1100	MEETINGS AND COORDINATION	40	0	80	0	20	0	0	0	0	20	0	0	0	0	160	\$34,827.60		\$0.00			\$0.00	\$0.00	\$34,827.60
Total		79	0	225	432	922	0	0	72	0	562	0	616	0	100	3008	\$495,399.75	400	\$252.00	\$0.00	\$0.00	\$0.00	\$252.00	\$495,651.75

*Year 3 rates per executed contract amendment #2 dated 4/4/2022. Valid thru 4/30/2024



SECTION A - APPENDIX

SECTION OUTLINE

- Appendix A – Application Form for Grant and Loan Requests for All Categories
- Scope of Work Narrative and Supporting Documents for Study Applications
 - Exhibit 1- Floodplain Administrator Coordination
 - Exhibit 2 – Resumes for Qualifications of Project Team
 - Exhibit 3 – Scope of Services for the Bull Run Watershed Management Plan (Approved Kimley-Horn Proposal)



Loudoun County – Bull Run Watershed Management Plan
Community Flood Preparedness Fund (CFPF)
Grant Application Package – Section A - Appendix

Application Form for Grant and Loan Requests for All Categories

Applicants must have prior approval from the Department to submit applications, forms, and supporting documents by mail in lieu of the WebGrants portal.

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) 510090A

Name of Authorized Official and Title: George Govan, Director of Finance and Procurement

Signature of Authorized Official: _____

Mailing Address (1): P.O. Box 7000

Mailing Address (2): 1 Harrison Street, SE, 5th Floor

City: Leesburg State: Virginia Zip: 20177

Telephone Number: 571-367-8604 Cell Phone Number: (____) _____

Email Address: george.govan@loudoun.gov

Contact and Title (If different from authorized official): _____

Mailing Address (1): _____

Mailing Address (2): _____

City: _____ State: _____ Zip: _____

Telephone Number: (____) _____ Cell Phone Number: (____) _____

Email Address: _____

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

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 modifications to existing 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)

- 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.

- 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.

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

- Structural floodwalls, levees, berms, flood gates, structural conveyances.
- Storm water system upgrades.
- Medium and large-scale Low Impact Development (LID) in urban areas.

- 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.
- 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 Appendix C

NFIP Community Identification Number (CID#) : 510090A

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): Zone AE, Zone A, Zone X

Flood Insurance Rate Map Number(s) (If Applicable): 51107C0365E, 51107C0370E, 51107C0390E, 51107C0410E, 51107C0335E

Total Cost of Project: \$495,651.75

Total Amount Requested \$247,825.88

Amount Requested as Grant \$247,825.88

Amount Requested as Project Loan (not including short-term loans for up-front costs)
Not Applicable

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

For projects, planning, capacity building, and studies in low-income geographic areas: Are you requesting that match be waived? Yes No (*Not Applicable*)

Additional Information for Loan Requests

Requested Loan Security: Not Applicable

(General Obligation, Lease, Revenue, Special Fund Revenue, and/or Moral obligation from other government entity)

Desired loan term: Not Applicable

Since the date of your latest financial statements, did the applicant issue any new debt? Not Applicable
(If yes, provide details)

Is there any pending or potential litigation by or against the applicant? Not Applicable

Attach five years of current audited financial statements (FY18-22) or refer to website if posted
(Not necessary for existing VRA borrowers)

Attach FY2024 adopted budget or refer to website

Not Applicable

Attach current Capital Improvement Plan

Not Applicable

Attach adopted Financial Policies

Not Applicable

Attach a list of the ten largest employers in the Applicant's jurisdiction.

Not Applicable

Attach a list of the ten largest taxpayers in the Applicant's jurisdiction

Not Applicable



Loudoun County – Bull Run Watershed Management Plan
Community Flood Preparedness Fund (CFPF)
Grant Application Package – Section A - Appendix

Scope of Work Narrative and Supporting Documents for Study Applications



Scope of Work Narrative

General Requirements

In 2008, Loudoun County contracted a consultant to development a watershed management plan which encompassed all 17 subwatersheds. The result of this effort was a qualitative assessment with limited actionable items for the County to implement. Fast forward to today, the County is looking forward towards future planning efforts and has decided to pursue a more innovative and progressive approach to watershed management.

The Bull Run Watershed in Loudoun County is actively being redeveloped in accordance with the County's 2019 Comprehensive Plan. Based on estimates by the Census Bureau, portions of this watershed will experience significant increases in population and housing units, which will result in the addition of impervious area and populations at risk from inadequate infrastructure. Under present day conditions, the majority of the existing flood sources have not been studied (see Table 1); the streams that have been studied have not been since approximately 2013.

Table 1: FEMA Hydrologic and Hydraulic Anlaysis Summary of Bull Run

Stream Name	Date of Hydrologic and Hydraulic Analysis	Method	FIRM Panel
Bull Run	No Detailed Study	N/A	MULTIPLE
Tributary No. 1 to Bull Run	No Detailed Study	N/A	51107C0410E
Tributary No. 2 to Bull Run	No Detailed Study	N/A	51107C0365E / 51107C0370E
Tributary No. 3 to Bull Run	No Detailed Study	N/A	51107C0365E
Tributary No. 5 to Bull Run	No Detailed Study	N/A	51107C0365E
South Fork Broad Run	2013	Regression Equation for Loudoun County	51107C0365E
Sand Branch	1976	TR-20	51107C0390E
Foley Branch	No Detailed Study	N/A	51107C0370E
Elklick Run	2013	Regression Equation for Loudoun County	51107C0370E
Tributary No. 1 to Elklick Run	No Detailed Study	N/A	51107C0370E
Tributary No. 3 to Elklick Run	2013	Regression Equation for Loudoun County	51107C0370E



For the systems that have been studied, flow estimates for many of these streams are no longer representative of present-day hydrology. Further, topographic data at the time of these analyses was based on 2012 LiDAR data (resolution of this data was 0.5' horizontal accuracy) and mapped at 2' intervals. In 2024, the County will receive brand new high-resolution LiDAR data which will be the basis for updating the topographic data for all studied systems in the Bull Run watershed.

From an infrastructure perspective, within this watershed, there are 50 roadway stream culverts presently, of which approximately 33 roads are assumed to flood during the 100-YR design storm based on current FEMA estimates. There are also 16 public schools within the watershed in proximity to streams, with limited assessment of flood risk during extreme weather events, and 3 data center facilities. Based on the current comprehensive transportation plan, an additional 11 roadway stream crossings are anticipated to be constructed. There is only one hospital/urgent care facility within the watershed, two fire stations and one police station. With such limited access to public safety facilities, a flood resilient transportation network is critical to ensuring the safety and well-being of County residents.

Presently, there are no reported locations of repetitive loss structures within the Bull Run Watershed; however, the County does not track these occurrences outside the FEMA Flood Zone. Understanding that most flood issues occur outside of the FEMA mapped flood zones, and that future flood risks will only further challenge existing infrastructure, the County has identified the need to develop accurate tailwater conditions throughout the watershed for existing and proposed storm drainage infrastructure.

In order to address these needs, the County intends on developing a Bull Run Watershed Management plan with the following goals and outcomes:

- Develop a living [to be kept current] 1D/2D Integrated Flood Model capable of modeling future flow conditions
- Accurately map the present-day 100-YR and 500-YR floodplains for all streams identified in this project scope; present day flood overlay districts will be updated as a result of these efforts under a future project
- Establish a baseline model which can be integrated with on-site storm sewer systems for future infrastructure assessment of public and private developments
- Incorporate existing pond facilities into the model to understand peak flow attenuation in existing facilities
- Perform a feasibility assessment for resiliency projects aimed at mitigating flood risk and providing nutrient removal benefits towards both the Chesapeake Bay TMDL and the Local Bull Run Sediment TMDL
- Develop a CIP list for the Bull Run Watershed with clear funding guidelines and implementation schedule goals
- Assess water quality pollutant loads throughout the watershed to better understand stream impairments; Bull Run drains to the Occoquan Reservoir which serves Virginians across multiple municipalities
- Public feedback on known flooding issues, preferred project implementation approaches and resiliency needs throughout the community

The Bull Run Watershed is also the headwaters to the Occoquan Reservoir, a major water supply source for Prince William County, Fairfax County, and the City of Alexandria. Improvements within this watershed



to water quantity and quality have a regional benefit which can directly impact the TMDL classifications of the downstream receiving systems.

The County feels that the discussed goals and needs are best achieved through developing a technically detailed 1D/2D inundation model for the entire watershed. This approach is consistent with present day industry best practices for flood modeling, and provides the County with an IFM that has the capability to accurately model all storm infrastructure, including stormwater management facilities. Instead of producing a static report that requires frequent updates, the County will receive a live model that can be used for:

- Resiliency Planning,
- Land Use Planning,
- Comprehensive Plan Updates,
- Floodplain Overlay District Refinement,
- Transportation Planning,
- Emergency Management Response,

If Loudoun County does not receive this funding, then the level of effort which can be dedicated to this modeling approach will be significantly reduced. The effort to tackle this is being spearheaded through the County's new Environmental Commission, a recently Board-Appointed group of citizens dedicated to implementing and guiding Loudoun County's approved Environmental and Energy Work Plan. The Committee is dedicated to the following goals:

- Energy sustainability
- Enhancing natural resources
- Environmental justice
- Government by Example
- Increased public engagement in environmental and sustainability initiatives.

In an effort to improve County resiliency, the Commission successfully secured \$200,000 to develop a watershed management plan in the County which aligns with the Commission's goals. This pursuit for CFPF funds is intended to bolster those funds to build a comprehensive WMP for the Bull Run Watershed which has yet to experience the same level of increased floods and environmental degradation as other watersheds within the County.

Based on the Commission's goals, the WMP will be throttled back to be primarily a project feasibility assessment and WMP development, rather than a floodplain model overhaul. The resulting project will not perform detailed studies of flooding in the Bull Run Watershed, but rather focus strictly on nature based project implementation to improve water quality.

The project must be complete by the end of 2025, with schedule primarily to be impacted based on the timing of public involvement and community feedback, as well as the timing of the new LiDAR data.

Overall Project Workplan:

The PCSWMM model being proposed as the backbone of this effort is going to function as a living model which will be updated over time to ensure that project implementation can be validated against present and future land use and rainfall scenarios. The intent is to develop an integrated flood model (IFM) which will include all minor (100 acres – 1 square mile) and major floodplains as a baseline condition for



understanding existing flood risk. Hydrology will be developed for all headwaters to accurately model runoff conditions throughout the entire system, and provide the framework for future efforts to tie in 1D storm sewer networks into these modeled tailwater conditions. Looking towards future rainfall scenarios, building the model now will put the County in a position to input NOAA Atlas 15 future rainfall estimates when this data comes out in 2027. Planned infrastructure and roadway maintenance can be performed based on future flood conditions to shift flood control from reactive to proactive.

The IFM will include stormwater management ponds to assess their individual impacts on flood mitigation to the downstream receiving systems. Opportunities to retrofit these facilities to provide additional resilience – whether that be a BMP retrofit or to simply alter the existing control structure to detain additional flow – can be evaluated holistically to assess large-scale impacts. In developing an IFM in this fashion, future land use considerations can be modeled to understand the impact to the watershed. As part of this effort, water quality pollutant loads will also be built into the model to better understand pollutant removal opportunities for nature-based solutions. These efforts will be collaborated with the Northern Virginia Regional Commission and Occoquan Monitoring Lab to ensure consistent loads are being applied throughout the Occoquan Watershed.

Below is a work plan overview summarizing the work to be completed and anticipated outcomes over the course of the project. Kimley-Horn will be responsible for implementing this work with the support of the Loudoun County Department of General Services, the Environmental Commission and public stakeholders. The County and its constituents will be key partners in the proper development of this WMP, from data collection and community partnerships to flood model validation and local reports of known flood locations. The County and the Commission will be updated throughout the process to ensure that the WMP aligns with the intended goals of the Commission and this WMP. The timeframe for each task will be refined during the project based on collaboration with these parties.

Step 1: Initial Public Involvement

- Initial Meeting In-Person
 - Outline Problems, Goals, and Funding Opportunities
 - Outline roles and origin of the funds dedicated to efforts of this nature
 - Provide an Overview of Approach
 - Setup Overall Project Schedule
 - Identify Key Meeting Opportunities
 - Survey Communities for interest in working with the County to implement projects on their land

Outcomes:

- Initial coordination with communities in Bull Run established
- Identification of communities that are open to collaboration with the County

Step 2: DATA REVIEW and modeling

A. Water Quantity and Baseline Hydraulic Conditions

- Establish Project Boundary for Modeling
 - Entirety of Bull Run Watershed within Loudoun County
 - Up to 25 Ponds for Integration into the Model
- Develop Flows for all Open Channels
 - FEMA Approved Flow Data will act as a validation metric.
 - PCSWMM Hydrology will be developed for all open channels to model actual flows, not those estimated using the Loudoun County Regression Equation. These flows will be further validated against known and future gauge data.
- Create velocity raster maps to understand where erosive conditions exist in open channels



throughout the County

- Assess quantity capacity of existing BMPs to determine opportunities for additional water quality improvements
- Establish 100-YR and 500-YR Minor and Major Floodplains
 - Minor Floodplain → 100 – 640 Acres
 - Major Floodplain → FEMA Regulated > 640 Acres (1 Square Mile)
- Coordinate with Loudoun County Office of Emergency Management to identify critical infrastructure that floods

Outcomes:

- Integrated Flood Model Developed for Present Day and Future Scenarios
- County-wide floodplains mapped (these will not attempt to update FEMA effective floodplains)
- Flood risk locations identified throughout watershed
- Provide estimates of erosive flows in existing streams for stream restoration prioritization
- Setup model with capabilities to have pollutant loading incorporated (Note this is heavily dependent on available monitoring data to calibrate it)
- Evaluate capacity of existing BMPs to assess feasibility of retrofitting them for improved treatment without acquiring additional land

B: Water Quality

- Develop Watershed-Wide Map identifying known streams which are impaired or have a documented TMDL
- Identify common pollutant sources for improved source management (i.e. agriculture)
- Compile Available Water Quality Data:
 - EPA 303d List
 - EPA MyWaterWay
 - Occoquan Monitoring Lab
 - Citizen Led Groups in the County
- Prioritize Stream Restoration Opportunities for Water Quality Benefit
 - Stream prioritization will be supported through the Bank Assessment for Non-Point Source Consequences of Sediment (BANCS)
 - Water quantity model will be used to estimate streams with high velocities and shears, which is an indicator of actively eroding systems
 - Installation of Banc Pins
- Document approved BMPs and BMP co-benefits (environmental outcomes besides nutrient reductions) Examples may include practices that provide wildlife habitat, remove toxic contaminants, or provide improved climate adaptation potential.
- Examine existing BMPs for retrofit opportunities leveraging preferred BMP list based on capacity results from the Water Quantity Model
- Identify potential opportunities for implementing new BMPs based on known pollutant sources and hydrologic conditions (drainage area size, pollutant loads available for treatment)

Outcomes:

- Identification of EPA impaired streams and environmentally sensitive systems
- Compilation of available water quality data for project prioritization and baseline metrics
- Documentation of preferred BMPs
- Preliminary identification of potential new BMPs and modified existing BMPs

Step 3: Nature-Based Solutions (NBS) Opportunity Assessments

- Develop minimum siting constraints for feasible facilities. This will encompass both physical site constraints, flood reduction and resiliency benefits, environmental benefits, likelihood of implementation (access, easements), hydrologic/hydraulic benefits, crediting opportunities, and funding mechanisms.
- Conduct site visits in the field to verify constraints, and identify additional feasibility considerations.
- Develop suite of preferred BMPs for future County land development in the Watershed. This will be developed in conjunction with the County and include a public comment period.
- Develop weighting criteria for the various constraints.



- Perform desktop review of proposed suitable project locations. Review approved crediting for existing regional wet ponds to assess if all existing credit opportunities have been claimed for both Chesapeake Bay TMDL and Bull Run Sediment TMDL.
- Conduct preliminary crediting analyses on opportunities to estimate pounds of reduction for Phosphorus, Nitrogen and Total Suspended Solids
- Create a prioritization matrix of identified projects to create a ranking of opportunities. Solicit feedback from residents on identified opportunities and incorporate their preferences as a criteria.
- Prepare preliminary concept plans for top opportunities
- Proposed condition modeling for optimal flood mitigation opportunities

Outcomes:

- Feasibility Assessment of Potential Opportunities
- Preliminary Concept Plan
- Preliminary Proposed Modeling Results for Resiliency Projects

Step 4: Cost Estimates, Funding Opportunities and Implementation Schedules

- Development of High Level Planning Cost Ranges. These will be based on limited available data and will only act as an indicator for overall cost ranges. CIP or Grant Funding level estimates will be generated as part of a separate task once the County has identified projects which it would like to move forward with for future planning efforts.
- Outline of County Budget for Implementation Opportunities
- Research potential grant funding opportunities
- Identify public-private partnership opportunities in flood-prone areas

Outcomes:

- EOPCCs for identified opportunities
- Summary of grants and financial resources for project implementation

Step 5: Monitoring and Validation

- Develop a set of metrics for monitoring and validating project performance as part of the WMP. This will consist of existing protocols within the County, and identify additional opportunities to improve the County's data collection network and validation metrics. Examples may include:
 - Structural BMPs (Wet Ponds, Constructed Wetlands, Bioretentions)
 - Evaluate influent and effluent monitors for implemented BMP projects for a period of five (5) years
 - Stream Restoration
 - Conduct post-construction monitoring for a period of seven (7) years to ensure ongoing stabilization
 - Conduct macro-invertebrate sampling for a period of four (4) years to monitor biological uplift

Outcomes:

- Validation metrics for establishing efficacy of projects
- Post-construction monitoring in place to ensure projects are a long-term success

Step 6: Ongoing Public Involvement

- Enhance public understanding of the projects and encourage their early and continued participation in selecting, designing, and implementing the prioritized BMPs through public outreach
- Update County website support on the development of the Watershed Management Plan
- Align watershed management messaging with existing MS4 MCMs for public outreach
- Schedule virtual town-halls throughout the project to provide updates on the progress of the Watershed Management Plan

Outcomes:

- Community driven project prioritization

Refer to the Scope of Services included in Section B for additional information about the proposed work that will be covered under this study grant.



Long Term maintenance of the IFM will be the responsibility of the Loudoun County Department of General Services. At the completion of this effort, it is anticipated that the County will develop a task order contract with an on-call consultant, or train internal staff, who can keep the model up to date over its lifespan to ensure that projects and models reflect present day conditions. The County anticipates the release of future flood rainfall data from NOAA Atlas 15 rainfall efforts in 2027 to lead to further refinement of this model to consider future flood conditions.

Success Metrics:

The project will be considered successful based on the following metrics:

- A functional IFM that is kept up to date as a living model over time
- Studied 100-YR and 500-YR floodplains along project reaches throughout the Bull Run Watershed which are validated by public feedback
- Identified HOAs/Private Entities interested in public-private partnerships
- Active public participation
- A new CIP plan for Bull Run with clear funding schedules and implementation timelines with offer both resiliency benefits and crediting opportunities to tackle both the Chesapeake Bay TMDL and Local Bull Run Sediment TMDL
- Support of the Environmental Commission in the outcome and quality of the work performed

A likely outcome of the WMP are recommended locations for installations of stream gauges and water quality monitoring equipment. These items will serve as validation metrics to further refine the developed hydrology and water quality loading estimated as part of this IFM. Community driven monitoring of streams and habitats for indicators of strong ecosystems will be continued by local organizations and used as a means of determining whether implementation efforts have resulted in improvements. The timeline for these kinds of benefits can take 5 plus years; therefore success will depend on the support of the Environmental Commission in maintaining these relationships with the public into the future.

Public involvement will be critical throughout this process. It is a priority of the County, the Commission and Kimley-Horn to actively engage residents early on and frequently within this process to develop a well-supported WMP with implementable projects. The County recognizes that the majority of publicly owned land has been assessed for projects and may not represent the most ideal locations for future projects. The County has successfully completed past public-private partnerships with subdivisions and HOAs to implement resiliency and retrofit opportunities, and in order to replicate this process, public support is essential. The objective of the public involvement piece of this effort is to identify projects with receptive communities who will experience resiliency benefits while offering the County community-scale opportunities to both address flood mitigation and improve water quality.

Project progress and budget will be tracked on a monthly basis and reported to the County with a monthly progress report containing documentation of services provided and meetings, action items, and deliverables will be coordinated with County staff. Developing a Stormwater Master Plan utilizing the tasks and procedures in Kimley-Horn's scope of services will help strengthen Waterford's resilience to flooding on a local and basin-wide scale and will allow for the design of drainage infrastructure improvement projects to aid in protecting historic landmarks and Waterford's NHL status.



Supporting Documents Required for Study Applicants:

1. The specific type of study proposed including whether the study is new or updates a prior study.

The specific type of study being performed is an update to the existing HEC-RAS model prepared by FEMA for watershed-wide hydrologic and hydraulic modeling of the Bull Run watershed. This study will revise the mapped and unmapped floodplains in the Bull Run Watershed. Also included are feasibility assessments for project implementation and a general update to a Watershed Management Plan which prioritizes these opportunities. See Appendix A for specific categories.

2. The relationship of the study to the local government's needs for flood prevention and protection, equity, community improvement, identification of nature-based solutions or other priorities contained in this manual.

The study is related to establishing accurate and up-to-date base flood elevations within the Bull Run watershed of Loudoun County. The study will allow Loudoun to ensure that infrastructure meets its intended level of service, that disenfranchised populations receive improvements equitably, and that projects are identified based on wholistic and community scale opportunities. Due to the present of both the Chesapeake Bay TMDL and the local Bull Run Sediment TMDL, resiliency projects leveraging nature based solutions will provide the County will substantial water quality benefits and be competitive projects to pursue grant funding. Lastly, this study will put into place a mechanism for the County to understand and model future rainfall and land use considerations to inform infrastructure planning, floodplain overlay district management and water quality management.

3. The qualifications of the individuals or organizations charged with conducting the study or the elements of any request for proposal that define those qualifications.

See Exhibit 2 for Project Team Resumes.

4. The expected use of the study results in the context of the local resilience plan or, in the case of regional plans, how the study improves any regional approach.

The outcome of this study will include a CIP list for the Bull Run watershed with an implementation schedule for the resiliency projects that have been prioritized. At this time, the County does not have a Resiliency Plan dedicated to project identification and implementation consistent with what CFPF details. Subsequent efforts are anticipated to include preparing a Resiliency Plan which meets DCR's standards and develops a roadmap for implementing these projects. Looking more broadly, the IFM will include a pollutant loading model which will be leveraged to work collaboratively with Prince William County, Fauquier County and Fairfax County to address impairments in the Occoquan Basin Watershed. This effort will allow Loudoun to improve water quality management in the Bull Run Watershed, further progressing the Environmental Commission's mission.



5. How the study may improve Virginia’s flood protection and prevention

Currently, the majority of streams within the Bull Run Watershed of Loudoun County do not have detailed studies. Further, there are multiple locations in the watershed where critical infrastructure is at risk from a flood event, and public safety during emergencies is a concern. See the narrative above for additional detail.

6. Other necessary information to establish project priority

The above information presented within this narrative summarizes the benefits of implementing this project. Without these matching funds, the Bull Run Watershed will continue to be not studied hydraulically and existing at risk infrastructure will be left as is for the foreseeable future.

7. Repetitive Loss and/or Severe Repetitive Loss Properties

Presently, there are no reported locations of repetitive loss structures within the Bull Run Watershed; however, the County does not track these occurrences outside the FEMA Flood Zone. An email attachment is included in Exhibit X where the Floodplain Administrator confirms that the County does not track these events at this time. It is a goal of this study to give a voice to the public to identify known flood risk locations, and assist the County in developing a better database of these occurrences.

Within the project watershed, existing land use consists of 178 commercial properties and 14,681 residential properties. The following table breaks these down between types:

CLASSIFICATION	BUILDING TYPE	TOTAL
COMMERCIAL	CHURCH	11
COMMERCIAL	DATA CENTER	3
COMMERCIAL	FARM FARM	3
COMMERCIAL	GOLF COURSE	2
COMMERCIAL	HEAVY IND	13
COMMERCIAL	HOTEL	1
COMMERCIAL	LIGHT INDUSTRIAL	30
COMMERCIAL	OFFICE GENERAL	5
COMMERCIAL	OFFICE MEDICAL	4
COMMERCIAL	OTHER_NON PUBLIC	37
COMMERCIAL	OTHER PUBLIC	16
COMMERCIAL	RETAIL	53
RESIDENTIAL	MULTI-FAMILY ATTACHED	15
RESIDENTIAL	MULTI-FAMILY STACKED	97
RESIDENTIAL	SINGLE FAMILY ATTACHED	5980
RESIDENTIAL	SINGLE FAMILY DETACHED	8589

8. Critical Facilities/Infrastructure



There are a variety of critical pieces of infrastructure located throughout the Bull Run Watershed. This narrative discusses this in greater detail but the mix of infrastructure includes:

- Roadway stream culverts presently,
- Schools
- Data center Facilities
- Urgent Care Facilities
- Fire Stations
- Police Stations



Exhibit 1 - Floodplain Administrator Coordination

Arizzi, Joseph

From: Auer, Maggie <Maggie.Auer@loudoun.gov>
Sent: Wednesday, September 20, 2023 12:33 PM
To: Arizzi, Joseph
Cc: Stone, Chris; Moore, Keara; Kight, Casey
Subject: RE: Repetitive Flood Loss Properties in the County

Follow Up Flag: Follow up
Flag Status: Flagged

Categories: External

Joe,

The County does not have any documented repetitive loss structures in that watershed, most of the repetitive losses are in the Broad Run watershed.

Thanks,

Maggie Auer, CFM | Floodplain Management Team Leader
Building and Development | Loudoun County
1 Harrison Street, S.E. | Leesburg, VA 20175 | 3rd Floor, MSC #60
Maggie.Auer@loudoun.gov | (O) 703-777-0222 | (C) 571-420-1863

From: Arizzi, Joseph <Joseph.Arizzi@kimley-horn.com>
Sent: Wednesday, September 20, 2023 11:16 AM
To: Auer, Maggie <Maggie.Auer@loudoun.gov>
Cc: Stone, Chris <Chris.Stone@loudoun.gov>; Moore, Keara <Keara.Moore@loudoun.gov>; Kight, Casey <Casey.Kight@kimley-horn.com>
Subject: [EXTERNAL] RE: Repetitive Flood Loss Properties in the County

Hi Maggie –

Thanks very much – this is going to be a watershed-wide analysis for the Bull Run Watershed. Is that enough for you to provide the addresses in the project area? I can also figure out where they are spatially if you the County is able to release those 15 addresses.

Joe Arizzi, P.E. (VA)
Kimley-Horn | 11400 Commerce Park Drive, Suite 400, Reston, VA 20191
Direct: 703 674 1330 | Mobile: 631 275 7094 | www.kimley-horn.com
Connect with us: [Twitter](#) | [LinkedIn](#) | [Facebook](#) | [Instagram](#)

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From: Auer, Maggie <Maggie.Auer@loudoun.gov>
Sent: Wednesday, September 20, 2023 10:53 AM
To: Arizzi, Joseph <Joseph.Arizzi@kimley-horn.com>
Cc: Stone, Chris <Chris.Stone@loudoun.gov>; Moore, Keara <Keara.Moore@loudoun.gov>; Kight, Casey

<Casey.Kight@kimley-horn.com>

Subject: RE: Repetitive Flood Loss Properties in the County

Good morning Joe,

The last update we received from FEMA about the number of repetitive losses was 9/2019 and at that time there were 15 addresses County-wide that qualified as repetitive loss. We have the addresses of the repetitive losses so we can provide the number for the proposed project area if needed. Currently, the County does not track repetitive losses outside of the FEMA Special Flood Hazard area so our data only reflects what is captured by the NFIP.

Thanks,

Maggie Auer, CFM | Floodplain Management Team Leader
Building and Development | Loudoun County
1 Harrison Street, S.E. | Leesburg, VA 20175 | 3rd Floor, MSC #60
Maggie.Auer@loudoun.gov | (O) 703-777-0222 | (C) 571-420-1863

From: Arizzi, Joseph <Joseph.Arizzi@kimley-horn.com>

Sent: Tuesday, September 19, 2023 3:24 PM

To: Auer, Maggie <Maggie.Auer@loudoun.gov>

Cc: Stone, Chris <Chris.Stone@loudoun.gov>; Moore, Keara <Keara.Moore@loudoun.gov>; Kight, Casey <Casey.Kight@kimley-horn.com>

Subject: [EXTERNAL] Repetitive Flood Loss Properties in the County

Hi Maggie,

Our team is working with DGS to submit a watershed management plan as part of the CFPF Grant Opportunity and one of the required items from the application is a record of the following:

Repetitive Loss and/or Severe Repetitive Loss Properties

Do not provide the addresses for these properties but **include an exact number of repetitive loss and/or severe repetitive loss structures within the project area**. Work with the local floodplain administrator or emergency manager to find this information. **If they do not have a list of repetitive loss/severe repetitive loss structures, the Department can assist them in accessing these lists for NFIP insured structures**. Please note, that repetitive loss and/or severe repetitive loss often occurs outside of the SFHA and to properties not captured in NFIP reporting. All flooding involving these properties should be tracked and addressed by the community. Residential and/or Commercial Structures – 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.

Is this information you are able to provide our team?

Thank you,

Joe Arizzi, P.E. (VA)
Kimley-Horn | 11400 Commerce Park Drive, Suite 400, Reston, VA 20191
Direct: 703 674 1330 | Mobile: 631 275 7094 | www.kimley-horn.com
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Exhibit 2 - Resumes for Qualifications of Project Team



Key Individuals

Kimley-Horn brings you a carefully selected team of seasoned professionals who are genuinely committed to Loudoun County's success. Our team serving Waterford prides ourselves on maintaining our strong project delivery, reputation for dependability, proactive thinking, and solid, consistent results. We are committed to delivering projects successfully and improving the County's resilience to flooding. Brief introductions to our team can be found below and resumes for each team member can be found on subsequent pages.



Joe Arizzi, P.E.

Joe is an experienced urban stormwater management designer and project manager in the State of Virginia. Joe is passionate about designing modern solutions to address resiliency and water quality challenges. He actively assists municipalities with assessing existing flood risk through 2D inundation studies using PCSWMM and HEC-RAS. Joe works with his Clients to ensure MS4 and TMDL Compliance and improve resiliency for residents throughout Northern Virginia.



Casey Kight, PLA

Casey has 19 years of experience assisting Phase II MS4 communities including Loudoun County, Fairfax County, City of Fairfax, Stafford County, GMU, and others with the development and implementation of a variety stormwater solutions in support of MS4 permit compliance. Casey is currently the contract manager for the following stormwater contracts: Loudoun County, City of Falls Church, and Town of Herndon and is providing his institutional knowledge, vast experience, can do attitude and highly capable skill set to serve those clients effectively and efficiently. Casey will serve as a task leader for the engineering design and civil engineering team and will bring his array of experience in stormwater coupled with his focus on providing quality deliverables to the County to serve as the QC/QA reviewer for this project.



Jared Hodes, P.E.

Jared has more than 7 years of experience in technical H&H modeling with a focus on hydrologic extremes, floodplain

management, and municipal flooding issues. Jared has used a variety of H&H software including HEC-RAS, HEC-HMS, XPSWMM, HY-8, FlowMaster, and PondPack to model watersheds, culverts, bridges, dams, stormwater infrastructure, and stormwater BMPs for the purposes of design, retrofitting, municipality permitting, FEMA floodplain permitting, resiliency assessment, and flooding hot spot identification. He has extensive experience using ArcGIS for spatial data analysis, map product creation, online dashboard creation, and compiling and editing ESRI geodatabases for asset management. He has performed field work for stream, stormwater, precipitation, and geophysical measurements and for pollutant sampling projects.



Sam Illes, P.E., SWPR

Samantha specializes in projects involving hydrologic and hydraulic modeling as well as design and construction of stormwater management systems and facilities. Samantha is proficient in the use of various hydrologic and hydraulic modeling software packages such as PCSWMM, HEC-HMS, HEC-RAS, FlowMaster, and ArcGIS. Samantha is also experienced with the Virginia Runoff Reduction Method (VRRM), as well as the TR-55 process in calculating runoff and nutrient loading. She assists in the design of stormwater best management practices (BMPs) and BMP retrofits. As a Stormwater Plan Reviewer, Samantha reviews stormwater management designs and coordinates with engineers to ensure stormwater regulations are met. Through her design efforts and plan reviews, Samantha is familiar with Virginia's Department of Environmental Quality BMP specifications.



Jenna Gregory, EIT

Jenna has 3 years of experience in stormwater design and stormwater modeling as an Analyst. She is proficient in the use of various hydrologic and hydraulic modeling software packages such as PCSWMM, HEC-HMS, HECRAS, and StormCAD. Her modeling and design experience includes stormwater master plans and BMPs.



Joe Arizzi, P.E.
Project Manager

Relevant Experience

Loudoun County Department of General Services (DGS) On-Call MS4 Support, Loudoun County, VA — Project Engineer. Joe actively assists Loudoun County's DGS department in providing municipal separate storm sewer system (MS4) program support. This work has consisted of various tasks orders including watershed planning for quality and quantity control which includes identifying projects for stream and outfall restorations, BMP retrofits, and infrastructure improvements. Project evaluation for this client has included assessing projects for both phosphorus, nitrogen and TSS reductions associated with the Chesapeake Bay TMDL and TSS reductions for Loudoun County's local TMDL. The assessments include use of GIS to identify project locations based on hydrologic, environmental and developmental restrictions, ease of implementation, and constructibility.

Town of Herndon On-Call Stormwater Management Services, Town of Herndon, VA — Project Manager. Joe actively supports the Town of Herndon in the implementation of BMP maintenance and retrofit opportunities in support of their MS4 Program. Opportunities include BMP retrofits, maintenance plans, stream restorations, and desktop reviews of opportunities.

Greening of Lincoln, City of Falls Church, Falls Church, VA — Project Manager. Joe is actively leading a PCSWMM analysis for a 250-acre watershed with known flooding issues in the City of Falls Church. This project is a hybrid stormwater – roadway capital improvement project which also is evaluating traffic calming measures and roadway features along an existing corridor within this watershed. As part of Phase 2 of this project, recommendations and solutions will be presented which incorporate GI along the corridor to act as both community assets and stormwater treatment practices.

Rostormel Court Outfall Restoration, Ashburn, VA — Project Manager. This project consists of the outfall restoration and small watershed analysis for Rostormel Court. Using a combination of GIS, H&H softwares, and AutoCAD Civil 3D, Kimley Horn analyzed the storm sewer at Rostormel Court to understand drainage patterns, flooding and storm infrastructure capacity. This also involved a TMDL crediting analysis, preparation of construction documents and extensive public outreach with the community.

Conklin Park Stream Restoration, Loudoun County, VA — Project Engineer. Kimley-Horn is performing a stream restoration for a 2,200 linear foot stream of unnamed tributary of Elklick Creek. This creek has high banks that have been excised by stormwater rushing through the tributary and the stream no longer functions as intended. This intention of this project is to restore the stream to a stable condition and incorporate improvements associated with a proposed dirt bike park parallel to the stream. The project includes due diligence/data collection, morphological assessment, hydrology and hydraulics, and design. This stream restoration is being restored using Natural Channel Design (NCD). Our team is performing detailed hydrologic analysis for the existing stream corridor and contributing drainage areas. Kimley-Horn integrated Loudoun County GIS data and used HECRAS to create a comprehensive hydraulic model.

***Indicates project completed prior to joining Kimley-Horn**

Special Qualifications

- Joe is an accomplished water resources engineer providing MS4 Support Services in Virginia for nearly a decade

Professional Credentials

- Bachelor of Science, Environmental Engineering, Rensselaer Polytechnic Institute, 2014
- Professional Engineer in Virginia
- Rosgen III Certified
- VDEQ Stormwater Management Inspector and Plan Reviewer



Casey Kight, PLA

QC/QA Manager

Relevant Experience

On-Call Stormwater Services, Loudoun County, VA — Contract Manager. Throughout the course of the past 19 years, Casey has provided a variety of services to the County in support of their MS4 Program Compliance. He has provided dry weather screening (DWS) for more than 5,000 MS4 regulated outfalls, post-construction stormwater inspections for more than 10,000 BMPs, stormwater pollution prevention (SWPPP) inspections for county owned high priority facilities, and he has developed numerous program planning documents including the county's IDDE SOP, BMP Inspection forms, good housekeeping SOPs, and several crediting protocols based on the Chesapeake Bay Total Maximum Daily Load (TMDL) Special Condition Guidance document. His team is actively providing Chesapeake Bay and Local TMDL Action Planning and implementation for various opportunities throughout the county including Conklin Park Stream Restoration and Lake Ashburn. Both of which recently won SLAF grants totaling more than \$3.5M.

On-Call Stormwater Program Support Services, Falls Church, VA — Contract Manager. Casey is actively managing the City of Falls Church Stormwater On-Call contract where he is providing comprehensive stormwater management program support services for their Phase II MS4 program. He and his team are currently providing SWMM modeling within the Trammel Branch and Coe Branch Watershed. He is also providing BMP retrofit and green infrastructure design services along Lincoln Avenue in support of the Greening of Lincoln CIP project. Previously services he provided to the City of Falls Church include the development MS4 standard operating procedures and other program planning documentation, dry weather screening (DWS) in support of the City's illicit discharge detection and elimination (IDDE) program, development of BMP inspection forms and training City staff with the post construction inspection and implementation of the BMP inspection program. Casey also provided inspection/assessment of the city's property yard and provided a review of the city's high priority facilities and activities. stormwater infrastructure and green streets alternatives for Lincoln Avenue. Through this contract, we also will be providing Utility Rate Studies and grant applications.

On-Call Stormwater Program Support Services, Herndon, VA — Contract Manager. Casey is actively managing the Town of Herndon Stormwater On-Call contract where he is providing MS4 program support services for their Phase II MS4 program. He and his team are actively assisting the Town by providing BMP retrofit design services for two non-functioning pond facilities. Retrofits are actively being design using the Recommendations of the Expert Panel to Define Removal Rates for Urban Stormwater Retrofit Projects and consist of the implementation of a variety of features that enhance the facilities and provide incremental TP, TN, and TSS credit.

Conklin Park Stream Restoration, Loudoun County, VA — Project Manager. Kimley-Horn is performing a stream restoration for a 2,200 linear foot stream of unnamed tributary of Elklick Creek. This creek has high banks that have been excised by stormwater rushing through the tributary and the stream no longer functions as intended. This intention of this project is to restore the stream to a stable condition and incorporate improvements associated with a proposed dirt bike park parallel to the stream. The project includes

Special Qualifications

- 19 years of experience implementing stormwater solutions

Professional Credentials

- Bachelor of Science, Landscape Architecture, West Virginia University, 2004
- Professional Landscape Architect in Virginia, Maryland, and West Virginia
- Rosgen Level I – IV
- Virginia DEQ Stormwater Combined Administrator



due diligence/data collection, morphological assessment, hydrology and hydraulics, and design. This stream restoration is being restored using Natural Channel Design (NCD). Our team is performing detailed hydrologic analysis for the existing stream corridor and contributing drainage areas. Kimley-Horn integrated Loudoun County GIS data and used HECRAS to create a comprehensive hydraulic model.

***Stormwater Management, Parks, Transportation On-Calls Fairfax County, VA —** Project Manager / Task Manager. Casey provided various expertise for the following City projects under several different on-call contracts including George Snyder Trail Concept Plan, Judicial Drive Concept Plan, Wilcoxin Trail Concept Plan, Westmore School Dog Park, Van Dyck Park BANCS Assessment, BMP Inspections, Country Club Hill Connector Trail, Ashby Pond Concept Plan, and Stafford Drive Stream Restoration.

***Stormwater Management On-Call, Stafford County, VA —** Project Manager/Task Manager. Casey provided various expertise for the following County projects under the stormwater management on-call including St. Clair Brooks Park Stream Restoration, Courthouse BMP Retrofits, DWS, BMP Inspections, Staff Training for BMP Inspections and IDDE, and BMP site retrofit assessments for various County projects.

***Stormwater Related Engineering and Consulting Services, Winchester, VA —** Project Manager. Casey provided TMDL Action Planning services for the city including the location, delineation, and land cover analysis for the city regulated outfalls draining into the waters of the US (WOUS) within the city limits. He also performed BMP Site retrofit assessments for five municipal sites to identify BMP implementation locations. He assisted with the development of the Chesapeake Bay TMDL Action Plan and the local TMDL action plans for Opequon Creek and Abrams Creek. He also helped develop a North Cameron Street storm infrastructure plan to identify and alleviate frequent flooding areas.

***George Mason University (GMU) Stream Restoration, Fairfax County, VA —** Project Manager. Casey was responsible for executing, delivering, and managing all tasks related to the GMU stream restoration project. The environmental services included a jurisdictional determination for up to five acres and 350 linear feet of stream and 401/404 permitting. The design services included natural channel design (NCD) of approximately 350 linear feet of stream, hydrologic and hydraulic analysis, and development of construction plans development. He also permitted the project through the U.S. Army Corps of Engineers (USACE), the Department of Environmental Quality (DEQ), GMU, and Virginia Department of Transportation (VDOT). Casey also prepared specifications for each of the components included in the design, assisted with bid support, evaluated contractors, made a contractor recommendation, and performed construction administration throughout the project.

***Indicates project completed prior to joining Kimley-Horn**



due diligence/data collection, morphological assessment, hydrology and hydraulics, and design. This stream restoration is being restored using Natural Channel Design (NCD). Our team is performing detailed hydrologic analysis for the existing stream corridor and contributing drainage areas. Kimley-Horn integrated Loudoun County GIS data and used HECRAS to create a comprehensive hydraulic model.

***Stormwater Management, Parks, Transportation On-Calls Fairfax County, VA —**

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***Indicates project completed prior to joining Kimley-Horn**



Jared Hodes, P.E.
Project Engineer

Relevant Experience

Stafford Drive Stream Restoration CLOMR, City of Fairfax, VA — Project Manager. Jared is responsible for managing a team that is providing hydrologic and hydraulic modeling services for approximately 2,400 linear feet of stream restoration along the North Fork Accotink Creek. As part of the permitting process, a CLOMR submittal package was prepared for FEMA approval. The tasks associated with the CLOMR package include HEC-RAS model development to reflect existing and proposed grading reflective of the restoration, evaluation of land cover changes, and utilization of model results to prepare a FEMA MT-2 application.

The Lakes Dam Inundation Study and Emergency Action Plan Development, City of Fayetteville, NC — Project Manager. Jared performed a dam breach analysis and subsequently provided inundation mapping for The Lakes Dam, which is classified as a high hazard dam. As part of this project, Jared updated the existing Emergency Action Plan based on the results of the inundation study. 1/3 Probable Maximum Precipitation and Sunny Day breaches were modeled using HEC-RAS 1-D unsteady methodology. The project resulted in successful approval through North Carolina Dam Safety.

Fairfax County Floodplain Use Determination (FPUD) Reviews and Other Services, Fairfax County, VA — Project Manager. Jared is leading a team contracted to provide engineering augmentation services for county reviews of FPUD requests. This includes utilizing GIS-based tools and detailed Zoning Ordinance understanding to assess if the proposed work is approvable under Zoning Ordinance statutes. This work also includes cost estimation in accordance with FEMA NFIP Substantial Improvement guidelines.

East Durham Water Sewer and Belt Street Stormwater, Durham, NC — Lead Engineer. Kimley-Horn evaluated approximately 68,500 linear feet of waterlines, 56,000 linear feet of sanitary sewer lines, and 9,000 linear feet of stormwater pipes via in-field and CCTV footage assessments. Designed approximately 2,100 linear feet of 15- through 66-inch stormwater infrastructure. A combined 1-D/2-D XPSWMM model was developed for a larger and more complex portion of the stormwater network with known flooding issues to better assess the existing system's performance. The model was field verified in an intense storm event and was then used to help design the proposed system. Civil 3D was utilized for iterative pipe network design and plan set development and hydraulic performance was confirmed in the XPSWMM model.

Lakeside Trail Phases, Henrico County, VA — Lead Engineer. Kimley-Horn is designing 4 phases of the overall Lakeside Trail project in Henrico County. Jared has led the floodplain permitting and modeling effort to provide Henrico County with analyses of the floodplains associated with North Run and Upham Brook in relation to the multi-phase trail design. Jared guided iterative trail design updates to achieve a No-Rise for the County. The County has also asked Kimley-Horn to incorporate an additional adjacent project into Phase 1 of the analysis, since they have been so pleased with the coordination, quality of deliverables, and responsiveness of the team. This project involves coordination with Henrico County and City of Richmond Floodplain Administrators, and VDOT. There are multiple funding sources for this work including County funds, bonds, VDOT, and ARPA funding, which necessitates hitting

Special Qualifications

- Experienced water resources engineer
- Applied Fluvial Geomorphology (Rosgen Level1)

Professional Credentials

- Master of Science, Civil and Environmental Engineering, Duke University, 2016
- Bachelor of Science, Atmospheric, Oceanic, and Environmental Sciences, University of California, Los Angeles, 2014
- Professional Engineer in Virginia and North Carolina



schedule milestones to bid the work for construction in accordance with the various funding sources.

Holly Springs Road Widening Phase 2 CLOMR, Holly Springs, NC — Lead Engineer. Jared provided engineering services to the Town of Holly Springs to evaluate the effects of a proposed road widening on the floodplain. One of the main project objectives was to address the recurring flooding at the crossing of Middle Creek. Kimley-Horn designed the conversion of a triple barrel box culvert to a 150 linear foot, 3-span bridge to elevate the roadway profile to avoid roadway overtopping in the 100-year flood event. This work included HEC-RAS model development and modification using best available public data, survey data, proposed grading, land use changes, and FEMA MT-2 application preparation. Effective and Preliminary Floodway remapping was required.

Loudoun Soil and Water Conservation District (LSWCD) Floodplain Services, Loudoun County, VA — Project Manager. Jared is responsible for leading a team that provides floodplain analyses using GIS-based tools and available FEMA models, performing site visits to characterize potential impacts on the floodplain, and coordinating with the county's floodplain administrator to facilitate permit approvals through No-Rise designations. The County has a cost sharing program to help partially fund riparian tree plantings or livestock control fence installations that will lead to improved floodplain management. These projects had previously been on hold due to impasses encountered during floodplain permitting. Kimley-Horn was hired to assist LSWCD navigate the permitting process for these projects without making them cost prohibitive. Kimley-Horn has helped LSWCD successfully navigate the permitting process in a cost-effective manner for all projects worked on thus far.

Junction and Ferrell Industrial & Beth Page Apartments No-Rise Studies, Durham, NC — Project Manager. Jared managed a team that provided engineering services on two sites (for Scannell Properties LLC and Buckingham Companies respectively) with three new roadway crossings in the floodplain. This work required HEC-RAS analyses to design the culvert crossings such that a No-Rise could be achieved for the non-encroachment areas, effective floodplain, and future conditions floodplain along Panther Creek Trib. 1 and Unnamed Trib. to Stirrup Iron Creek Tributary D, per Durham County standards.



Sam Illes, P.E., SWPR
Project Engineer

Relevant Experience

Chatham Hall Lake Water Quality Retrofit, City of Virginia Beach, VA

— Kimley-Horn is building upon previous feasibility efforts that successfully achieved a SLAF grant award for the retrofit for Chatham Hall Lake. The lake is being modified to increase water quality treatment efficiency to reduce nutrient and sediment loads to the Chesapeake Bay. Samantha leads the design of the project and has completed the water quality nutrient calculations, the design plans, and engineering specifications for the project. Kimley-Horn is currently working towards 100 percent plans. Samantha calculated the pollutant loading the existing lake receives through delineating the watershed in PCSWMM and modeling the amount of runoff for the water quality storm event. She also modeled the lake watershed in PCSWMM to compare the existing and proposed conditions for the 1-, 2-, 10- and 100-year storm events.

Lake Herbert Spillway Design, Norfolk, VA — Project Engineer. Kimley-Horn evaluated multiple alternatives to evaluate opportunities to combat sea level rise (SLR) within Broad Creek as part of the required spillway replacement for Lake Herbert. Documented SLR also is impacting the Kempsville Road crossing Lake Herbert as well as Lake Taylor. Kimley-Horn's efforts included field assessments, and detailed hydrologic and hydraulic modeling in PCSWMM to evaluate the following alternatives: replacing the spillway "in-kind" at a higher elevation and/or maintaining the current spillway elevation and implementing a tide gate to eliminate tidal influence into Lake Herbert and maximize runoff storage available during rainfall events. Kimley-Horn has completed the conceptual design and cost estimates for both alternatives. Upon selection of a preferred alternative by the City, Kimley-Horn will begin detailed design.

Accomack County, Onley Walmart Ditch Drainage, Onancock, VA — Project Engineer. Accomack County retained Kimley-Horn to evaluate the drainage system along the Walmart site in Onley that appeared to flood Redwood Road and cause hazardous driving conditions. Samantha visited the site and performed hydrologic and hydraulic analysis on the system using PCSWMM. She determined that the Walmart parking lot was not the cause of flooding on Redwood Road. She also evaluated proposed solutions to minimize the hazardous flooding. Samantha summarized her findings and gave recommendations to the County in a memorandum.

Coliseum Drive Extension, Segment A (UPC #108731), Hampton, VA — Project Engineer. Kimley-Horn designed the 0.31-mile extension of Coliseum Drive for the City of Hampton through VDOT's locally administered projects (LAP) process using SMART SCALE funds. Coliseum Drive extension is a four-lane divided minor collector facility proposed on new location with curb and gutter, a shared use path, and sidewalk. Design features included traffic analysis, signal modifications, street lighting, stormwater management, and a hydraulic analysis for the crossing of Billy Woods Canal. Public involvement to select alignment alternatives and seek input from adjacent property owners, as well a NEPA documentation, also were key components of the project. Final design and construction documents were completed in late 2019 and the project was advertised for construction in early 2020. Kimley-Horn also performed construction phase services.

Special Qualifications

- Stormwater Plan Reviewer, Virginia, SWPR0332

Professional Credentials

- Master of Science, Engineering Management, Duke University, 2015
- Bachelor of Science, Environmental Engineering, University of Central Florida, 2014
- Professional Engineer in Virginia and North Carolina



Jenna Gregory, EIT
Project Engineer

Relevant Experience

Annual Services Contract for Stormwater Master Planning (PWCN-14-0003), Virginia Beach, VA — Project Analyst. Kimley-Horn is providing stormwater master planning services for the City of Virginia Beach for the identification and prioritization of stormwater management projects to improve drainage infrastructure across the entire City. This contract will culminate in the development of planning documents for each of the four major watersheds spread across 15 drainage basins within the city that will address thousands of simulated flooding areas (SFAs) that are known to flood in the existing condition. Each master plan will include alternatives analysis, benefit cost analysis, and project ranking for CIP funding and implementation over the next 15 years. Considerations include site assessment, regulatory guidance, conceptual engineering projects and programs, hydraulic analysis of solutions, data analytics, and cost estimation to support decision making. Efforts to date include a review of nationwide best practices, development of a set of criteria to prioritize simulated flood areas and rank potential alternatives, and the facilitation of a workshop with critical stakeholders across multiple departments within the City to gather input and feedback on the criteria developed. The criteria will be the foundation of the master plan documents that will ultimately be created. Kimley-Horn is currently developing the Linkhorn Bay Stormwater Master Plan.

Beggar's Bridge Lead Canal Site 18, Virginia Beach, VA — Project Analyst. Kimley-Horn is assisting the City with restoration and project implementation for the removal of accumulated sediment within a non-tidal canal. The project area is characterized by flat topography, low surface and roadway elevations, high groundwater, poor infiltration, and wind-driven tide elevations resulting in localized flooding conditions during storm events.

Kemps Lake Water Quality Retrofit, Virginia Beach, VA — Project Analyst. Kimley-Horn is building upon previous feasibility efforts that successfully achieved a Stormwater Local Assistance Fund (SLAF) grant award of \$1.3 million for the retrofit of Kemps Lake. We are managing the final design documents for the 40-acre lake adjacent to the I-264 and Witchduck Road interchange in Virginia Beach. The lake is being modified to increase water quality treatment efficiency to reduce nutrient and sediment loads to the Chesapeake Bay. Implementation of the final design requires significant public outreach and close coordination with the Virginia Department of Environmental Quality (VDEQ).

City of Virginia Beach Development Authority, Corporate Landing Business Park Conduit Plan, Virginia Beach, VA — Project Analyst. Kimley-Horn engineered permitting drawings for conduit infrastructure in Corporate Landing Business Park in Virginia Beach, Virginia. The project included design of conduit infrastructure that would serve the future data center and transatlantic cable needs for the park. The conduit system was designed with two diverse paths for redundant connections to data centers and cable landing stations. Close coordination with future stakeholders created a secure informational highway that will provide connectivity in the park while minimizing the impacts the limited right-of-way.

Special Qualifications

- Applied Fluvial Geomorphology (Rosgen Level 1)

Professional Credentials

- Bachelor of Science, Civil and Environmental Engineering, University of Maryland at College Park, 2020
- Engineer-in-Training, 56378, MD



Exhibit 3 - Scope of Services for the Bull Run Watershed Management Plan (Approved Kimley-Horn Proposal)



November 2nd, 2023

Chris Stone, CFM, PG
Stormwater Chief
801 Sycolin Road, SE
Suite 300
Leesburg, VA 20175

Re: Professional Services for the Bull Run Watershed Management Plan Development

Dear Chris:

Kimley-Horn and Associates, Inc. (“Kimley-Horn” or “Consultant”) is pleased to submit task order proposal to Loudoun County (“Client”) for the development of a Watershed Master Plan for the Bull Run Watershed. These services will be performed underneath contract RFQ 338784B-C – Year 3, Engineering Services for the Loudoun County Stormwater Management Program, executed by Loudoun County and Kimley-Horn on May 1st, 2021.

TASK 100 – DATA COLLECTION AND EXISTING CONDITIONS

Kimley-Horn will compile the best publicly available data for use in the development of the IFM within the Bull Run Watershed.

Data sources will consist of:

- Loudoun County Publicly Available Geospatial Data
- Homeland Infrastructure Foundation-Level Data (HIFLD)
- Loudoun County LiDAR Data
- Multi-Resolution Land Characteristics Consortium (MRLC) Land Cover Data
- NRCS Web Soils Survey
- Virginia Geographic Information Network (VGIN) Data Hub
- Conserve VA
- Federal Emergency Management Agency (FEMA) Resilience Analysis and Planning Tool (RAPT)
- EPA Environmental Justice Screening Tool (EJ Screen)
- Virginia Flood Risk Information System (VFRIS)

Existing Features Basemap Development

Kimley-Horn will generate a GIS Basemap consisting of environmental, flood risk, infrastructure and land use features from the data sources outlined in this proposal. The available data will be used for the tasks within this proposal to assist in the planning, assessment and prioritization of potential resiliency projects, and validation of predicted flood extents. This task assumes that up to five (5) GIS figures will be developed as supporting documentation in the WMP based on this data. Figures may consist of the following:

- Existing Environmental Features Map
- Existing Flood Risk Map
- Existing Stormwater Infrastructure Map

- Resiliency Planning Considerations Map (Conserve VA, RAPT, EJ Screen, VFRIS)
- Existing Zoning / Land Use Map

Stormwater Pond Plan Review and Feature Identification

Kimley-Horn will identify up to twenty-five (25) stormwater ponds within the Bull Run watershed of Loudoun County for incorporation into the IFM. Kimley-Horn will initially sort all existing ponds based on total drainage area and impervious acres to perform a rapid assessment of facilities which have the potential to manage the largest peak flows during the 100-YR design storm. A review of existing BMP type, and whether it is currently reported as a BMP, will be included as part of this assessment. Kimley-Horn will also review previously provided plan data within the Bull Run watershed to determine additional data needs for these facilities. A list of these facilities will be provided to the County, identifying which facilities are in need of data in order to generate stormwater models, and which facilities are recommended for inclusion in the IFM. The intent of this exercise is to model facilities which both have the potential to reduce peak flood flows downstream and may provide opportunities for the County to earn POC reductions to apply to their Chesapeake Bay and Bull Run TMDLs.

Acceptable data sources include:

- Loudoun County Approved Design Plans
- Loudoun County Approved As-Builts
- Loudoun County Bathymetric Surveys

Kimley-Horn assumes that up to ten (10) stormwater ponds will need stage-storage curves. For these facilities, contours from the County provided data sources will be traced in Bluebeam (or equivalent PDF software) and a stage storage curve will be derived. Kimley-Horn will then identify the open channels within Bull Run for incorporation into the IFM. Open channels will be based on:

- Modeled streams within the Bull Run Watershed where the County can provide the effective HEC-RAS model for
- Unmodeled streams which has been digitized by the EPA as part of their impairment assessment

Stream centerlines which are anticipated to be modeled have been provided in Attachment A.

Once the open channels that meet the criteria above have been identified, Kimley-Horn will review County documented in-line (with respect to the stream) storm drainage culverts in order to establish a fully connected open channel network. For systems where in-line stream culvert data is not documented, Kimley-Horn will prepare a data request to the County for this information. If the County does not have access to this data, and coordination with VDOT is required, it is assumed that Kimley-Horn will provide the County with the location of the culvert(s) and the specific data being requested, but the County will lead efforts in requesting this information from VDOT.

Kimley-Horn will then identify and compile known gage data throughout the County (sourced from the County or USGS) in an effort to validate flows generated as part of the IFM. Based on a preliminary review of USGS gage data, it does not appear that there are any existing gages within the Bull Run Watershed of the County, or immediately downstream in Fairfax County; therefore, any gage data will be based on existing gages operated by the County or other external agencies.

Emergency Management Division Coordination

Kimley-Horn will review the RAPT tool, data from HIFLD and the County to identify and document locations of critical infrastructure throughout the Bull Run Watershed. Once this preliminary review is complete, Kimley-Horn will setup a meeting with the Loudoun County Office of Emergency Management to discuss and identify known flooding locations throughout the Bull Run Watershed, along with any additional locations of critical infrastructure. If photo documentation of flooding exists, Kimley-Horn will request these records at this time.

Acceptable flood risk will be defined based on standard level of service requirements in accordance with the FSM and VDOT Drainage Manual. Examples of critical infrastructure may consist of hospitals, schools, substations, public safety locations, and emergency access routes.

Kimley-Horn will digitize these flood and infrastructure locations in ArcGIS and will leverage this data as part of model validation during Task 200.

Water Quantity and Quality Data Collaboration Efforts

Kimley-Horn will download and compile water quality data from the EPA 303d list using resources such as EPA My Water Way. Kimley-Horn will also request available data on the under development TMDL for Sand Branch from the County.

Kimley-Horn will reach out to the following organizations in an effort to collaborate on water quality and quantity data for the purposes of the Bull Run WMP:

- Northern Virginia Regional Commission (NVRC)
- Occoquan Watershed Monitoring Laboratory
- Loudoun Wildlife Conservancy

Kimley-Horn will request available data on the Occoquan Watershed Model from NVRC, including input parameters, pollutant loads, and data sources. This data, along with information compiled from the County, the Occoquan Watershed Monitoring Laboratory, and the Loudoun Wildlife Conservancy will be leveraged to compare quantifiable water quality data within Loudoun County's Bull Run Watershed against estimated loads and improve the accuracy of the water quality model developed as part of Task 300.

TASK 200 – EXISTING HYDROLOGY DEVELOPMENT

Using the County's latest available LiDAR data, Kimley-Horn will delineate the drainage areas for the open channels throughout Bull Run leveraging PCSWMM's watershed delineation tool; delineated subbasins will be compared against Loudoun County mapped outfall drainage areas and digitized stormwater infrastructure to correct any poorly represented watershed boundaries. Subbasin delineations will be developed for open channels with a minimum drainage area of 100 acres. Subbasins will then be developed at intervals no greater than every 2,000 feet; where large flow changes are anticipated due to confluences or new inflows, additional subbasins will be delineated.

Kimley-Horn will then develop the SWMM Hydrology for these drainage basins as outlined in the EPA SWMM Volume 1 Hydrology Manual. This task will include the development of the following attributes:

Percent Impervious

Kimley-Horn will estimate the percent impervious based on the County's latest impervious data. This data will be a composite of impervious features compiled from the following GIS data:

- Loudoun Road Casings
- Loudoun Buildings
- Loudoun Park and Ride Lots
- Miscellaneous Cultural Polygons
- Large water bodies (Ponds, Lakes, etc.)

Both artificial turf fields and sidewalks and trails will be further evaluated for incorporation into the impervious database. Sidewalks and trails data are only digitized as polylines by the County, therefore a buffer will be applied to this feature class to assume constant 4' widths where present. Artificial turf fields may be considered impervious on a case by case basis.

The latest Loudoun County aerial imagery will be compared against these data sets to identify any missing impervious areas. These areas will be communicated to the County, and a request for digitization of these areas will be placed with the County for accurate modeling.

This analysis will assume the following:

- Existing rooftop downspouts shall be assumed to be disconnected and flow over pervious areas.
- Driveways drain directly to the street and will be considered hydraulically connected impervious area.

Subcatchment Length and Width

Kimley-Horn will develop time of concentration flow paths for each Subbasin to estimate overland flow lengths. Kimley-Horn will estimate the sub catchment width by dividing the area of the basin by the average maximum length of overland flow.

Overland Flow Slope

Kimley-Horn will initially estimate the overland flow slope of the sub catchment as the change in elevation divided by the length of overland flow. Kimley-Horn will also estimate the average watershed slope using the slope along this line.

Mannings Coefficient

Kimley-Horn will apply unique impervious and pervious mannings coefficients to each sub catchment surface type to represent the resistance that the overland flow will encounter as it is conveyed through the subcatchment. Mannings coefficients will be based on Table G-1 of Volume II Hydraulics of the EPA SWMM User Manual. A list of appropriate mannings coefficients for various land covers will be provided to the County for review and input.

Depression Storage

Impervious depression storage will be estimated using a typical value of 0.10 and initial pervious depression storage will be represented using a typical value of 0.20.

Infiltration Method

The default infiltration method will be the modified Green Ampt method. Hydraulic conductivity will be estimated using NRCS soil classifications, suction head will be calculated as outlined in Volume 1 of the EPA SWMM Reference Manual, and initial deficit will be derived from the soil type and Table 4-8 of Volume 1 of the EPA SWMM Reference Manual.

Loudoun County Regression Equation

Kimley-Horn will also generate peak flows for each Subbasin based on the Loudoun County Regression Equation in accordance with the FEMA Region III Hydrologic Analysis of Loudoun County, Virginia, 2013 report. Subbasins which do not meet the following limitations of the regression equations will have their flows estimated based on the PCSWMM Hydrology methodology:

- Drainage Areas = 0.28 to 332 square miles
- Impervious Area = 0 to 41.1 percent
- Channel Slope = .001 to .04 foot/foot
- D Soil = 0 to 70.67%

The generated flows from the Loudoun County Regression Equation will be used to assist in the remapping of the flood overlay districts within Bull Run Watershed of Loudoun County.

Water Quality Modeling Setup

Kimley-Horn will setup water quality loading factors to develop Phosphorus, Nitrogen and Total Suspended Sediment (TSS) loads from individual sub catchments based on regulated and unregulated areas. The land use data developed as part of this task will be associated with loading rates consistent with the Potomac River Basin as outlined in the Guidance Memo No. 20-2003 – Chesapeake Bay TMDL Special Condition, dated February 2021. Kimley-Horn will compare these loads against those generated in the Occoquan Watershed Model; if these loads differ, Kimley-Horn will develop two (2) alternative loading scenarios, to allow the County to estimate load opportunities for complying with the following TMDLs:

- Chesapeake Bay TMDL Action Plan
- Bull Run TMDL Action Plan

Water quality loads will be used to assess watershed improvements as part of Task 600 to identify opportunities which both provide flood resiliency and water quality improvements.

TASK 300 – PCSWMM MODEL DEVELOPMENT

Hydraulic Routing Setup

Kimley-Horn will import the existing County HEC-RAS model into PCSWMM as the basis for the Bull Run watershed model. Unmapped open channels which were identified as part of Task 100 will be imported from GIS, along with any connecting storm infrastructure (i.e culverts, bridges) to develop the link-node layout within the Loudoun County Bull Run watershed.

A Digital Terrain Model (DTM) will be used as the basis for all topographical data. Kimley-Horn will review the culvert, road and bridge data imported from HEC-RAS against this DEM to ensure accuracy. Kimley-Horn will also request plan data for all culvert, road and bridge crossings within the model from the County and/or VDOT to validate the accuracy of modeled capacities at all critical infrastructure locations. Where plan data references the NGVD29 datum, the FEMA Flood Insurance Study Report will be used to convert the datum based on geographic location.

Kimley-Horn will develop transect cross-sections at intervals of no less than three-hundred (300) feet, or at locations where there are significant changes to the floodplain or channel geometry. Transects will span beyond the five-hundred year floodplain limits to provide opportunity for future rainfall modeling with more intense storm events.

Kimley-Horn will populate the following information into the PCSWMM model for analyzing surface runoff:

- Boundary data – input rainfall time series based on the NOAA C curve (1, 2, 10, 25, 50, 100, 500)
- Subcatchment Data
- Node (manhole, inlet, outlet, storage node, weir)
 - Type (junction, outlet or basin)
 - Horizontal & Vertical Information
 - Depth
- Link (Conduit)
 - Upstream and Downstream Nodes
 - Shape and dimensions
 - Material
 - Roughness
 - Upstream and Downstream inverts
- Tailwater Conditions

After the base hydraulics model is built, Kimley-Horn will develop the following PCSWMM scenarios to evaluate the system's capacity under various design storm events:

- 1-YR 24-HR
- 2-YR 24-HR
- 10-YR 24-HR
- 25-YR 24-HR
- 50-YR 24-HR
- 100-YR 24-HR
- 500-YR 24-HR

Pond Model Integration

Kimley-Horn will review the DTM generated at each pond for incorporation into the model and generate stage-storage curves using the standard PCSWMM work-flow for generating pond-storage curves from contour polylines. Generated stage-storage curves will be compared against those documented in the approved plans reviewed as part of Task 100. Where storage capacity is within a reasonable range (+/- 10%) of the design plans, Kimley-Horn will modify the impoundment as part of the 2D model with its corresponding stage – discharge curve. In cases where the calculated storage capacity is greater than a

10% deviation from the approved design plans, it will be assumed that the facility has silted in and cannot be modeled as a physical impoundment within the DTM. In cases where this occurs, the DTM will be manually edited to “fill” in the impoundment and eliminate the topographic representation of the pond. In its place, a storage node and outfall device will be built into the model to route pond performance and storage capacity. It is assumed that this DTM editing process will only need to be performed for in-line stormwater facilities; all other instances where the DTM varies will be addressed through routing subcatchments directly to the storage-nodes. It is assumed that all ponds are in functional condition for the purpose of this model.

Kimley-Horn will generate a list of ponds which appear to be silted in or inadequate to the County for further consideration as part of its maintenance program.

Hydraulic Boundary Conditions

Kimley-Horn will route the flows using the dynamic wave routing method through a 1D/2D SWMM model (PCSWMM) for these design storm events to understand existing flood risk and location where existing transportation infrastructure does not meet the intended level of service (LOS); level of service requirements will be based on Table 6-1 from the VDOT Drainage Manual.

Tailwater conditions will be based on normal depth for all design storms where no additional data is available. In instances where the 100-YR and 500-YR water surface elevations are documented as part of FEMA studies or approved floodplain studies, these known water surface elevations shall be used.

Model calibration will involve a review of generated flood depths and flows against gage station records, confirmation of modeled flooding against known flooding in documented areas, and efforts by NOAA as part of their flood inundation mapping initiative (if completed in Loudoun at the time of this effort).

TASK 500 – EXISTING CONDITION RESILIENCY ASSESSMENT

Flood Risk Assessment

Kimley-Horn shall identify flood risk along the identified open channels, and at road crossings, within the study limits of the Bull Run Watershed within Loudoun County. Flood risk shall be illustrated with flood depth rasters and GIS figures for County review and documentation in the WMP as part of Task 1000. Kimley-Horn will also provide digital deliverables of the rasters to the County for potential use in ArcGIS online interactive maps.

The following flood risks will be reviewed:

- Locations where existing roadway infrastructure does not meet the intended level of service as defined in Task 300
- All buildings that fall within the modeled 100-YR floodplain
- Critical infrastructure identified as part of Task 100

Locations which are identified as at risk for flooding will be documented at opportunities for flood resiliency projects to be considered as part of Task 600. Kimley-Horn will generate a GIS map identifying these locations and include this as an Appendix in the WMP developed as part of Task 900.

Pond Capacity Assessment

Kimley-Horn will review the performance of the existing stormwater ponds integrated into the model to assess facilities where excess, or inadequate, capacity may exist. Locations where existing stormwater ponds do not currently convey the 100-YR 24-HR design storm without overtopping will be documents for further review by the County. Similarly, in locations where existing ponds have excess capacity, these stormwater facilities will be flagged for further consideration for retrofits during Task 800.

Pollutant Load Assessment

Kimley-Horn will summarize pollutant loads generated in subbasins through the Bull Run watersheds. Attribute data associated with these loads will be exported from PCSWMM into ArcGIS for development into GIS figures for the WMP. Two separate heat maps will be generated for illustrating this parameter: (1) a heat map illustrating maximum pollutant loads throughout the watershed and (2) a normalized heat map illustrating maximum pollutant loads / acre to identify critical locations within the watershed which experience atypically high pollutant loads.

Pollutant load assessments will be imposed against impaired streams to identify critical management areas for future BMPs.

Stream Stability Assessment

Kimley-Horn will leverage PCSWMM in-stream erosion potential tools to estimate the following parameters along open channels:

- Cumulative Erosion Index (Velocity)
- Cumulative Effective Work Index (Shear Stress)

It is assumed that these estimates will be leveraged as indices for potential erosion along open channels. The accuracy of the available topographic data will significantly impact the accuracy of the measurements collected. Kimley-Horn will use the best available data to identify reaches within the watershed which may be experiencing unstable flow conditions, indicating the presence of bed and/or bank erosion. Kimley-Horn will flag reaches for consideration in feasibility assessments as part of Task 800.

Assumptions:

TASK 600 – BMP PRIORITIZATION ASSESSMENT

Kimley-Horn will develop a table summarizing approved BMPs as outlined in the BMP Clearinghouse and Guidance Memo No. 20-2003 within Virginia for potential to be implemented throughout the Bull Run Watershed. Co-benefits for BMPs will be identified which document additional environmental considerations associated with their implementation.

Co-benefits are anticipated to consist of:

- Habitat and Biodiversity
- Stream Health
- Fish Habitat
- Tree Canopy

- Climate Resiliency
- Flood Risk Mitigation
- Removal of Bacteria
- Groundwater Recharge / Infiltration Capacity
- Nutrient Uptake / Pollutant Removal

Kimley-Horn will develop tabular summaries of the above co-benefits for review by the County and public. The co-benefits summary tables will be leveraged by the County and the public to help identify and guide preferred BMPs for resiliency and water quality enhancements to the watershed. The reviewed BMPs will be prioritized based on their effectiveness in specific applications and ranked based on preference for incorporation into future land development opportunities.

Kimley-Horn will then meet with the County to develop an evaluation matrix rubric which considers key considerations for prioritizing projects; this effort will include both identification of key criteria, and appropriate weights for developing a prioritization matrix for project selection. This effort will aide in identifying key site criteria for consideration as part of Task 700 for evaluating project feasibility.

TASK 700 – NATURE-BASED SOLUTIONS (NBS) FEASIBILITY ASSESSMENTS

Based on the existing conditions assessment performed as part of Task 500, and the prioritized BMP opportunities outlined in Task 600, Kimley-Horn will perform a desktop-based opportunity assessment for project implementation opportunities.

The following project types will be prioritized for identification at the County-wide level for potential implementation (note that the order of this list is not indicative of the likelihood of implementation):

- Regional Ponds Retrofits and Pond Infrastructure Upgrades
- Stream Restoration Practices in Conjunction with Floodplain Improvement Projects
- Land Conversion
- Floodwall Implementation Projects
- Land Acquisition Techniques
- Restoration of Floodplains
- Nature-based Approaches Aimed at Increased Resilience

Kimley-Horn will identify up to twenty (20) BMP (structural and non-structural) opportunities and up to ten (10) stream restoration opportunities for consideration. Project locations will be primarily focused on the following types of parcels:

- County-Owned Lots
- HOA Owned Common Lots
- Flood-prone Areas on Privately Owned Lots

Kimley-Horn will conduct an opportunities and constraints analysis for each potential project to determine its feasibility. The feasibility assessment will consider:

- Constraints (utilities, access, easement, ownership)
- Resiliency Potential

- Crediting Potential
- Topographic Assessments for Upstream and Downstream flow conveyance
- Preliminary Facility Footprint and Configuration

Each opportunity and constraints assessment will be performed in ArcGIS and documented with a retrofit assessment figure including a short narrative and an outline of potential project opportunities and constraints. Kimley-Horn will submit these projects to the County for consideration and initial review, and further identification of additional limitations or constraints.

The identified projects will be scored using the prioritization matrix developed under Task 600 and the top fifteen (15) projects will be selected for site visits and further refinement. Site visits will be performed to collect site photos, identify additional site constraints, and refine preliminary concept layouts to validate feasibility. Photo collection will be done using GPS grade data collection tools to ultimately develop a photo-location map for opportunities reviewed in-field. For stream restoration opportunities, site visits will also include full BANCS assessments to assess real time erosion potential. It is assumed up to five (5) prioritized projects will be stream restorations; if additional stream restoration opportunities are determined to move forward, Kimley-Horn will coordinate with the County to request additional funds for the rapid BANCS assessment of these assets.

The BANCS Assessment consists of the following studies:

- Bank Erosion Hazard Index (BEHI)
- Near Bank Stress (NBS)

Bank Erosion Hazard Index

The BEHI Method for assessing stream bank erosion potential assigns point values to characteristics of stream bank condition. These scores will be used to inventory stream bank condition over large areas and prioritize stream restoration efforts. Kimley-Horn will utilize a Trimble R1 submeter GPS along with Arc Collector to collect information efficiently and accurately for each of the stream parameters shown in Table 1 and Figure 1.

Table 1: BEHI Parameters

Bank length	Length of bank consisting of similar BEHI characteristics
Bank height	Height from toe of bank to top of bank
Bankfull height	Height from toe of bank to bankfull
Rooting depth	Depth of roots from top of study bank down
Root density	Percentage of study bank with roots
Bank angle	Angle of the bank
Bank surface protection	Percent vegetation/roots protecting study bank
Bank materials	Material consistency (Silt, Sand, Clay, Boulder, gravel)
Bank material stratification	Bank materials layered in study bank

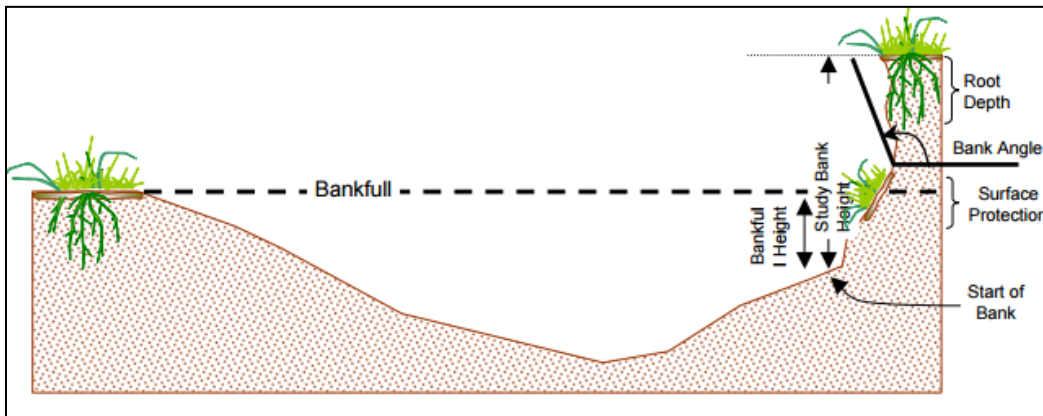


Figure 1: Bank Erosion Hazard Index (BEHI) Data Collection Graphic

Kimley-Horn will record the results on the BEHI Worksheet 3-11 (Rosgen). An erodibility rating will be assigned for each study bank corresponding with those shown in Table 2.

Table 2: BEHI Score and Rating Table

Total BEHI Score	Erodibility Rating
5-9.5	Very Low
10-19.5	Low
20-29.5	Moderate
30-39.5	High
40-45	Very High
46-50	Extreme

Near Bank Stress (NBS) Assessments

Kimley-Horn will also perform NBS assessments in the same general location as the BEHI assessments. The NBS is a protocol for estimating energy distribution in the near-bank region (1/3 of channel cross-section) associated with the bank being evaluated. Kimley-Horn will utilize NBS methods 2 and 5 for determining each study bank’s NBS rating.

Method 2 utilizes a ratio between an outer bend’s Radius of Curvature and the Bankfull Width. For each NBS assessment the following parameters will be collected and/or calculated to develop NBS scores:

- Radius of Curvature - the distance measured from the outside of the bankfull channel to the intersection point of two lines that perpendicularly bisect the tangent lines of each curve departure point
- Bankfull Width – The surface width of the stream measured at the bankfull stage

The resulting ratio corresponds to the NBS erodibility rating shown in Table 3.

Table 3: NBS Method 2 Ratio vs Rating Table

Near Bank Stress (NBS) Ratings	Ratio
Very Low	>3.00
Low	2.21 - 3.00
Moderate	2.01 - 2.21
High	1.81 - 2.00
Very High	1.50 - 1.80
Extreme	<1.50

Kimley-Horn will utilize NBS Method 5 for study banks which are not outer bends. Method 5 is a ratio between the Near Bank Max Depth and the Near Bank Mean Depth.

- Near Bank Max Depth – The maximum depth from a stream’s invert to the bankfull stage in the stream’s near bank region (2/3 of channel cross-section)
- Near Bank Mean Depth – The average of the depth measurements from a stream’s invert to the bankfull stage in the stream’s near bank region (1/3 of channel cross section).

The resulting ratio corresponds to the NBS erodibility rating shown in Table 4.

Table 4: NBS Method 5 Ratio vs Rating Table

Near Bank Stress (NBS) Ratings	Ratio
Very Low	<1.00
Low	1.00 - 1.50
Moderate	1.51 - 1.80
High	1.81 - 2.50
Very High	2.51 - 3.00
Extreme	>3.00

The above-listed parameters will be collected using a Trimble R1 submeter GPS and Arc Collector to collect information efficiently and accurately for each parameter. Kimley-Horn will record information on Worksheet 3-12 (Rosgen) - Estimating Near Bank Stress.

Soil Sampling & Nutrient Concentration Analysis

Kimley-Horn will collect up to ten (10) soil samples from the stream banks using a 4” soil sampling auger and performed in general accordance with the *Bulk Density and Soil Nutrient Concentration Methods Guidance* outlined in Chesapeake Stormwater Network (CNS) publication *A Unified Guide to Crediting Stream and Floodplain Restoration Practices in the Chesapeake Bay Watershed*. Soil samples will be spaced 200’ to 500’ apart. Kimley-Horn will collect samples from each soil horizon found in the stream bank (O, A, B, C, etc.), create a composite sample, and store in a ziploc bag for shipping to the laboratory. Kimley-Horn will photo document the stream bank where the soil sample was collected, and GPS locate each sample location using a Trimble R1 submeter GPS and Arc Collector. Soil samples will be sent to the

Waypoint Analytics to determine Bulk Density and Nitrogen (TN) and Phosphorous (TP) nutrient concentrations.

Predicted Stream Bank Erosion & Stream Restoration POC Load Reduction Credit Estimates

After completing the BEHI and NBS field assessments, Kimley-Horn will utilize the Spreadsheet Tool for Erosion Rate Estimates (Appendix A. Bank Erosion Summary Table w-BEHI and NBS – with TMDL Phase 6 revisions) as outlined in publication “*A Unified Guide to Crediting Stream and Floodplain Restoration Practices in the Chesapeake Bay Watershed.*” Kimley-Horn will also utilize the Colorado streambank erosion prediction curve and the BEHI and NBS erodibility ratings associated with that curve to predict the streambank erosion for each study bank and the total streambank erosion for the assessment reach. The Colorado curve and erodibility ratings are already built into the Spreadsheet Tool for Erosion Rate Estimates. Virginia DEQ utilized the Spreadsheet Tool for Erosion Rate Estimates for SLAF in 2023 (Attachment A). The total bank erosion calculations will be summarized using a variation of the Bank Summary worksheet from Spreadsheet Tool for Erosion Rate Estimates to show the total predicted streambank erosion in tons/year/foot. Kimley-Horn will estimate the potential POC load reduction credits associated with restoring the stream as described in “*A Unified Guide for Crediting Stream and Floodplain Restoration Projects in the Chesapeake Bay Watershed.*”

Kimley-Horn will prepare a PDF graphic showing the following items:

- Map showing BEHI and NBS ratings along stream banks
- Map showing BEHI and NBS data collection locations
- Appendix A. Bank Erosion Summary
- Nutrient sampling locations

TASK 800 – RESILIENCY MODELING SCENARIOS

Kimley-Horn will develop a proposed conditions PCSWMM model which considers the following development scenarios:

- Scenario A: Present-Day Land Cover with NBS Integration
- Scenario B: Comprehensive Plan Scenario without NBS Integration
- Scenario C: Comprehensive Plan Scenario with NBS Integration

Scenario A

The existing conditions model developed as part of Task 400 will be modified to incorporate the fifteen (15) projects identified as part of Task 700. It is assumed that all improvements will be built within a single model, with improvements being implemented systemically from upstream to downstream within the Watershed. This scenario will not consider comprehensive land cover conditions.

No modeling will be performed for stream restoration opportunities at this time. It is assumed any improvements from stream restoration opportunities will be further evaluated during concept planning or design for those individual projects.

Scenario B

The existing conditions model developed as part of Task 400 will be modified to consider comprehensive plan land cover throughout the watershed. Kimley-Horn will review the County's comprehensive plan and develop a conversion table to assign land cover changes to the watershed which reflect the comprehensive plan's buildout conditions. The table will be submitted to the County for review and updated based on feedback to more accurately assign open space/forested area, managed turf and impervious percentages. As part of the final WMP, a table will be developed summarizing assumed land cover percentages for each development type. Kimley-Horn will model the increase in flood inundation extents and update the water quality pollutant loads as a result of these changes to land cover. Actual infrastructure improvements, such as roads, will not be captured in the model.

Scenario C

The comprehensive buildout model developed as part of Scenario B will be modified to incorporate the fifteen (15) projects identified as part of Task 700 to assess how these improvements will be impacted by proposed land use changes. For stormwater management facilities, alternative configurations to meet larger runoff quantities will be modeled to understand facility footprints under ultimate buildout conditions.

For each of these scenarios, a summary table will be generated outlining the following parameters resulting from these improvements (where applicable):

- Runoff reduction volume
- Runoff storage volume
- Impact to critical infrastructure
- Nutrient credit reductions

For Scenarios B and C, recommendations will be quantified and discussed in the WMP which outline:

- Recommended treatment mechanisms and requirements to avoid reductions in watershed water quality
- Total storage volumes required to limit flood extents to present-day conditions

Note that comprehensive plan scenarios will only be ran for the 100-YR and 500-YR design storms. It is assumed that development standards for stormwater management will mitigate design storms up to the 10-YR, and improve conditions for events between the 10-YR and 100-YR.

TASK 900 – PROJECT COSTS, FUNDING AND PRIORITIZATION

Based on the results of Tasks 700 and 800, Kimley-Horn will develop Engineer's Estimates of Probable Construction Costs (EOPCC) for the fifteen (15) projects identified for consideration. EOPCCs will be based on concept level planning from modeling iterations. Costs may not be representative of actual construction costs based on ultimate design.

Kimley-Horn will review potential grant funding opportunities and identify sources such as CFPF, the Stormwater Local Assistance Fund and the County's Capital Improvement Plan (CIP) budget. Kimley-Horn will also research and evaluate other local, state and federal grant opportunities which may be suitable for project implementation and summarize these in the WMP for future consideration.

The prioritization matrix will be further refined to include considerations such as resiliency impact, cost and funding opportunity. The projects will then be ranked based on the weightings considered as part of Task 600 as part of the final evaluation.

Kimley-Horn will review available funding opportunities, along with the County's budget, to develop a new five (5) and ten (10) year CIP for the Bull Run Watershed. This project implementation schedule will be drafted such that it will be representative of past efforts by the County (i.e. estimated capacity of the County and consultants to design, manage and construct these projects will be assumed to be similar to those in the past).

TASK 1000 – WATERSHED MANAGEMENT PLAN DEVELOPMENT

Kimley-Horn will review previously published County WMP, and Fairfax County's Bull Run and Cub Run WMPs, as reference points for the layout, feel and content of this deliverable. Using these documents in conjunction with the information generated from this scope of work, Kimley-Horn will prepare a draft WMP outline that best represents the intent and purpose the following EPA Nine Elements to Watershed Management.

1. Identify causes of impairment and pollutant sources that need to be controlled in order to achieve load reductions
2. Estimate load reductions expected from management measures
3. Describe nonpoint source management measures that will need to be implemented to achieve load reductions from Step 2, and describe critical areas in which those measures will be needed to implement this plan
4. Estimate the amounts of technical and financial assistance needed, associated costs, and funding sources
5. Implement an information and education component to enhance public understanding of the projects, with ongoing collaboration throughout the process
6. Develop a schedule for implementation of the nonpoint source management measures identified herein
7. Describe interim measurable milestones for determining whether nonpoint source management measures or other controls are being implemented
8. Develop criteria for evaluating the effectiveness of projects
9. Establish a monitoring plan for long-term project evaluation

Kimley-Horn will then meet with the County to solicit feedback on the draft outline with the intent of finalizing an outline that effectively communicates the information generated from this scope of work consistent with the EPA Nine Elements to Watershed Management while also incorporating successful elements from previously published County WMP and identifying those elements that may need additional care from the previously published County WMP.

After completing the outline in conjunction with the County's input, Kimley-Horn will prepare the WMP that effectively summarizes the analytics and methodologies leveraged as part of this scope of work. The final WMP will serve as a framework for the County to guide project implementation throughout the Bull Run Watershed and a criteria for developing and maintaining a living model to proactively plan for future development and infrastructure projects. Where existing efforts do not meet those outlined in the EPA's Nine Steps, narratives will be provided which detail future opportunities to enhance this document.

As part of this WMP, documentation of existing County requirements for the design of stormwater management facilities associated with development in the watershed through VSMP requirements will be reviewed. Kimley-Horn will summarize the anticipated changes to the Virginia Runoff Reduction Management Spreadsheet (VRRM) as a result of Virginia Tech's latest efforts to update the methodology as part of version 4. A summary of the untreated pollutant of concerns within the watershed based on version 3.0 and version 4.0 will be developed to inform the County's policy on regulating private development within this actively developing watershed.

TASK 1100 – PUBLIC INVOLVEMENT

Public involvement is anticipated to be an ongoing process throughout the development of this WMP. Public meetings and coordination are anticipated at the following milestones:

Meeting #1 - Initial Public Meeting

At the conclusion of Task 100, Kimley-Horn and the County will host a public meeting to showcase existing conditions [based on publicly available data] in the Bull Run Watershed. This presentation will educate the public on the overall approach of this project, the anticipated outcomes, and an overview of additional opportunities for community feedback. The presentation will highlight the concept behind nature-based solutions and resiliency projects, and outline examples of public-private partnerships that the County has implemented successfully in the past. The known flooding location map generated as part of Task 100 with the Loudoun County Office of Emergency Management will be shared with the public and feedback will be requested to identify any additional areas with known instances of recurring flooding.

Meeting #2 – Feasibility Assessments Update

After the initial feasibility assessment is performed in Task 600, Kimley-Horn and the County will host a public meeting to provide an update to the community on the efforts completed to date. Initial modeling results will be shared with residents to provide a forum for public-driven validation of the model results. Feedback will be solicited on preferred BMPs and on the feasibility assessments. Stakeholders and representatives of private HOAs where opportunities have been identified will be asked to weigh in to further gauge the potential for actual implementing these projects.

Meeting #3 – Draft WMP Presentation

At the conclusion of Task 900, Kimley-Horn and the County will host a public meeting to present to the community the results of the proposed draft WMP for the Bull Run Watershed. The meeting will educate residents on all efforts performed to date, actionable outcomes and next steps. It is anticipated the document will be open to public comment with feedback solicited for incorporation into the Final WMP.

TASK 1200 – MEETINGS AND COORDINATION

This task includes the anticipated project meetings and coordination with the County and various stakeholders, and routine project management activities including but not limited to internal staffing, setting milestone schedules, and preparing monthly invoices.

Internal County coordination shall consist of the following departments:

- Project Meetings with DGS

- The Environmental Commission
- Building and Development Floodplain Department,
- The Department of Transportation and Capital Infrastructure,
- Loudoun County GIS Staff,
- Department of Finance and Procurement (Grants Coordinator)

Also included in this task is routine project management activities including but not limited to internal staffing, setting milestone schedules, and preparing invoices.

Kimley-Horn also anticipates coordination with the following external agencies:

- NVRC
- Occoquan Watershed Monitoring Lab
- Loudoun Wildlife Conservancy
- Fairfax County

The following table summarizes assumed effort with these agencies and organizations:

Entity	Hours
Project Meetings	40 [Includes time for regular project meetings on efforts and general coordination on overall progress]
The Environmental Commission	10 (Includes attendance at up to 3 committee meetings in person and miscellaneous coordination)
Building and Development Floodplain Department,	20 [Includes up to 2 virtual meetings and 2 in-person meetings with the Floodplain Group, and miscellaneous coordination]
The Department of Transportation and Capital Infrastructure,	10 [Includes up to 2 virtual meetings to discuss the overall approach and effort being performed, and data request needs]
Loudoun County GIS Staff,	10 [Includes up to 2 meetings to discuss data visualization and formatting, and coordination on sharing of data, and miscellaneous coordination]
Department of Finance and Procurement (Grants Coordinator)	4 [Includes up to 2 meetings on additional grant research opportunities]
NVRC	8 [Includes up to 2 meetings on the overall approach of the existing Occoquan Model and integration opportunities, as well as miscellaneous coordination]
Occoquan Watershed Monitoring Lab	4 [Includes up to 1 virtual meeting on data needs and requests]
Loudoun Wildlife Conservancy	6 [Includes up to 2 meetings on data requests and existing monitoring efforts]
Fairfax County	8 [Includes up to 2 virtual meetings on data requests, existing modeling efforts, and WMP lessons learned]
Total Hours	120

All meetings dedicated to public outreach are included in Task 1100. Should additional meetings and coordination be required beyond those stated above, Kimley-Horn will prepare an Amendment outlining the additional scope and fee for these meetings and coordination.

Schedule:

Upon receipt of formal notice-to-proceed, Kimley-Horn will develop a project schedule with the County to complete the requested work by no later than December 31st, 2025.

Deliverables:

Assumptions:

- It is assumed that the County will perform plan research for missing pond or storm sewer culvert data. This analysis assumes existing research from the Bull Run watershed will contain 1/3 of the 25 facilities.
- It is assumed that existing Stormwater GIS data for connecting culverts is accurate. If field validation is required, a separate task order for surveying services will be submitted for County review.
- It is assumed that the County will provide access to all existing water quality data and will provide points of contacts for stakeholder organizations.
- No FEMA submissions will be performed as part of this effort.
- All ponds which will be modeled will rely on previously digitized/delineated drainage areas within the County's database. Kimley-Horn will only perform a brief review of the drainage areas to ensure existing delineations remain appropriate.
- Loudoun County will provide a high resolution DTM for the Bull Run Watershed after post-processing of the latest LiDAR data. Kimley-Horn will not generate this file.
- Kimley-Horn will not generate ArcGIS online interactive maps as part of this proposal.
- Existing ponds will not be assessed for dam breach analyses or hazard classification.
- Ponds will not be reviewed for conformance with dam safety standards. Probably maximum flood events will not be evaluated as part of this analysis.
- It is assumed that the County will coordinate property entry with any non-County owned landowners with potential project implementation opportunities. If access is not granted, the feasibility assessment will be restricted to a desktop review.
- Rapid BANCS assessments shall not be a substitute for a full BANCS analysis.
- All project crediting will be performed in accordance with Guidance Memo No. 20-2003, and "Recommendations of the Expert Panel to Define Removal Rates for Urban Stormwater Retrofit Projects", as appropriate.
- The EOPCC will be based upon our understanding of local costs, historical bid averages, and similar project experience. Kimley-Horn does not control the cost of labor, materials, equipment or services furnished by others, methods of determining prices, or competitive bidding or market conditions; therefore any opinions rendered as to costs, including but not limited to opinions as to the costs of construction and materials, shall be made on the basis of our experience and represent our judgment as an experienced and qualified professional, familiar with the industry. Kimley-Horn cannot and does not guarantee that proposals, bids, or actual costs will not vary from its opinions of cost.

- The County will make the arrangements for the meeting locations included in Task 1100 and coordinate with any facility owner. The County will be responsible for any and all fees associated with the location.
- The County will provide notice to the public in advance of all public outreach activities.
- The WMP is not intended to act as a Zoning Ordinance update or Facilities Standards Manual update. Any recommendations that result from this report will be reviewed by the County and only considered for future efforts outside of this proposal.
- All models prepared for the County will be the property of the County. Kimley-Horn will not be responsible for modifications made to the model after completion of this task order.
- All modeling efforts will comply with those outlined in FEMA’s Guidance for Flood Risk Analysis and Mapping Guidance Documents.
- Any permits, permit application fees, review fees, or bonds required will prepared by others.
- This proposal and the accompanying cost estimate are valid for a period of 60 days and will expire if not accepted within that timeframe.

Exclusions:

Services that are not currently anticipated as part of this project and are therefore outside the scope of this task order proposal include the following:

- FEMA Coordination
- Design Phase Services
- Construction Phase Services
- Environmental Permitting
- All other services not explicitly stated in this scope of work

Fee and Expenses

Kimley-Horn will perform the following services as specifically requested by the County under this Scope of Services on a lump sum basis fee not to exceed \$495,651.75.

Task 100	County-Wide Data Collection And Existing Conditions	\$29,332.49
Task 200	Existing Hydrology Development	\$75,517.34
Task 300	PCSWMM Model Development	\$60,397.06
Task 400	Existing Condition Resiliency Assessment	\$33,248.00
Task 500	BMP Prioritization Assessment	\$13,887.48
Task 600	Nature-Based Solutions Feasibility Assessments	\$84,540.46
Task 700	Resiliency Modeling Scenarios	\$54,210.87
Task 800	Project Costs, Funding And Prioritization	\$35,865.96
Task 900	Watershed Management Plan Development	\$42,398.56
Task 1000	Public Involvement	\$31,425.93
Task 1100	Meetings And Coordination	\$34,827.60

Kimley-Horn will utilize the rate schedule as provided for in the County contract RFQ 338784B-C, Year 3. A detailed cost estimate (Attachment B) is provided with this proposal.

Closure

To proceed with the services, please have an authorized person sign this proposal below and return to us. Fees and times stated in this proposal are valid for thirty (30) days after the date of this letter.

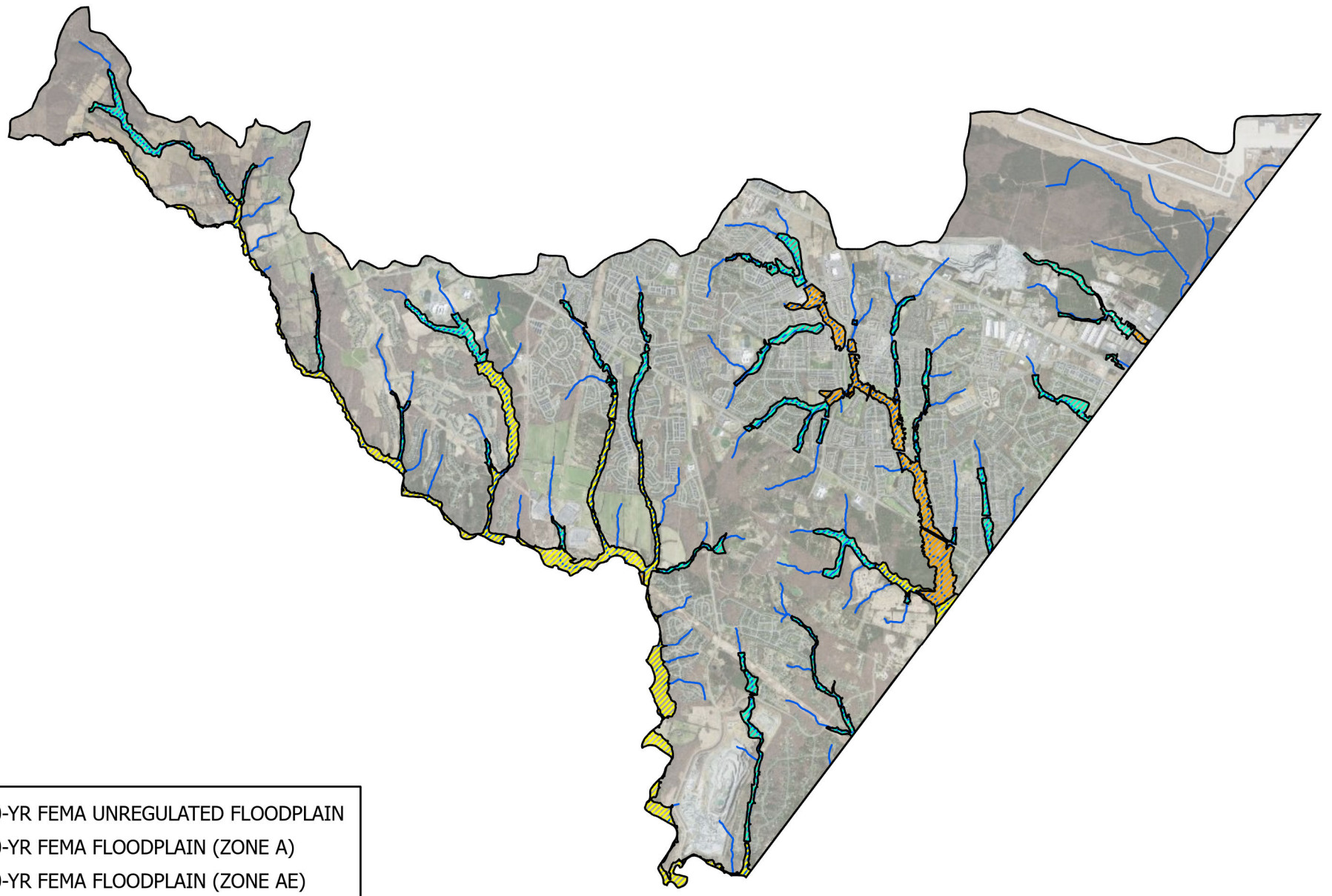
We appreciate the opportunity to provide these services. Please contact me if you have any questions.





Sincerely,

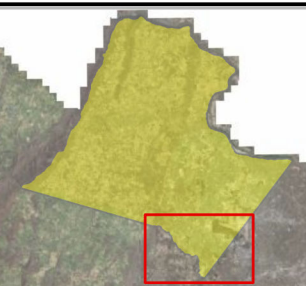
KIMLEY-HORN AND ASSOCIATES, INC.

By: Paul Elman, P.E.
Senior Vice President

Joe Arizzi, P.E.
Project Manager



-  100-YR FEMA UNREGULATED FLOODPLAIN
-  100-YR FEMA FLOODPLAIN (ZONE A)
-  100-YR FEMA FLOODPLAIN (ZONE AE)
-  STREAM CENTERLINE



BULL RUN WATERSHED IMPAIRED STREAMS AND FLOODPLAINS

Loudoun County
VIRGINIA



0 1.25 Miles

Aerial Data Source: VDOT Spatial Intelligence Group, Virginia Geographic Information Network (VGIN)

Coordinate System: NAD 1983 StatePlane Virginia North FIPS 4501 Feet

RFQ 338784-C
Engineering Services for the Loudoun County Stormwater Management Program

BULL RUN WATERSHED MANAGEMENT PLAN
11/3/2023

TASK	TASK DESCRIPTION	Principal	Sr Project Manager	Project Manager	Sr Engineer	Engineer III	Engineer II	Sr Landscape Architect	Landscape Architect	Sr Environmental Scientist	Environmental Scientist	GIS Programmer	Analyst II	Analyst I	Administrative	Total Hours	Labor Total	Total Miles For Each Task	Mileage Cost	KH Expenses	Sub Expenses	Sub Markup	Expense Total (Includes 10% Sub Markup)	Total Fee
		\$275.81	\$243.36	\$216.32	\$194.69	\$173.06	\$151.42	\$194.69	\$151.42	\$194.69	\$151.42	\$173.06	\$124.38	\$113.57	\$86.53				\$0.63			10%		
100	COUNTY-WIDE DATA COLLECTION AND EXISTING CONDITIONS	0	0	6	12	28.5	0	0	0	0	32	0	128	0	0	206.5	\$29,332.49		\$0.00			\$0.00	\$0.00	\$29,332.49
200	EXISTING HYDROLOGY DEVELOPMENT	0	0	32	66	164	0	0	0	0	138	0	52	0	0	452	\$75,517.34		\$0.00			\$0.00	\$0.00	\$75,517.34
300	PCSWMM MODEL DEVELOPMENT	0	0	36	66	170	0	0	0	0	42	0	32	0	0	346	\$60,397.06		\$0.00			\$0.00	\$0.00	\$60,397.06
400	EXISTING CONDITION RESILIENCY ASSESSMENT	0	0	18	0	54	0	0	0	0	50	0	100	0	0	222	\$33,248.00		\$0.00			\$0.00	\$0.00	\$33,248.00
500	BMP PRIORITIZATION ASSESSMENT	0	0	0	20	0	0	0	0	0	20	0	56	0	0	96	\$13,887.48		\$0.00			\$0.00	\$0.00	\$13,887.48
600	NATURE-BASED SOLUTIONS (NBS) FEASIBILITY ASSESSMENTS	30	0	20	110	63	0	0	0	0	122	0	168	0	0	513	\$84,288.46	400	\$252.00			\$0.00	\$252.00	\$84,540.46
700	RESILIENCY MODELING SCENARIOS	0	0	8	54	242.5	0	0	0	0	0	0	0	0	0	304.5	\$54,210.87		\$0.00			\$0.00	\$0.00	\$54,210.87
800	PROJECT COSTS, FUNDING AND PRIORITIZATION	0	0	8	40	84	0	0	0	0	78	0	0	0	0	210	\$35,865.96		\$0.00			\$0.00	\$0.00	\$35,865.96
900	WATERSHED MANAGEMENT PLAN DEVELOPMENT	0	0	8	40	60	0	0	0	0	60	0	80	0	40	288	\$42,398.56		\$0.00			\$0.00	\$0.00	\$42,398.56
1000	PUBLIC INVOLVEMENT	9	0	9	24	36	0	0	72	0	0	0	0	0	60	210	\$31,425.93		\$0.00			\$0.00	\$0.00	\$31,425.93
1100	MEETINGS AND COORDINATION	40	0	80	0	20	0	0	0	0	20	0	0	0	0	160	\$34,827.60		\$0.00			\$0.00	\$0.00	\$34,827.60
Total		79	0	225	432	922	0	0	72	0	562	0	616	0	100	3008	\$495,399.75	400	\$252.00	\$0.00	\$0.00	\$0.00	\$252.00	\$495,651.75

*Year 3 rates per executed contract amendment #2 dated 4/4/2022. Valid thru 4/30/2024

Arizzi, Joseph

From: Auer, Maggie <Maggie.Auer@loudoun.gov>
Sent: Wednesday, September 20, 2023 12:33 PM
To: Arizzi, Joseph
Cc: Stone, Chris; Moore, Keara; Kight, Casey
Subject: RE: Repetitive Flood Loss Properties in the County

Follow Up Flag: Follow up
Flag Status: Flagged

Categories: External

Joe,

The County does not have any documented repetitive loss structures in that watershed, most of the repetitive losses are in the Broad Run watershed.

Thanks,

Maggie Auer, CFM | Floodplain Management Team Leader
Building and Development | Loudoun County
1 Harrison Street, S.E. | Leesburg, VA 20175 | 3rd Floor, MSC #60
Maggie.Auer@loudoun.gov | (O) 703-777-0222 | (C) 571-420-1863

From: Arizzi, Joseph <Joseph.Arizzi@kimley-horn.com>
Sent: Wednesday, September 20, 2023 11:16 AM
To: Auer, Maggie <Maggie.Auer@loudoun.gov>
Cc: Stone, Chris <Chris.Stone@loudoun.gov>; Moore, Keara <Keara.Moore@loudoun.gov>; Kight, Casey <Casey.Kight@kimley-horn.com>
Subject: [EXTERNAL] RE: Repetitive Flood Loss Properties in the County

Hi Maggie –

Thanks very much – this is going to be a watershed-wide analysis for the Bull Run Watershed. Is that enough for you to provide the addresses in the project area? I can also figure out where they are spatially if you the County is able to release those 15 addresses.

Joe Arizzi, P.E. (VA)
Kimley-Horn | 11400 Commerce Park Drive, Suite 400, Reston, VA 20191
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From: Auer, Maggie <Maggie.Auer@loudoun.gov>
Sent: Wednesday, September 20, 2023 10:53 AM
To: Arizzi, Joseph <Joseph.Arizzi@kimley-horn.com>
Cc: Stone, Chris <Chris.Stone@loudoun.gov>; Moore, Keara <Keara.Moore@loudoun.gov>; Kight, Casey

<Casey.Kight@kimley-horn.com>

Subject: RE: Repetitive Flood Loss Properties in the County

Good morning Joe,

The last update we received from FEMA about the number of repetitive losses was 9/2019 and at that time there were 15 addresses County-wide that qualified as repetitive loss. We have the addresses of the repetitive losses so we can provide the number for the proposed project area if needed. Currently, the County does not track repetitive losses outside of the FEMA Special Flood Hazard area so our data only reflects what is captured by the NFIP.

Thanks,

Maggie Auer, CFM | Floodplain Management Team Leader
Building and Development | Loudoun County
1 Harrison Street, S.E. | Leesburg, VA 20175 | 3rd Floor, MSC #60
Maggie.Auer@loudoun.gov | (O) 703-777-0222 | (C) 571-420-1863

From: Arizzi, Joseph <Joseph.Arizzi@kimley-horn.com>

Sent: Tuesday, September 19, 2023 3:24 PM

To: Auer, Maggie <Maggie.Auer@loudoun.gov>

Cc: Stone, Chris <Chris.Stone@loudoun.gov>; Moore, Keara <Keara.Moore@loudoun.gov>; Kight, Casey <Casey.Kight@kimley-horn.com>

Subject: [EXTERNAL] Repetitive Flood Loss Properties in the County

Hi Maggie,

Our team is working with DGS to submit a watershed management plan as part of the CFPF Grant Opportunity and one of the required items from the application is a record of the following:

Repetitive Loss and/or Severe Repetitive Loss Properties

Do not provide the addresses for these properties but **include an exact number of repetitive loss and/or severe repetitive loss structures within the project area**. Work with the local floodplain administrator or emergency manager to find this information. **If they do not have a list of repetitive loss/severe repetitive loss structures, the Department can assist them in accessing these lists for NFIP insured structures**. Please note, that repetitive loss and/or severe repetitive loss often occurs outside of the SFHA and to properties not captured in NFIP reporting. All flooding involving these properties should be tracked and addressed by the community. Residential and/or Commercial Structures – 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.

Is this information you are able to provide our team?

Thank you,

Joe Arizzi, P.E. (VA)
Kimley-Horn | 11400 Commerce Park Drive, Suite 400, Reston, VA 20191
Direct: 703 674 1330 | Mobile: 631 275 7094 | www.kimley-horn.com
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