

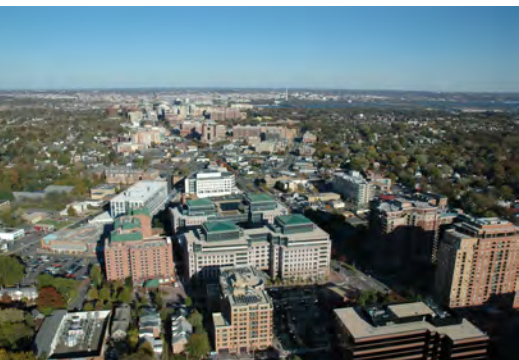


ARLINGTON
VIRGINIA

ARLINGTON COUNTY RESILIENCE PLAN

ARLINGTON COUNTY, VIRGINIA

November 20, 2024



Document History and Status

Revision	Date	Description	Author	Checked	Reviewed	Approved
2	November 8, 2024	Draft	Laurens van der Tak, Emmanuel Brainoo	Lauren Linville	Liz Thurber	Laurens van der Tak
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Executive Summary

Purpose

Arlington County, Virginia (the County) is at risk of three types of flooding: (1) interior (pluvial) flooding, (2) riverine flooding, and (3) coastal flooding. Recent localized flooding from intense, short periods of rainfall now challenges parts of the County's stormwater system because of capacity issues, limited overland relief, and climate change. The County's [Flood Resilient Arlington](#) program includes a range of policies and projects to enhance the flood resilience of the community, but more can be done (County n.d.l).

This document addresses the resilience planning requirements of the Community Flood Preparedness Fund (CFPF) outlined in Appendix F of the [2024 CFPF Grant Round 5 Manual](#) (DCR and VRA 2024), with the goal of securing grants for critical resilience plans, studies, and projects.

The County has many relevant plans, policies, and ordinances that support its resilience efforts. This Executive Summary provides an overview of relevant documents that support overall resilience goals. The remainder of this Arlington Resilience Plan identifies how existing and ongoing County plans and programs specifically address each of the nine critical elements identified in Appendix F of the [2024 CFPF Grant Manual](#), which are listed as follows (DCR and VRA 2024):

1. The Resilience Plan is project based with a focus on flood control and resilience
2. The Resilience Plan incorporates nature-based infrastructure to the maximum extent possible
3. The Resilience Plan includes all parts of a community regardless of socioeconomic status or race and addresses the flood resilience needs of underserved populations
4. The Resilience Plan identifies flooding issues in all areas of the community, not just Special Flood Hazard Areas (SFHAs), and addresses repetitive loss properties
5. The Resilience Plan includes property acquisitions and includes equitable relocation strategies (if applicable)
6. The Resilience Plan includes a strategy for debris management in water channels and floodplains
7. The Resilience Plan includes administrative procedures for substantial damage or improvement of structures within the SFHA
8. The Resilience Plan includes coordination with other local and interjurisdictional plans and projects and has a timeline for implementation
9. The Resilience Plan is based on the best available science and incorporates climate change, sea level rise, storm surge (where appropriate), and current flood maps

Plans, Studies, and Initiatives Supporting the Resilience Plan

Arlington’s flood resilience planning elements are largely contained within the recently completed [Flood Risk Assessment and Management Plan](#) (RAMP; Jacobs 2024). Although the RAMP is not an “adopted stand-alone” plan that addresses all the CFPF Resilience Plan requirements, the County has dedicated funding to its [Flood Resilient Arlington](#) efforts (County n.d.l), which, when combined with other County initiatives, incorporates the critical elements described previously. This section identifies how the County’s various resilience planning documents satisfy the CFPF Resilience Plan elements.

Each of the following County plans, studies, and initiatives have components that satisfy elements of the CFPF Resilience Plan requirements; together they form a Resilience Plan:

- Flood Resilient Arlington (County n.d.l)
- Flood RAMP (Jacobs 2024):
 - Volume 1, Executive Summary, Watershed Fact Sheets, and Mitigation Strategy Fact Sheets
 - Volume 2, Summary Report, Watershed Maps with Climate Scenarios and Mitigation Strategies
 - Volume 3, Appendices
- [Stormwater Management Zoning Study Amendments](#) (adopted March 2023; County n.d.aa)
- [Increased stormwater requirements for development](#) (County n.d.r)
- Increased investment in the Stormwater Management Program through bonds and [Capital Improvement Plan Fiscal Year \(FY\) 2025 to FY 2034](#) (County 2024a)
- [Implementation of a stormwater utility fee](#) (County n.d.ac)
- Participation in the [National Flood Insurance Program Community Rating System](#) (County n.d.w)
- [Voluntary property acquisition](#) (County n.d.af)
- [Floodproofing outreach](#) (County n.d.w)
- [Storm Sewer Capacity Study](#) (County n.d.y) as part of [Stormwater Master Plan](#) (County 2014)
- [Four Mile Run Master Plan](#) (R&H et al. 2006)
- [Neighborhood Complete Streets Program](#) (County n.d.aj)

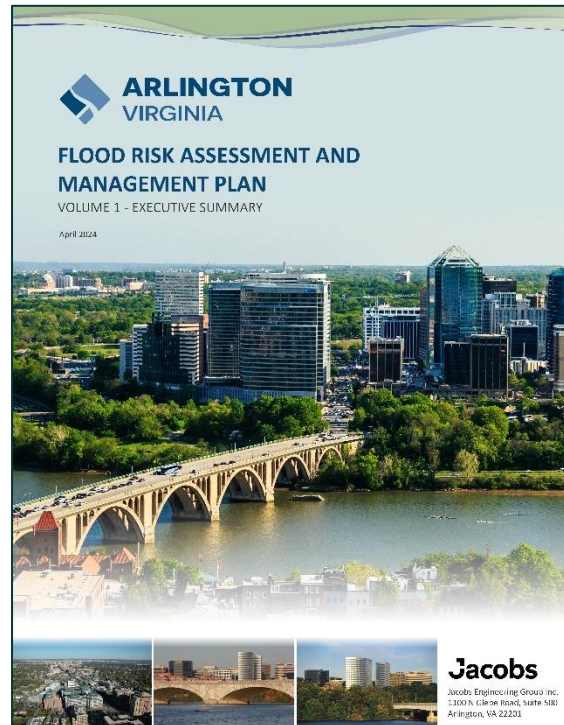


Figure ES-1. Flood Risk Assessment and Management Plan Cover

Source: RAMP Volume 1 (Jacobs 2024)

- [Arlington Neighborhoods Program](#) (County n.d.w)
- [Northern Virginia Hazard Mitigation Plan Annex 1: Arlington County](#) (County and IEM 2022)
- [Stream Assessment](#) (County n.d.ad)
- [Watershed Retrofit Study](#) (County n.d.ag)
- [Stormwater Capacity Improvements](#) (County n.d.z)
- [Stormwater, Watershed, and Stream Projects](#) (County n.d.ab)
- New types and locations for capacity projects (such as the [vault at Cardinal Elementary School](#) [County n.d.e])
- [Green Streets Projects](#) (County n.d.o)
- [Chesapeake Bay Total Maximum Daily Load \(TMDL\) Action Plan](#) (County n.d.f)
- [Chesapeake Bay Preservation Plan](#) (County 2023a)
- [Bacteria and Polychlorinated Biphenyls \(PCB\) TMDL Action Plans](#) (County n.d.d)

Specific excerpts from each plan that satisfy the requirements outlined in the [2024 CFPF Grant Manual](#) (DCR and VRA 2024) Appendix F, are included in Section I, Resilience Plan Elements.

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Acronyms and Abbreviations

AIRE	Arlington County Initiative to Rethink Energy
CDC	Centers for Disease Control and Prevention
CFPF	Community Flood Preparedness Fund
the County	Arlington County
DCR	Virginia Department of Conservation and Recreation
DES	Arlington County Department of Environmental Services
DOC	U.S. Department of Commerce
DPR	Arlington County Department of Parks and Recreation
FEMA	Federal Emergency Management Agency
GI	green infrastructure
GLUP	General Land Use Plan
LDA	land disturbing activity
LGBTQIA+	lesbian, gay, bisexual, transgender, queer, intersex, asexual, and others
NFIP	National Flood Insurance Program
NOAA	National Oceanic and Atmospheric Administration
NVRC	Northern Virginia Regional Commission
RAMP	Risk Assessment and Management Plan
RPA	Resource Protection Area
SFHA	Special Flood Hazard Area
SVI	Social Vulnerability Index
TMDL	total maximum daily load
VRA	Virginia Resources Authority

I. Resilience Plan Elements

This section summarizes how existing plans, studies, policies, and initiatives support each of the nine required elements of a Resilience Plan. Section II provides supplemental considerations reflecting additional guidance at the end of Appendix F of the 2024 [Community Flood Preparedness Fund \(CFPF\) Grant Round 5 Manual](#) (DCR and VRA 2024).

The Resilience Plan is Project Based with a Focus on Flood Control and Resilience

For years, Arlington County, Virginia (the County) has experienced significant flooding, with increasing social, infrastructure, public health, and economic impacts. Brief, intense storms, particularly in the summers of 2006, 2018, 2019 and 2020, have caused flash flooding and significant property loss (Figure 1).

To better predict and plan for flooding, the County has developed the [Flood Risk Assessment and Management Plan](#) (RAMP; Jacobs 2024), a three-volume report completed in April 2024 that identifies watersheds and critical facilities countywide that are the most vulnerable to flooding. The RAMP does the following:

- Provides an extensive study of flood-vulnerable watersheds based on flood modeling and risk assessments for both current and future stormwater conditions
- Defines impacts of future climate change
- Maps mitigation measures and projects
- Evaluates the costs and benefits of potential flooding solutions



Figure 1. Intense Storms, like in 2006, 2018, 2019, and 2020, Caused Significant Street Flooding

Flood mitigation projects were identified, and benefit-cost analyses were performed for two categories identified as vulnerable: (1) neighborhood problem areas and (2) critical facilities. For neighborhood areas, conceptual flood mitigation projects were developed using either conveyance or storage. These were summarized in the priority vulnerable watersheds in a series of maps. Figure 2 provides one example, and others are included in Volume 2 of the RAMP report.

Benefits were calculated as the difference in estimated annualized risk before and after project implementation, as determined with the Federal Emergency Management Agency (FEMA) [Hazardus tool](#) (FEMA n.d.).

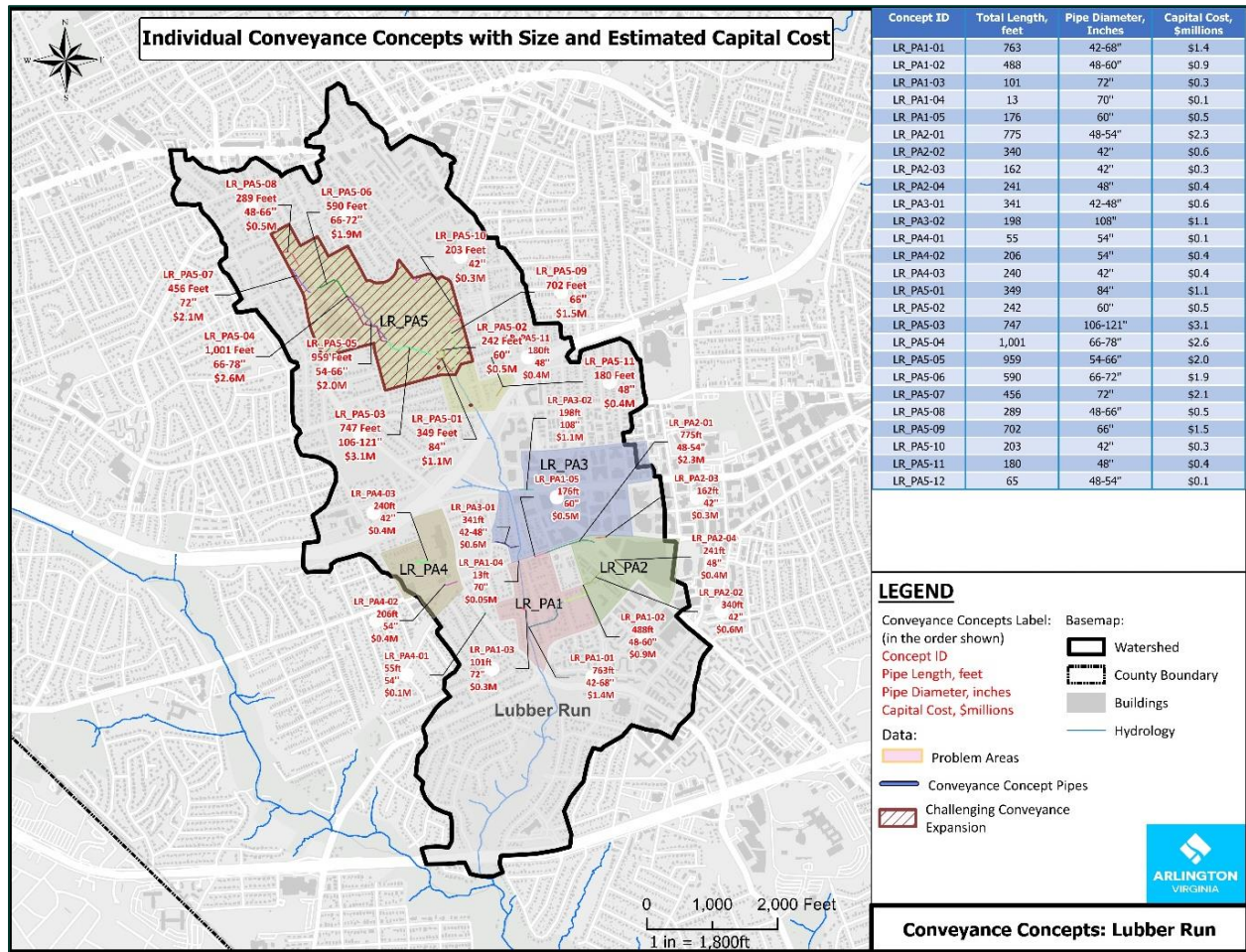
For critical facilities, such as the County Water Pollution Control Plant, alternatives were developed for dry or wet flood proofing, or elevating, at either an asset level, building level, or facility level. Figure 3 shows flood mapping around the Water Pollution Control Plant, which was used to set design flood elevations for evaluation of flood mitigation alternatives.

In addition to these more structural solutions, programmatic solutions serve as an important tool to address flooding countywide and in localized areas. These programmatic solutions include the following:

- Land use planning and risk communication
- Enhanced building design and construction codes for areas at high risk
- Where other solutions are infeasible, overland relief by acquiring and removing structures in flood-prone areas

The County already includes these and many other programmatic solutions in its menu of flood management strategies.

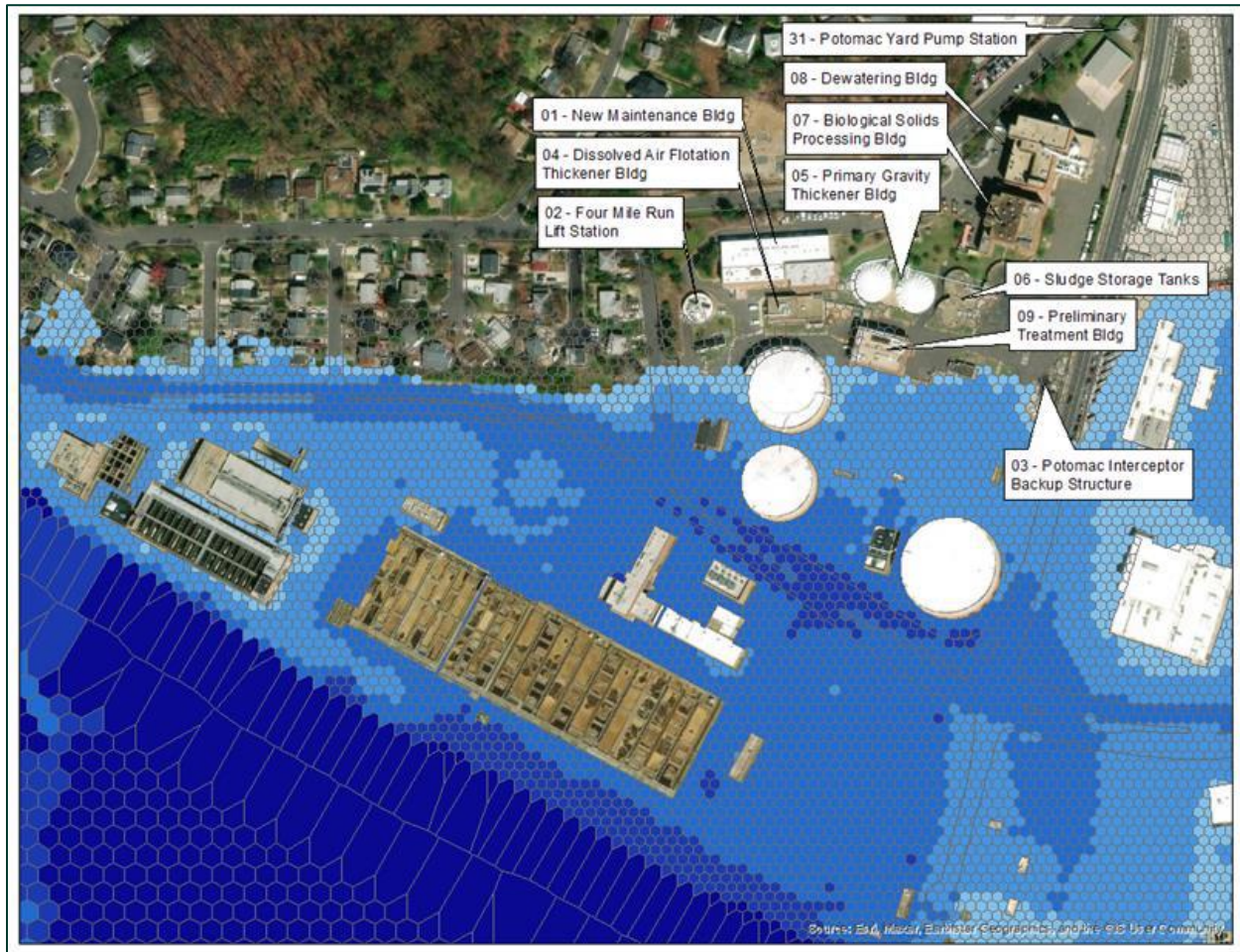
Figure 2. Example Project Concept Map Prepared for Vulnerable Watersheds



Source: RAMP Volume 2 (Jacobs 2024).

ID = identification

Figure 3. Flood Exposure for the Flood Scenario 1 (Climate Change in 2040) 100-year Storm at the Water Pollution Control Plant



bldg = building

The Resilience Plan Incorporates Nature-based Infrastructure to the Maximum Extent Possible

The County has an extensive program of identifying opportunities, evaluating feasibility, and implementing nature-based solutions. These include stream assessments and restoration, as well as green infrastructure (GI) associated with green streets and other green stormwater infrastructure in public spaces. In addition, the County has recently adopted a stormwater utility fee, which includes an incentive program for implementing GI on private property.

The County conducted a [Watershed Retrofit Study](#) to identify opportunities for installing facilities to slow down and filter stormwater runoff before it flows into local streams (County n.d.ag). Projects were scored and ranked based on several factors, including runoff reduction, pollutant removal, drainage problem alleviation, feasibility, and maintenance requirements. A ranked list of retrofit projects was developed by watershed. Stormwater facility types included bioretention and dry swales. The County has been steadily implementing GI projects, in particular [green streets](#) (County n.d.o), in coordination with the [Arlington](#)

[Neighborhoods Program](#) (County n.d.w), [Stormwater Management Program](#) (County n.d.al), and [Neighborhood Complete Streets Program](#) (County n.d.aj).

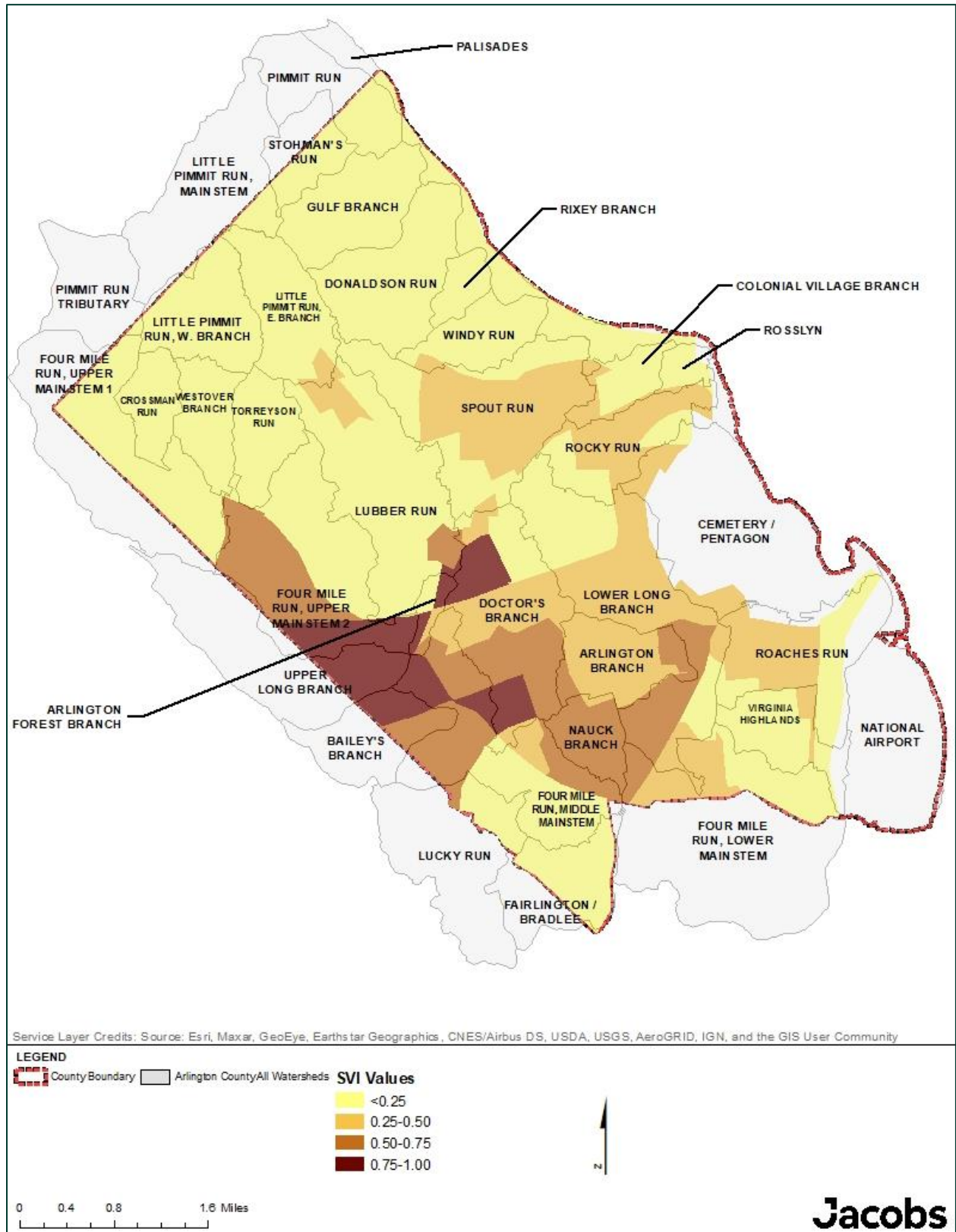
In addition to GI projects, the County has conducted [a countywide stream assessment](#) (County n.d.ad) and prioritized stream restoration projects. The County has an ongoing program to implement [stream restoration projects](#) that apply natural channel design principles (County n.d.ae).

Although the County's programs for implementing nature-based solutions have been proactive and effective at managing water quality and habitat impacts from development, the County recognizes that more could be done when managing flooding and drainage issues from larger storms to integrate "green and grey" solutions (that is, combining solutions that capture stormwater through watershed retrofits while also implementing conveyance or storage solutions). An example is integrating green streets with projects that expand drainage conveyance solutions (such as larger inlets and larger storm sewers) and considering GI as part of overland relief corridors. The County is working on policies and procedures to improve this integration of green and grey solutions. The RAMP project recommends the County consider "blended solutions and green stormwater infrastructure" as part of detailed feasibility studies that will be needed to implement each resilience project (refer to Section 5.2 of Volume 2 of the RAMP).

The Resilience Plan Includes All Parts of a Community Regardless of Socioeconomics or Race and Addresses the Flood Resilience Needs of Underserved Populations

The County's commitment to equity reaches across the programs, policies, and projects of all County departments and bureaus and is detailed in [Realizing Arlington's Commitment to Equity](#) (County 2022). Consistent with this principle, the [Stormwater Management Program](#) has identified and prioritized mitigation projects in County watersheds where underserved populations exist (County n.d.al). This commitment is also reflected in the Flood RAMP through explicit analysis of the impacts of flooding and the benefits of mitigation measures on vulnerable communities. This analysis was achieved by mapping areas of high vulnerability using the Centers for Disease Control and Prevention's (CDC's) [Social Vulnerability Index](#) (SVI; ATSDR and CDC n.d.) and intersecting those areas with areas of flooding based on detailed hydrologic and hydraulic modeling. Figure 4 shows SVI data overlaid on Arlington County watersheds.

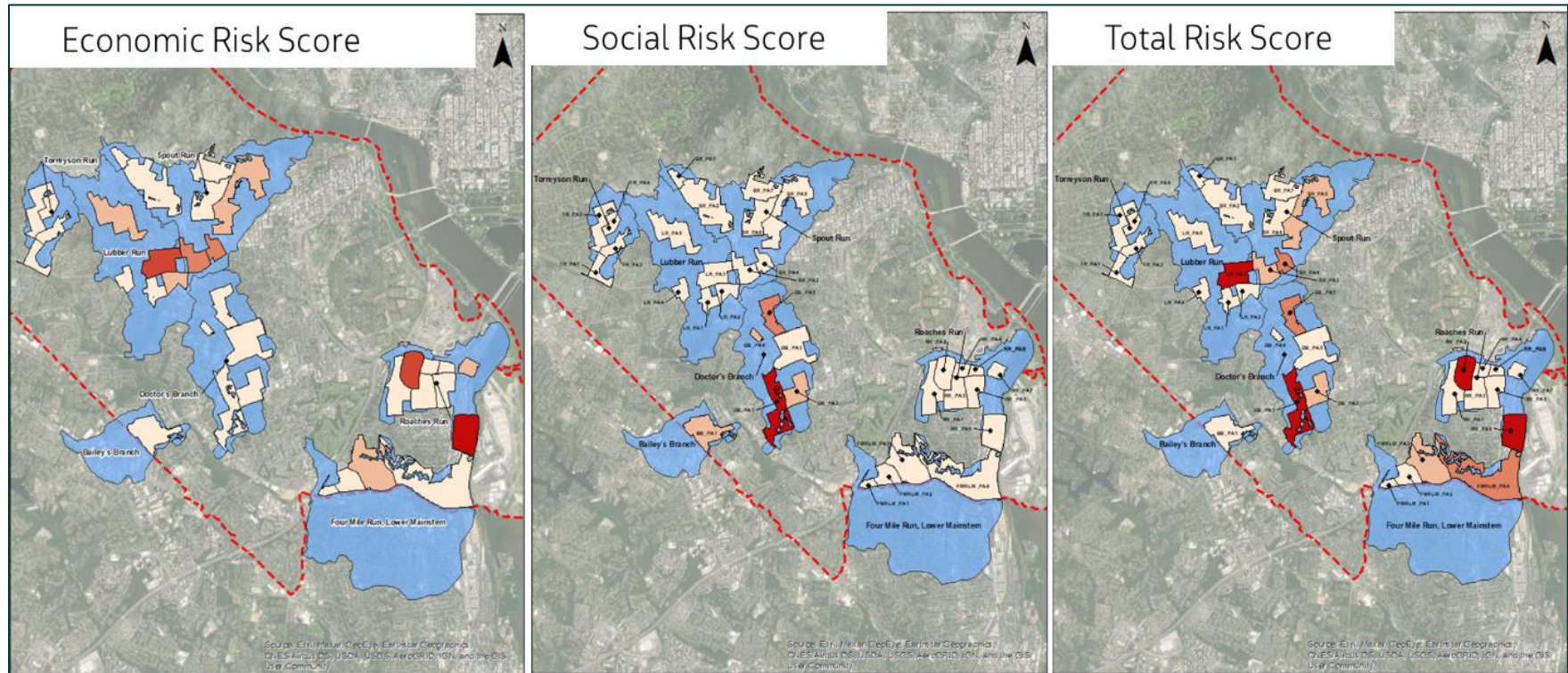
Figure 4. Social Vulnerability Index Values and Arlington County Watersheds



Thirty-six watersheds are either wholly or partly within Arlington County. The RAMP analyzed 15 of the most critical watersheds based on several factors, including the likelihood of significant flooding, past flood complaints and impacts, and the presence of critical facilities. These 15 watersheds were then assessed for flood vulnerability based on current conditions and projected climate-driven rainfall intensity and flood impacts in 2040 and 2070, resulting in 7 watersheds for a more detailed “problem area” flood risk assessment. For the RAMP, flood modeling and risk assessments were conducted considering climate change for urban interior, riverine, and coastal flooding. The modeling determined areas of the County, critical facilities, and vulnerable groups that are most susceptible based on current and projected flooding with climate change. Detailed risk assessments were conducted for watersheds with the highest vulnerability. FEMA’s (n.d.) [Hazus tool](#) was applied to assess current and projected future damages at the neighborhood and watershed scale. Alternatives were developed for flood mitigation risk based on economic, environmental, and social equity criteria with a benefit-cost analysis methodology. Strategies included storage, conveyance, overland relief, and policy and programmatic alternatives.

This approach demonstrated the importance of considering social vulnerability in the benefit-cost analysis, resulting in a different prioritization of problem areas compared to an analysis based solely on monetary damages. The analysis also demonstrated the need to analyze all sources of flooding, with interior flooding representing a significant flood risk well outside FEMA floodplains (Figure 5).

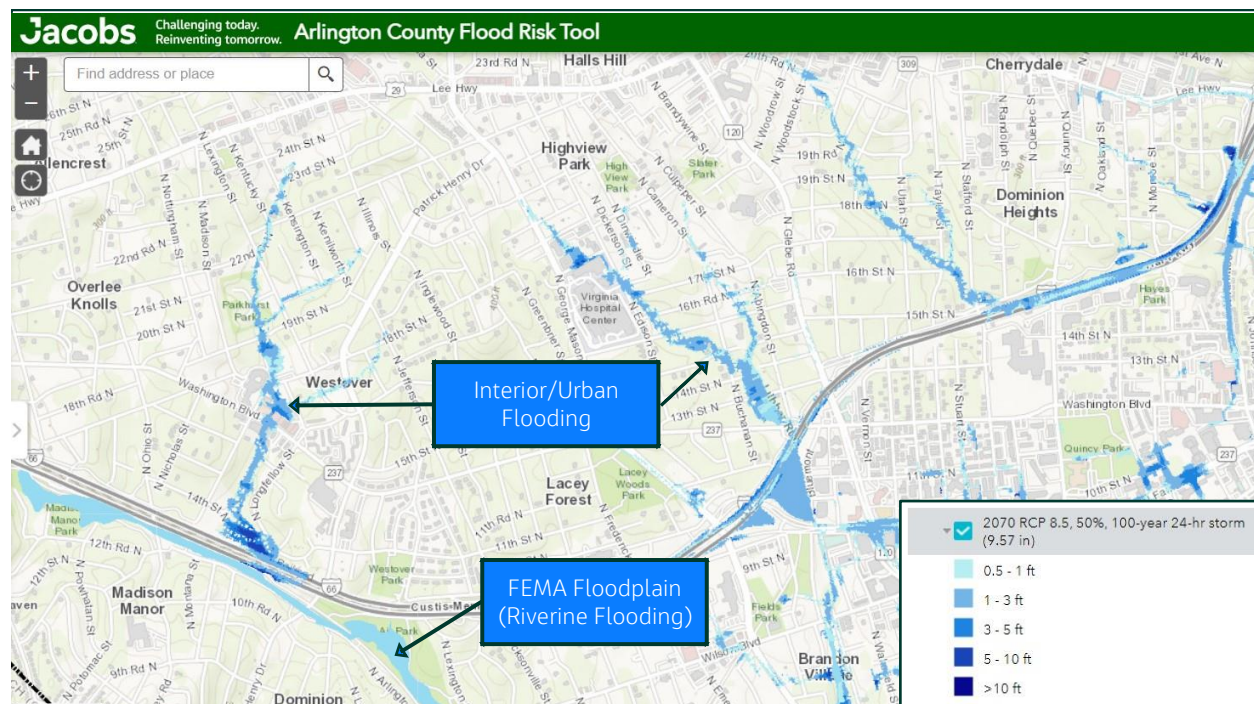
Figure 5. Problem Area Comparative Results Shows the Importance of Integrating Economic and Social Risk in the Prioritization of Problem Areas for Flood Mitigation



The Resilience Plan Identifies Flooding Issues in all Areas of the Community, Not Just SFHAs, and Addresses Repetitive Loss Properties

The analysis conducted for the RAMP also demonstrated the need to analyze all sources of flooding, with interior flooding representing a significant flood risk well outside FEMA Special Flood Hazard Areas (SFHAs). The RAMP modeled all types of flooding (interior flooding, riverine flooding, and coastal flooding) under current and future climate conditions. Given the flood events of 2006, 2018, 2019, and 2020, when repetitive flood losses occurred well outside FEMA floodplains, much of the RAMP's emphasis was on those areas of urban interior flooding. Figure 6 illustrates the flooded areas for interior flooding versus the mapped FEMA floodplain.

Figure 6. Interior (Urban) Flooding is a Bigger Risk to Arlington County Residents, Businesses, and Infrastructure than Riverine Flooding in the FEMA SFHA



Such interior flooding issues will require more comprehensive solutions, including policy and programmatic, and infrastructure solutions that factor in climate change, and adaptive solutions that include land use planning, design guidelines, and property acquisition to allow for overland relief.

The Resilience Plan Includes Property Acquisitions and Includes Equitable Relocation Strategies (If Applicable)

Arlington County has a program for [voluntary property acquisition to reduce flood risk](#) (County n.d.af). The County is purchasing some properties on a voluntary basis to provide overland relief or expand the storm system capacity and reduce flood risk to the community. Because the program is voluntary, it does not include a provision to assist with relocation.

The program is in the early stages and will, by necessity, take place in phases as properties are acquired. The properties currently targeted for potential acquisition are those in interior flooding areas, typically far from SFHA but subject to repetitive losses.

The Resilience Plan Includes a Strategy for Debris Management in Water Channels and Floodplains

Debris management in water channels and floodplains is handled by the County's Water, Sewer, Streets Bureau and the County Department of Parks and Recreation (DPR; for tree issues) on an as-needed basis. A large team of representatives from several County departments evaluates the county after large storms (like in 2019) and determines the necessary cleanup efforts.

The Resilience Plan Includes Administrative Procedures for Substantial Damage or Improvement of Structures within the SFHA

Building permits for structures within 15 feet (landward) of the SFHA are flagged during the [Land Disturbing Activity/Stormwater Permit Overview](#) (LDA; County n.d.r) application process and sent to designated permit reviewers. These reviewers will perform an analysis (usually based on an appraisal) to determine if the proposal is greater than the 50% threshold to be considered a substantial improvement as defined by the County Floodplain Ordinance. Refer to Attachment A for the County's Construction Certificate Management Procedures under the National Flood Insurance Program (NFIP) [Community Rating System](#) (County n.d.w).

The Resilience Plan Includes Coordination with Other Local and Interjurisdictional Plans and Projects and Has a Timeline for Implementation

The County participates in the [Four Mile Run Watershed Program](#), which is coordinated by the Northern Virginia Regional Commission (NVRC; n.d.). Four Mile Run watershed is shared with the City of Alexandria, the City of Falls Church, and Fairfax County, and it includes shared sections of SFHA. The [Four Mile Run Channel Maintenance and Dredging Project](#) is coordinated with the City of Alexandria (County n.d.m).

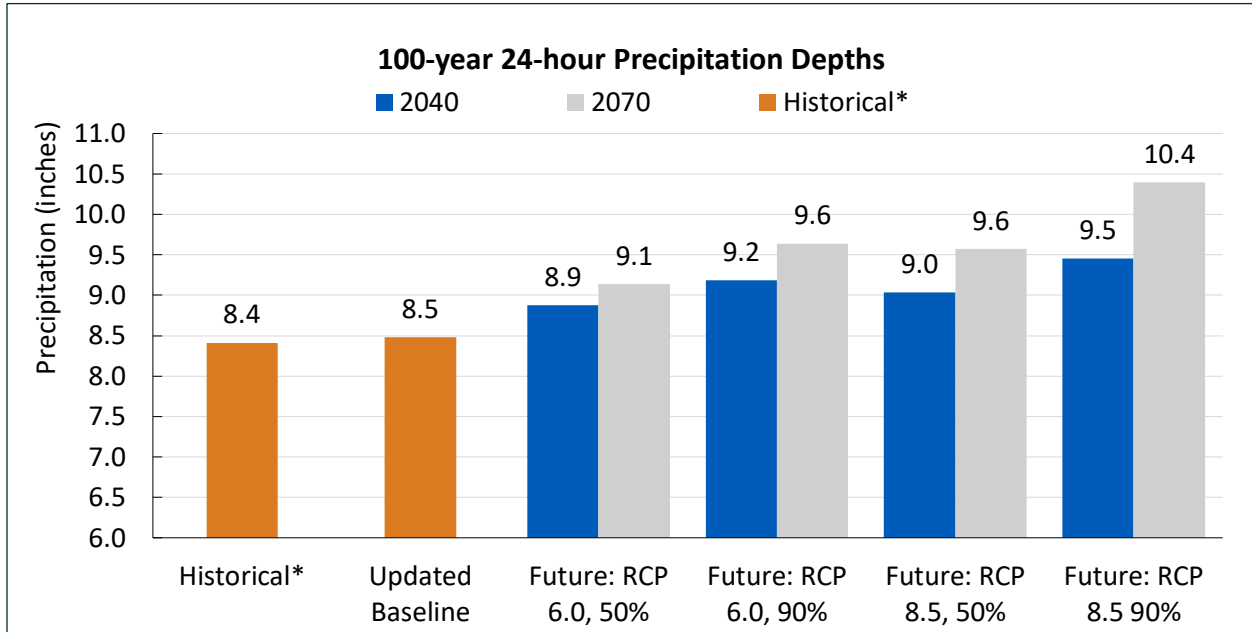
The County regularly coordinates and participates with regional planning organizations and professional societies such as Metropolitan Washington Council of Governments ([MWCOC](#)), [NVRC](#), Virginia Municipal Stormwater Association ([VAMSA](#)), U.S. Army Corps of Engineers ([USACE](#)), [VFMA](#), and various civic associations.

The Resilience Plan Is Based on the Best Available Science and Incorporates Climate Change, Sea Level Rise, Storm Surge, and Current Flood Maps

The RAMP relied on best available science at the time to develop climate projections for rainfall intensity, duration, and frequency (IDF) for interior and riverine modeling, as well as sea level rise for coastal storm surge modeling. Details are in Appendix A in [Volume 3 of the RAMP](#) (Jacobs 2024) report. National Oceanic and Atmospheric Administration (NOAA) [Atlas 14 Volume 2](#) (DOC et al. 2006) rainfall data were updated to include the most recent rainfall records. IDF projections were then prepared for a range of greenhouse gas emission scenarios and time horizons. The Representative Concentration Pathway (RCP) 8.5 projections for 2040 and 2070 were selected. Figure 7 shows the projections for the 100-year 24-hour storm.

Projections were developed for the 10-year through 500-year storms. In addition, sea level rise projections from NOAA were reviewed, and the NOAA Intermediate High curve was selected to evaluate the impacts of storm surge.

Figure 7. Rainfall Projections for Arlington County for 100-year Storm



*Historical: NOAA Atlas 14, based on 15 stations in region

II. Additional Considerations in Arlington Resilience Plan

In addition to the 9 required elements discussed in Section I, Appendix F of the 2024 CFPF Grant Manual provides an additional list of 16 considerations to help guide the development and identification of strategies and documents needed for a successful Resilience Plan. This section summarizes how the County's existing plans or initiatives address each of these considerations.

Strategic policies for local government-wide flood protection and prevention that include considerations of all parts of a locality regardless of socioeconomic status or race and address flood resilience needs of underserved populations within the community.

The County adopted [a new floodplain ordinance](#) in October 2023 (County 2023b). New FEMA Flood Insurance Rate Maps were adopted in November 2023.

As mentioned previously, the RAMP extends the analysis of flood risk in Arlington County on a countywide basis to include areas subject not only to current riverine and coastal flood risk, but also existing and projected future areas of interior flooding, largely where legacy streams were encased in culverts decades ago, and extends riverine and coastal flooding maps to reflect climate change. As explained previously, the RAMP purposefully considered underserved populations so that risk assessment methods reflected these communities and not just traditional estimates of economic damage, which tend to prioritize areas of greater assessed value and/or economic activity.

Proposed projects that enable communities to adapt to and thrive through natural or human hazards.

The [Northern Virginia Hazard Mitigation Plan Annex 1: Arlington County](#) (County and IEM 2022) includes a high-level assessment of risk to multiple natural and human hazards. Although the overall risk rating is low, the report includes some recommendations to address improvements to the NFIP [Community Rating System](#) (County n.d.w) and interior flooding. As noted previously, the County has made significant strides in this respect, adopting an updated floodplain ordinance and completing the [Flood RAMP](#) (Jacobs 2024), which identifies specific capital projects and policy recommendations to improve resilience. The County's Community Rating System rating has improved from Class 8 to Class 7 this year.

The County has been including blended solutions to flood mitigation for many years. Two examples of blue/green projects follow:

1. The [West Little Pimmit Run Storm Sewer Upgrade](#) consisted of 1,600 linear feet of storm sewer upgrades designed to address flooding that occurred in 2006 (County n.d.ah). The project was designed with two green street facilities, one in the island of [John Marshall Drive](#) (Figure 8; County n.d.q) and the other on [North Kensington Street](#) (County n.d.t).



Figure 8. [John Marshall Drive Green Street](#)

This green street was a part of the larger West Little Pimmit Run Storm Sewer Upgrade project that increased the capacity of the storm sewer through this neighborhood.

Source: County, n.d.q.

2. [Headwaters of Donaldson Run Outfall Repair](#) (County n.d.j) was a project that installed storm sewer to pick up runoff from the public street, which was causing erosion. The receiving stream was then restored from the improved outfall to the connection point with a previously completed stream restoration project. The result was a completely restored stream tributary.

Both projects provided elements of traditional “grey” storm conveyance infrastructure, such as storm drainage pipes, and “green” infrastructure, such as stream restoration and bioretention facilities. The projects included a balance of blue/green blended flood mitigation solutions.

Documentation of the County’s of existing social, economic, natural, and other conditions present in the local government.

Refer to both the [Northern Virginia Hazard Mitigation Plan Annex 1: Arlington County](#) (County and IEM 2022) and the [RAMP](#) (Jacobs 2024) reports for detailed documentation of social, economic, natural, and governance conditions for the County.

Review of the vulnerabilities and stressors, both natural and social, in the local government.

Refer to both the [Northern Virginia Hazard Mitigation Plan Annex 1: Arlington County](#) (County and IEM 2022) and the [RAMP](#) (Jacobs 2024) reports for detailed documentation of vulnerabilities and stressors for the County.

Forward-looking goals, actionable strategies, and priorities that incorporate protections for all impacted parts of a locality.

In addition to the goals and strategies in [Flood Resilient Arlington](#) program (County n.d.l), the [RAMP](#) report (Jacobs 2024), the [stream](#) (County n.d.ad) and [watershed](#) (County n.d.ag) assessments, and the [green streets](#) programs (County n.d.o), the [Arlington County Initiative to Rethink Energy \(AIRE\)](#) (County n.d.c) has cross-cutting technologies encompassing all-of-government strategies to reduce greenhouse gas emissions and execute a Community Energy Plan, with a goal of achieving the County’s 2050 greenhouse gas emissions reduction target for carbon neutrality.

Strategies that guide growth and development away from high-risk locations, which may include strategies in comprehensive plans, other land use plans or ordinances, or other studies, plans, or strategies adopted by a local government.

The County performed the [Stormwater Management Zoning Study Amendments](#) study (adopted in March 2023; County n.d.aa), which proposed amendments to existing zoning standards applicable to public stormwater management facilities to enable greater flexibility in their siting and construction. In addition, the [Public Spaces Master Plan](#) recommends

modernizing zoning standards for more flexible public space master planning and development (WRT 2019). The stormwater zoning amendments made it easier to locate flood mitigation measures by making the zoning requirements consistent throughout Arlington County, where, previously, certain flood mitigation facilities were treated inconsistently under differing zones. In addition, the County is currently developing flood resilient design guidelines and recommendations for a zoning overlay.

The [General Land Use Plan](#) (GLUP) establishes policy for land use decisions and development in Arlington County. The GLUP is implemented through several processes, some of which protect areas of high flood risk or sensitive environmental areas (County 2023c). Specifically, the [Zoning Ordinance](#), [Sector and Area Plans](#), [Use Permit](#) process, and [Site Plan](#) process are used by planning staff and reviewers to direct development away from high flood risk areas, mitigate flood risk, improve stormwater conveyance systems, improve water quality, or protect sensitive environmental areas (County n.d.ai, n.d.ak, n.d.am).

An example of how these are implemented for flood resilience is the recent zoning study amendments, which streamlined and standardized the treatment of flood mitigation measures, such as public underground detention facilities and stormwater pump stations (County n.d.aa). Another example is the recently adopted [Plan Langston Boulevard](#) area plan, which calls for specific flood mitigation and resilience measures and provides incentives for resilient development (County n.d.u). The [Use Permit](#) and [Site Plan](#) processes incorporate reviews from stormwater engineers, watershed planners, and flood plain staff, whose main focus is on flood risk mitigation, stormwater capacity improvements, watershed protection, and water quality improvements (County n.d.ak, n.d.am). Code requirements are enforced via these reviews, and voluntary resilience measures are requested and approved.

Proposed acquisition of land or conservation easements or identification of areas suitable for conservation, particularly areas identified as having high flood attenuation benefit by ConserveVirginia or similar data driven tools. Identification of areas suitable for property buyouts in frequently flooded areas.

Most stream valleys are protected as [Resource Protection Areas \(RPA\) under the Chesapeake Bay Preservation Ordinance](#), which often coincide with FEMA floodplains (County n.d.x). Many of these stream valley areas were acquired by the County or have restrictions on development and require review by the County.

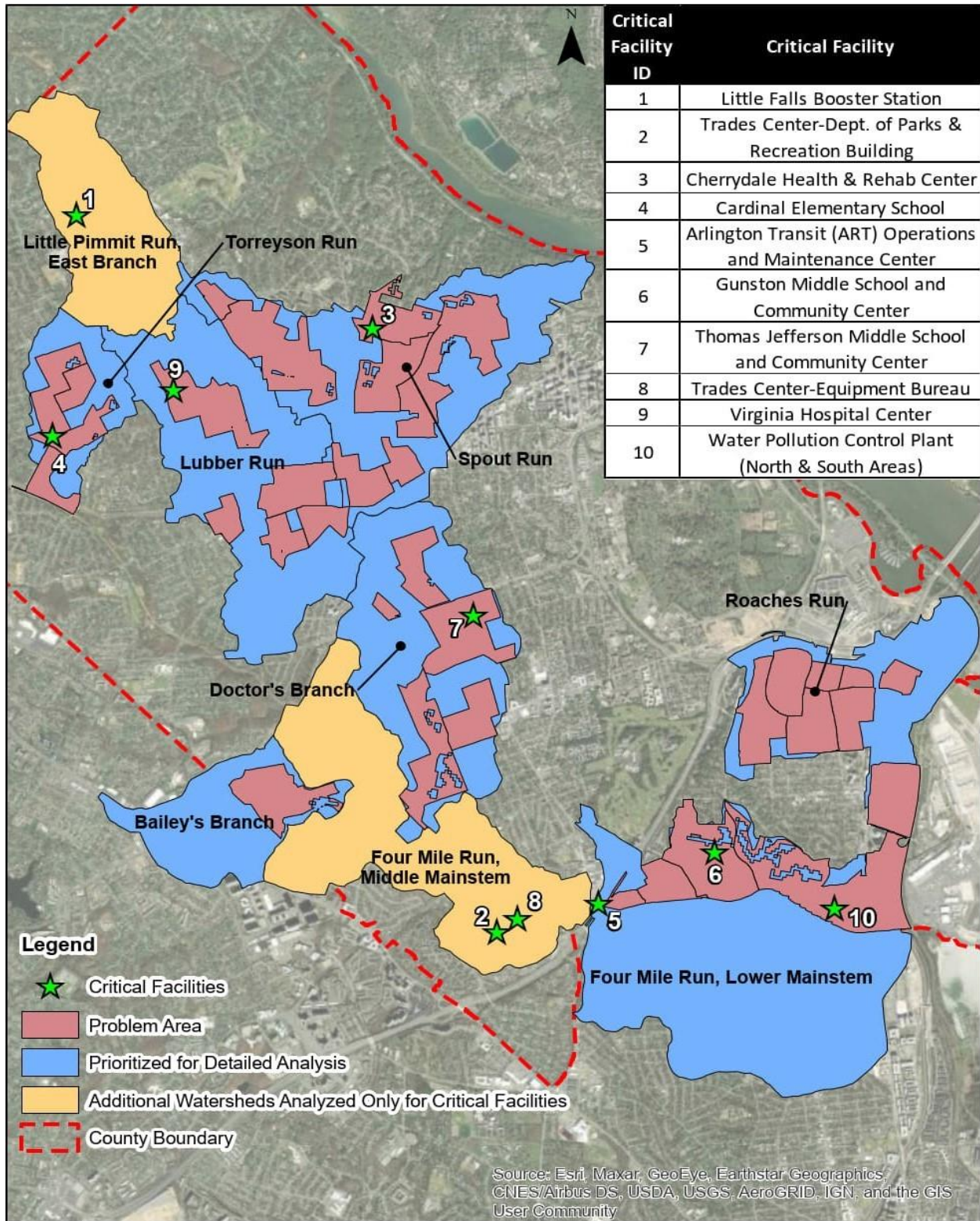
[Voluntary property acquisition](#) (County n.d.af) is one tool being used by the County to reduce flood risk, as described in the [FY25 to FY34 Capital Improvement Plan](#) approved by the County Board in July 2022 and updated in 2024 (County 2024a). The County is purchasing some properties on a voluntary basis to provide overland relief or expand the storm system capacity and reduce flood risk to the community. The County DPR and Department of Environmental Services (DES) are coordinating regarding maintenance of the lots that have been acquired. Budget has been appropriated for maintenance of these properties. The County is considering creating a new asset class in their asset inventory to account for the lots that are acquired for overland relief pathways.

[A Flood Resilient Arlington](#) provides a Story Map and other information pertaining to a range of public-private options the County is considering, including overland relief corridors and the use of available public space for storm facilities (County n.d.l).

Identification of critical facilities and their vulnerability throughout the local government such as water and sewer or other types identified as “lifelines” by FEMA.

The Flood RAMP builds on the inventory of critical facilities from the [Northern Virginia Hazard Mitigation Plan Annex 1: Arlington County](#) (County and IEM 2022) to assess those critical facilities (both public and private) that are vulnerable to flooding. Of those vulnerable to flooding, 10 were further prioritized for detailed flood risk assessments and subsequent evaluations of alternatives. A summary of the facilities that were prioritized is included in RAMP [Volume 2](#) and shown on Figure 9. A complete list of facilities identified and evaluated for vulnerability is in Appendix D, Vulnerability Assessment, in RAMP [Volume 3](#) (Jacobs 2024).

Figure 9. Arlington County Critical Facilities and Problem Areas Selected in RAMP for Detailed Risk Assessments



Identified ecosystems, wetlands, and floodplains suitable for permanent protection.

In addition to RPAs and floodplains, Arlington County has a rare magnolia bog located within a park that was protected through a flood and erosion mitigation project. The County also follows state and federal requirements for wetlands. The County has established the [Four Mile Run Restoration Master Plan](#) (R&H et al. 2006) for a living shoreline project in Four Mile Run. In addition, the County's floodplain management is integrated into the [Public Space Masterplan](#) (WRT 2019) and [Forestry and Natural Resources Plan](#) (County 2023d).

Identified incentives for restoring riparian and wetland vegetation.

The County's recently adopted stormwater utility includes a credit program described in the [Stormwater Credit Manual](#) (County 2024b). The program includes incentives (reductions in stormwater fees) for installation of stormwater facilities and voluntary actions to promote water quality and habitat. These include incentives for conservation landscaping and tree planting.

The County's [LDA process](#) requires all projects with an LDA permit to show tree conservation measures and provides credits for providing canopy trees (County n.d.s).

A framework for implementation, capacity building, and community engagement.

The County has comprehensive flood resilience public engagement and information processes for engaging the community on program implementation and capacity building; for example, the County regularly participates in meetings of the [Arlington County Civic Federation](#). At the County Manager's Office, the [Communications and Public Engagement](#) team is responsible for enterprise-wide communications and civic engagement (County n.d.g) and has developed and implemented strategies for creating knowledgeable, inclusive community leaders and networks.

About 50 standing advisory groups provide input to the [County Board](#) on a variety of issues (County n.d.i). From time to time, the Board also creates ad hoc committees and task forces for limited terms to focus on projects of immediate concern. At each January organizational meeting, the Board designates a [County Board liaison](#) to each commission (County n.d.a).

A number of groups also provide guidance to the [County Manager](#) on specific topics. Every meeting of each County advisory group is open to the public.

The County relies on the hard work of its many civic-minded volunteer commissioners to help it make decisions that benefit the community. Membership in all of these groups is voluntary. The list of commissions and advisory groups follows:

- [Alexandria/Arlington Regional Workforce Council](#)
- [Arlington Commission for the Arts](#)
- [Arlington Neighborhoods Advisory Committee](#)
- [Audit Committee](#)
- [Aurora House Citizens' Advisory Committee](#)
- [Bicycle Advisory Committee^a](#)
- [Board of Equalization of Real Estate Assessments](#)
- [Board of Building Code Appeals](#)
- [Board of Zoning Appeals^b](#)
- [Chesapeake Bay Ordinance Review Committee^a](#)
- [Child Care Initiative](#)

- [Civil Service Commission](#)
- [Clarendon Live Entertainment Group](#)
- [Climate Change, Energy and Environment Commission](#)
- [Commission on Aging](#)
- [Commission on the Status of Women](#)
- [Community Development Citizens Advisory Committee](#)
- [Community Advancing Resilience and Readiness Together^a](#)
- [Community Criminal Justice Board](#)
- Community Housing Finance Corporation Board
- [Community Oversight Board](#)
- [Community Services Board](#)
- [Crystal and Pentagon Cities Council](#)
- [Disability Advisory Commission](#)
- [Economic Development Commission](#)
- Fire Prevention Code Board of Appeals
- Fire Trial Board
- [Fiscal Affairs Advisory Commission](#)
- [Food Security Task Force](#)
- [Form Based Code Advisory Working Group^a](#)
- [Forestry and Natural Resources Commission](#)
- [Historical Affairs and Landmark Review Board](#)
 - [Design Review Committee](#)
- [Housing Commission](#)
- [Human Rights Commission](#)
- [Industrial Development Authority](#)
- [Information Technology Advisory Commission](#)
- [Joint Facilities Advisory Commission](#)
- [LGBTQIA+ Advisory Committee^a](#)
- [Military and Veterans Affairs Committee^a](#)
- [Natural Resources Joint Advisory Group](#)
- [Neighborhood Complete Streets Commission](#)
- [Park and Recreation Commission](#)
- [Partnership for Children, Youth and Families](#)
- [Pedestrian Advisory Committee^a](#)
- [Planning Commission](#)
 - [Long Range Planning Committee](#)
 - [Site Plan Review Committee](#)
 - [Zoning Committee](#)
- Police Contract Towing, Advisory Board
- Police Trial Board
- [Public Facilities Review Committee](#)
- [Social Services Advisory Board](#)
- [Sports Commission](#)

- [Tenant-Landlord Commission](#)
- [Transit Advisory Committee^a](#)
- [Transportation Commission](#)
- [Trespass Towing Advisory Board](#)

^a Membership is appointed by the County Manager (as opposed to the County Board).

^b The Board of Zoning Appeals is appointed by the Arlington County Circuit Court.

A community dam safety inventory and risk assessment posed by the location and condition of dam.

There are no high-risk dams in Arlington County.

A characterization of the community.

Refer to both the [Northern Virginia Hazard Mitigation Plan Annex 1: Arlington County](#) (County and IEM 2022) and the RAMP (Jacobs 2024) reports for detailed characterization of Arlington County's population, economics, cultural and historic resources, dependence on the built environment, and infrastructure, as well as the risks posed to infrastructure.

The [RAMP](#) (2024) and the [Stormwater Master Plan](#) (County 2014) include descriptions of flooding from climate change, riverine flooding, sea level rise, tidal events, or storm surges and other weather.

The [Arlington County Profile](#) (CPHD 2024) provides a comprehensive profile of the County. The Arlington County Profile is an annual report providing statistical information including demographics, development, employment, transportation, community resources, and more. The Profile has been updated for 2024 and includes data topics, key facts and takeaways, and planning corridor statistics.

- [Profile 2024](#) (CPHD 2024a)
- [Profile 2024 Interactive Summary by Planning Corridor](#) (County 2024b) highlights population and housing statistics by planning corridor. Refer to the three dashboard pages:
 - Population, Housing, and Jobs by Corridor
 - 2023 Development Activity
 - Office and Residential Land Use by Corridor
- [Profile open data](#) (County n.d.v)

For more information about Arlington's history, amenities, and highlights, refer to [Arlington Fast Facts](#) (County n.d.b).

Strategies to address other natural hazards, where applicable, that would cause, affect, or result from flooding events, including the following:

- Earthquakes: The County conducts an earthquake drill every year through public convocations such as the [Great Southeast Shakeout Day](#) (County n.d.n).
- Storage of hazardous materials: The [Help With Hazardous Materials](#) webpage provides information about hazardous materials storage and permits. The Hazmat Team includes firefighters and paramedics (County n.d.p).

- Landslides, mud, debris flow, and rock falls: The Construction Pollution Prevention webpages provide information about handling debris (County n.d.f). Landslides are not applicable to Arlington County.
- Dam failures: There are no high-hazard dams in Arlington County.
- Wildfires: Prevention of wildfires that would result in denuded lands making flooding, mudslides, or similar events more likely is handled by the [Fire Prevention Office](#) (County n.d.k). Arlington County has regulations on outdoor burning, fireworks, and similar activities that are intended to prevent wildfires. The [Northern Virginia Hazard Mitigation Plan Annex 1: Arlington County](#) lists wildfires as a low risk for Arlington County (County and IEM 2022).
- Severe weather: Through the [Department of Public Safety Communications and Emergency Management \(PSCM\)](#), Arlington County maintains its mission to be prepared for emergencies and respond effectively. PSCM oversees and coordinates emergency [Plans and Resources](#), engages with the community to [prepare for an emergency or disaster](#), and operates the Emergency Communications Center (9-1-1 Center) and [Arlington Alert](#) program, which sends alerts about local traffic, hazardous weather, major events, and more.

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Appendix A
Construction Certificate Management
Procedures under NFIP Community Rating
System



National Flood Insurance Program Community Rating System

Construction Certificate Management Procedures

Arlington County, Virginia

July 2024

The **Department of Environmental Services (DES), Development Services Bureau, and the Department of Community Planning and Housing (CPHD), Inspection Services Division (ISD)** are responsible for the administration of permitting, inspection, and review of all construction, along with the management and maintenance of all building permit files and administrative documents (building guides, applications, forms, etc.) related to building and development. All inspections and permit/plan reviews are conducted by these two departments, as well as all permit approvals.

Currently, all building permit applications are automatically screened by DES to determine if the parcel is located within a Special Flood Hazard Area, or within 15 ft. (in the landward direction). If it is determined that a parcel is within a Special Flood Hazard Area, the application is routed to DES for review and approval.

The purpose of this document is to explain the County's administrative procedures for review of Elevation Certificates and all other required floodplain-related construction certificates including, but not limited to, Floodproofing Certificates, and engineered flood opening certificates. These procedures outline the guidelines for the submittal of required certificates; the responsibilities of reviewing agencies; the location where the certificates and other related documents are to be stored/archived; and the process for making such certificates available to the public.

TYPES OF CERTIFICATES REQUIRED

Section 48-55 of the Arlington County Floodplain Ordinance requires that new construction and/or substantial improvements to existing structures must maintain a minimum 15-foot setback from a Special Flood Hazard Boundary as follows:

- A. *All new construction of and substantial improvements to residential structures shall be set back fifteen (15) feet horizontally in the landward direction from the location of the base flood elevation boundary.*
- B. *All new construction of and substantial improvements to nonresidential structures shall be set back fifteen(15) feet horizontally in the landward direction from the location of the base flood elevation boundary, unless such structures are floodproofed.*

New commercial construction; substantial improvements to an existing structure; or repairs to a substantially damaged building to be floodproofed in accordance with paragraph B. above, will require a submission to the Inspection Services Division of an Elevation Certificate, and any other applicable floodplain-related certificate such as a Floodproofing Certificate for Non-Residential Structures, and a certification of engineered flood openings for the development.

CERTIFICATE SUBMITTAL REQUIREMENTS

The applicant shall submit an Elevation Certificate with the building permit application. The Elevation Certificate will be reviewed to determine if the proposed design complies with the Arlington County Floodplain Ordinance, Chapter 48, of the Arlington County Code.

Once construction of the building is completed, and all adjacent site grading is finalized, a certified Finished-construction Elevation Certificate must be submitted by the applicant showing the “as-built” characteristics of the building. A Finished-construction Elevation Certificate must be submitted, reviewed, corrected (if necessary), and approved by the County before a **certificate of occupancy or final approval of the building permit** is issued. At this point, all other required certificates must also be submitted and reviewed.

If a Floodproofing Certificate for Non-Residential Structures is required for a floodproofed non-residential building, an Elevation Certificate is not required for purposes of the National Flood Insurance Program (NFIP). A complete and certified Floodproofing Certificate must be submitted through the Arlington Permit Online Portal upon completion of construction before making a request for issuance of a certificate of occupancy.

When engineered flood openings are installed in the foundation of a building, and the Elevation Certificate indicates that they were installed (Sections A8d and A9d on the Elevation Certificate), an Engineered Opening Certification must be submitted with the Elevation Certificate to verify compliance and the insurance rate. The developer must submit either the International Code Council® Evaluation Service (ICC-ES) form for the engineered opening, or an individual certification. Individual certifications must include the following, at a minimum:

- 1) An identification of the building (address) containing the installed engineered openings.
- 2) The certifying professional’s name, title, address, type of license, the state issuing the license, signature, and seal.
- 3) A statement certifying the design of the openings will automatically equalize hydrostatic flood loads on exterior walls by allowing for the automatic entry and exit of floodwaters; and
- 4) A description of the range of flood characteristics tested or computed for which the certification is valid, such as rates of rise and fall of floodwaters.

REVIEW OF ELEVATION CERTIFICATES

All finished-construction Elevation Certificates shall be submitted through the **Online Arlington Permit Portal**. If the certificate is for an address located within the SFHA or the 15 ft. setback in the County’s tracking system, it will be forwarded to the **DES - Development Services Bureau** for review of any associated supporting documentation compliance.

Upon receipt of the Elevation Certificate, **DES - Development Services Bureau** will review the permit application for approval. A **final building permit** will not be issued until the Elevation Certificate and supporting documentation are approved.

DES INTERNAL REVIEW PROCESS

1. DES will review Elevation Certificates, and Finished Construction Elevation Certificates for minimum form submittal criteria requirements within ten business days of submittal to ensure required forms are completed correctly.

2. Resubmittal of an Elevation Certificate, or a Finished Construction Elevation Certificate containing inaccurate or incomplete information in Section C2, or other parts of the form, may/will be required before formal review and approval.
3. Upon completion of a certificate review, DES will provide the applicant written comments and approval conditions.
4. Comments and approval conditions may be provided in a separate document/memo.
5. Comments and approval conditions may also be included in Section G of the form.
6. DES review of an Elevation Certificate or the Finished Construction Elevation Certificate will be done within ten (10) business days after staff confirms all minimum submittal criteria and information on the respective form has been met.
7. DES will not sign off on the approval of a building permit until the review and approval of either certificate above is completed.

COUNTY STORAGE AND MAINTENANCE OF CERTIFICATES AND ASSOCIATED DOCUMENTS

Elevation Certificates and associated documents and permits, other required construction certificates, and related permit application documentation, will be stored Online in the County’s **Onbase Permitting Archives** as prescribed by State and County records retention policies and practices.

AVAILABILITY OF CERTIFICATES AND RELATED DOCUMENTS REQUESTED BY THE PUBLIC

Requests by the public for a copies of Elevation Certificates, Finished Construction Elevation Certificates, or any other related documents can be made by filing a Virginia FIOA request through the County’s online **FOIA request portal** using this link: [Freedom of Information Act \(FOIA\) – Official Website of Arlington County Virginia Government \(arlingtonva.us\)](https://www.arlingtonva.us/foia) The County will respond to a FOIA request within five (5) business days of receiving such request. If the County’s response will require more time than the five-day period, the County may exercise its allowed option for an extension of seven (7) additional business days to prepare and return a response. The requestor will be informed in writing should an extension be necessary.

FOIA responses may include charges associated with the research, production, and reproduction of requested documents. Applicable exemptions may apply.

ACKNOWLEDGEMENTS:

<i>Luis D Araya</i>	7-26-24
Luis Araya, Chief, DES-Development Services Bureau	Date

<i>Shahriar Amiri</i>	7/26/2024
Shahriar Amiri, Chief building official, CPHD, Inspection Services Division	Date