

1958 - CID515519_Alexandria_CFPF

Application Details

Funding Opportunity:	1446-Virginia Community Flood Preparedness Fund - Capacity Building/Planning Grants - CY23 Round 4
Program Area:	Virginia Community Flood Preparedness Fund
Application Status:	Under Review
Stage:	Final Application
Organization:	ALEXANDRIA, CITY OF
Applicant:	Jessica Lassetter
Internal Status:	
Initial Submit Date:	Nov 9, 2023 4:04 PM
Initially Submitted By:	Jessica Lassetter
Last Submit Date:	
Last Submitted By:	

Tasheem Crosby

Review Details

Round:	1
Reviewer:	Tasheem Crosby
Type:	Internal
Role:	Primary
Review Status:	Submitted
Submitted Date:	Nov 20, 2023 11:58 AM
Score:	260.00

Capacity Building & Planning Scoring Sheet - Round 4

Eligibility and Scoring

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)?

Yes = Eligible for consideration

No = Not eligible for consideration

Local Government*: Yes

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

Yes = Eligible for consideration under all categories

No = Eligible for consideration for studies, capacity building, and planning only

Resilience Plan*: No

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

Yes = Eligible for consideration

No = Not eligible for consideration

Letters of Support*: Yes

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

Yes = Not eligible for consideration

No = Eligible for consideration

Previously Funded*: No

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

Yes = Eligible for consideration

No = Not eligible for consideration

Evidence of Matching Funds*: Yes

Is the project eligible for consideration?

Yes = Eligible for consideration

No = Not eligible for consideration

Project Eligible for Consideration*: Yes

Eligibility Comments:

City developing a new resilience plan. Requirements have been met for eligibility based on attached documents and info that were included.

Eligible Capacity Building and Planning Activities (Select all that apply) ? Maximum 100 points.

Development of a new resilience plan - 95 points

Rewrites to existing resilience plans and modifications to existing comprehensive and hazard mitigation plans - 60 points

Resource assessments, planning, strategies and development - 40 points

Policy management and/or development - 35 points

Stakeholder engagement and strategies - 35 points

Goal planning, implementation and evaluation - 25 points

Long term maintenance strategy - 25 points

Other proposals that will significantly improve protection from flooding on a statewide or regional basis approved by the Department - 15 points

Capacity Building and Planning*: 100.00

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) - 10 Points

High Social Vulnerability (1.0 to 1.5) - 8 Points

Moderate Social Vulnerability (0.0 to 1.0) - 5 Points

Low Social Vulnerability (-1.0 to 0.0) - 0 Points

Very Low Social Vulnerability (Less than -1.0) - 0 Points

Socially Vulnerable*: Low Social Vulnerability (-1.0 to 0.0)

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

(If Yes - 5 Points | If No - 0 Points)

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.

(If Yes - 5 points | If no - 0 points)

Low-Income Geographic Area*: No

Does this project provide ?community scale? benefits?

More than one census block - 30 points

50-100% of census block - 25 points

25-49% of census block - 20 points

Less than 25% of census block - 0 points

Community Scale Benefits*: More than one census block

Scoring Comments:

Resilience plan is city-wide and will benefit the entire community. No low-income geographic areas and low social vulnerability.

Project Total Score*: 130

Special Conditions:

City of Alexandria Flood Resilience Plan
Community Flood Preparedness Fund Round 4 Application

Appendix C: Checklist All Categories -- Capacity Building and Planning

1) A link to or a copy of the current floodplain ordinance

The City's current floodplain ordinance is found under [ARTICLE VI. - SPECIAL AND OVERLAY ZONES, Sec. 6-300 - Floodplain district.](#)

Link: https://library.municode.com/va/alexandria/codes/zoning?nodeId=ARTVISPOVZO_S6-300FLDI

Appendix C: Checklist All Categories -- Capacity Building and Planning

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

The *Flood Resilience Plan* does not require physical maintenance. However, measures are in place to ensure the plan is executed. First, the City has an established Flood Action Alexandria program administered jointly by Transportation & Environmental Services and Department of Project Implementation. The program is responsible for executing the approved *Flood Resilience Plan* and is funded by the City's dedicated Stormwater Utility Fee, effective since 2018. Second, the City plans to provide an official public comment period for the *Flood Resilience Plan* and bring the Plan to Council for adoption. With adoption and public input, the City has the authority and obligation to move forward with executing the plan. Finally, T&ES and DPI have forged relationships with other City Departments and staff as well as the community at-large, which is imperative to ensuring programmatic longevity and focus on this effort to help build flood resilience in Alexandria. Other City departments will remain involved in the execution including Office of Emergency Management; Office of Climate Action; and Office of Race and Social Equity

City of Alexandria Flood Resilience Plan
Community Flood Preparedness Fund Round 4 Application

Appendix C: Checklist All Categories -- Capacity Building and Planning

- 3) *A link to or a copy of the current comprehensive plan*

The City's Master Plan is available at <https://www.alexandriava.gov/small-area-plans/basic-page/city-alexandria-master-plan>

One Independence Mall
615 Chestnut Street, 6th floor
Philadelphia, PA 19106-4404



FEMA

August 4, 2023

The Honorable Justin Wilson
Mayor
City of Alexandria
301 King Street
Alexandria, Virginia 22314

Community: City of Alexandria,
Virginia
PDC: Northern Virginia
Plan Adoption Date: 06/13/2023
Plan Approval Date: 02/23/2023
Plan Expiration Date: 02/22/2028

Dear Mayor Wilson:

I am pleased to tell you that FEMA has approved your Hazard Mitigation Plan (HMP). The plan meets the requirements of Title 44, Chapter 1, Section 201.6, of the Code of Federal Regulations ([44 CFR 201.6](#)). It addresses the required elements: planning process, risk assessment and hazard identification, mitigation strategy, maintenance and implementation, and adoption.

Your HMP also met the requirements to address all dam risks, based on the Fiscal Year 2022 Rehabilitation of High Hazard Potential Dams (HHPD) Notice of Funding Opportunity.

Participating communities are now eligible for FEMA non-emergency assistance and mitigation grants from the following programs:

- [Hazard Mitigation Grant Program \(HMGP\)](#)
- [Building Resilient Infrastructure and Communities \(BRIC\)](#)
- [Flood Mitigation Assistance \(FMA\)](#)
- [HHPD Grant Program](#)

Funding from these programs can be used for qualified mitigation planning and projects that reduce disaster losses and protect life and property from future disasters. Approved HMPs can also earn points under the [Community Rating System](#).

Within 5 years, your community must revise its plan and obtain approval to remain eligible for mitigation grant funding. You should review the plan annually to keep it relevant to the mitigation goals in your community. Please consider the enclosed recommendations to further strengthen your plan during its next update.

I commend you and the planning team for your hard work and continued commitment to building a safer, more resilient community. For questions about your plan or mitigation grant funding, please contact Debbie Messmer, State Hazard Mitigation Officer, at (804) 897-9975.

Sincerely,



Sarah Wolfe, Branch Chief
Floodplain Management and Insurance Branch
FEMA Region 3

Enclosure

cc: Debbie Messmer, State Hazard Mitigation Officer, VDEM
 Robert Hoffower, Disaster Response and Recovery Officer, Region 7, VDEM
 Jake Kezele, Chief Regional Coordinator, Region 7, VDEM
 Katie Kitzmiller, Deputy Emergency Management Coordinator, Prince William County



Northern Virginia Hazard Mitigation Plan
Annex 2: City of Alexandria

November 2022



City of Alexandria Overview

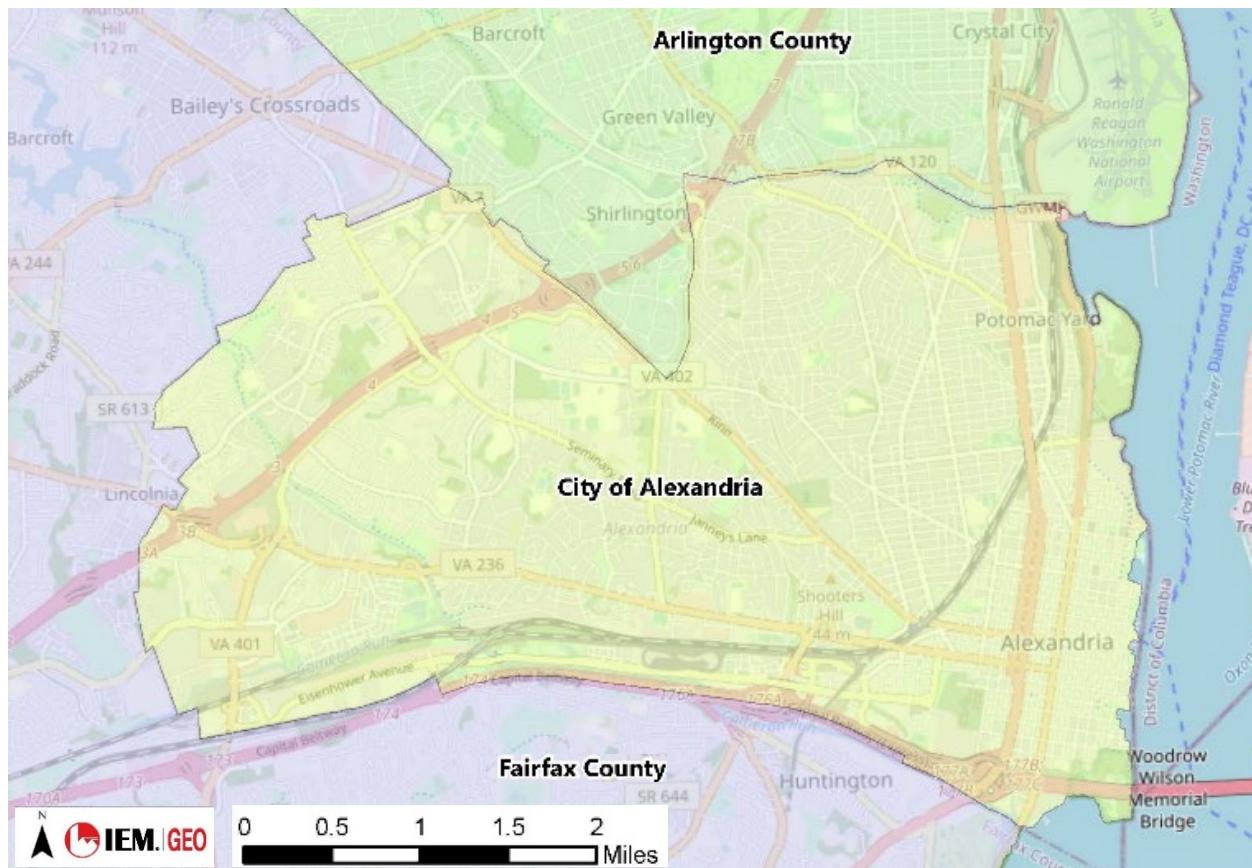


Table 1: Specific Jurisdictional Data

ESTABLISHED	LAND AREA	2020 POPULATION	GOVERNMENT ADDRESS	HOUSEHOLDS	MITIGATION FOCUS
Founded in 1749, Incorporated Independent City in 1870	15.75 sq. mi.	159,467	301 King Street, Alexandria, VA 22341	71,289	Flood/Flash Flood

City of Alexandria 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

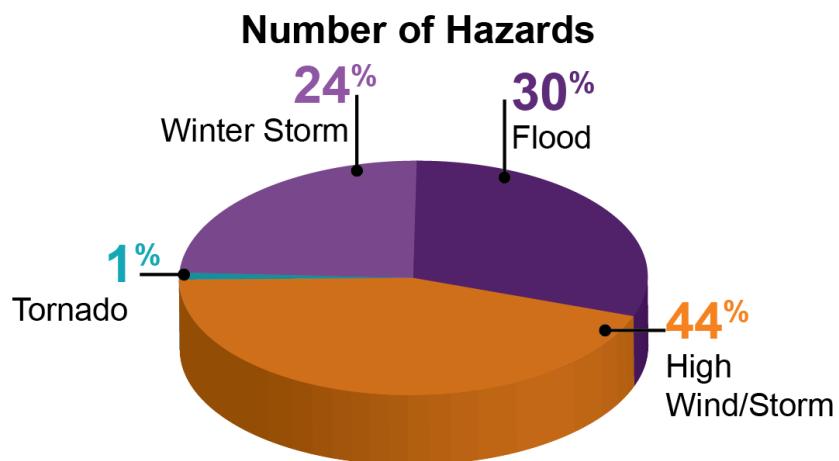


Figure 1: Percentage of Hazards

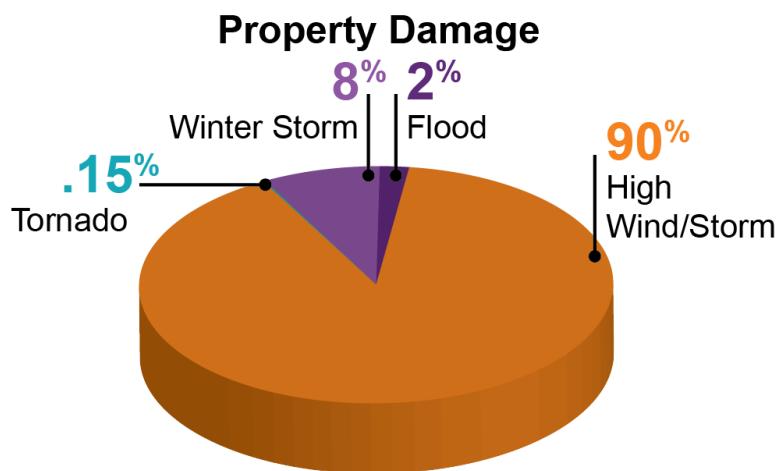


Figure 2: Reported Property Damage Percentages from Natural Hazard Events¹

¹ NOAA, National Centers for Environmental Information, Storm Events Database, 1950 – June 30, 2021.

Natural Hazard Risk Ranking

Table 2: Ranking of Natural Hazards by Risk

Hazard	Hazard Ranking
Winter Weather	High
Flood	High
High Wind/Severe Storm	High
Earthquake	High-Medium
Tornado	Medium
Drought	Medium
Dam Failure	Medium
Extreme Temperatures	Medium
Wildfire	Low
Karst/Sinkhole/Land Subsidence	Low
Landslide	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	13
Food, Water and Shelter	4
Health and Medical	3
Energy	2
Communications	1
Transportation	205
Hazardous Materials	1
Education	42
Cultural/Historical	38
High Hazard Dams	0

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.



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 the City of Alexandria

Capability	Ranking
Planning and Regulatory	High
Administrative and Technical	High
Safe Growth	Moderate
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	Kevin Coleman Deputy Emergency Management Coordinator City of Alexandria 2003 Mill Rd., Suite 3100 Alexandria, VA 22314 703-746-5267 kevin.coleman@alexandriava.gov
Secondary Point of Contact	Curicè O. Paulüs Deputy Emergency Management Coordinator City of Alexandria 2003 Mill Rd., Suite 3100 Alexandria, VA 22314 703-746-5296 curice.paulus@alexandriava.gov

City of Alexandria

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

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1. Jurisdiction Profile

Established	1749
Total Land Area	15.75 sq. mi.
Geographic Region	Piedmont
Persons Per Household	2.20
Persons Per Square Mile	10,125
Median Age	36
Elevation	Near sea level (~0 feet) – 39 feet

1.1. Location

Alexandria is an independent city in the Commonwealth of Virginia in the United States. Situated along the western bank of the Potomac River, the City of Alexandria is approximately seven miles south of downtown Washington, D.C.

The historic center of Alexandria is known as Old Town. With its concentration of boutiques, restaurants, antique shops, and theaters, it is a major draw for all who live in Alexandria as well for visitors. Like Old Town, many Alexandria neighborhoods are compact and walkable. It is the seventh largest and highest-income independent city in Virginia.

Alexandria's high population density and its location along the banks of the Potomac River increase the city's vulnerability to a variety of hazards, with flooding being a major concern. In addition to snow melt and rain-related river flooding episodes, Alexandria is also subjected 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 concern.

1.2. History

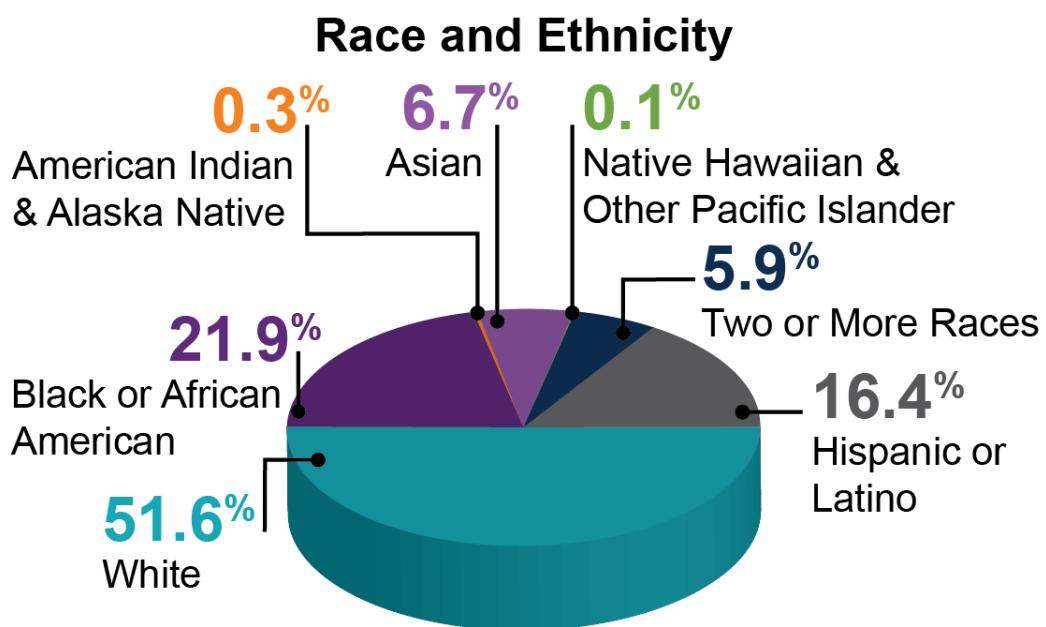
What is now the City of Alexandria was first settled as part of the British Colony of Virginia in the late 1660s. In 1791, George Washington included portions of the city in what was to become the District of Columbia. That portion was returned to Virginia in 1846 and the City of Alexandria was rechartered in 1852. In 1870, the City became independent of Alexandria County, with the remainder of the County changing its name to Arlington County in 1920.

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 the City of Alexandria was 159,467. The city is densely populated with 10,682 residents per square mile.

Table 6: Population and Growth Rate

Year	Population	Annual Percent Change
1980	103,217	
1990	111,183	7.7%
2000	128,283	15.4%
2010	139,966	9.1%
2020	159,467	13.9%

**Figure 4: Race and Ethnicity Demographics from 2020 US Census****Table 7: Economic Data**

Economy	Data
Median Household Income (2020)	\$102,227
Unemployment Rate (Nov 2020)	5.4% ²
Per Capita Income (2020)	\$64,836
Median House or Condo Market Value (2020)	\$572,900
Percentage Below Poverty (2019)	9.4%
Number of Businesses (2012)	17,540
Most Common Business (2020)	Office

² <https://fred.stlouisfed.org/series/VAALEX5URN>

Table 8: Government

Governance ³ - Independent City	Number
City Council (Mayor and Members)	7
City Boards and Commissions	70
FY 2023 Budget	\$839.2 million ⁴

Like the rest of Northern Virginia, modern Alexandria has been influenced by its proximity to the U.S. capital. It is largely populated by professionals working in federal civil service, the U.S. military, or for one of the many private companies that contract to provide services to the federal government. One of Alexandria's largest employers is the U.S. Department of Defense. Other large employers include the Institute for Defense Analyses, the National Science Foundation, and the U.S. Patent and Trademark Office.

1.4. Built Environment and Community Lifelines

The information related to Community Lifelines and critical assets in the City of Alexandria presented in this section has been collected from multiple sources, including Hazus (Version 5.0) and City government websites. Data extracted from the Hazus Level 1 assessment indicates that the City of Alexandria has an estimated total of 304 Community Lifelines and critical assets. The City of Alexandria maintains a detailed list of Community Lifeline facilities, sites, and critical assets.

Table 9: Number of Community Lifelines and Critical Assets in the City of Alexandria

Lifelines	Number of Assets
Safety and Security	6
Food, Water, Shelter	4
Health and Medical	2
Energy	2
Communications	1
Transportation	205
Hazardous Materials	1
Education	42
Cultural/Historical	38
High Hazard Dams	0

1.4.1. Safety and Security

The City of Alexandria has one fire department and three law enforcement entities (Alexandria Police Department, Alexandria Sheriff's Office, and Northern Virginia Community College Police). The Office of

³ City Manager, Alexandria, VA, Recruitment Brochure

⁴ <https://www.alexandriava.gov/Budget>

Emergency Management also maintains two City Emergency Operations Centers (one primary and one secondary).

1.4.2. Food, Water, Shelter

Food commodities are available throughout the City of Alexandria from public retail providers, wholesalers, and contracted services for specific institutions and facilities. Additional contracts may be entered into for post-disaster needs. Virginia American Water provides drinking water in the City and the City of Alexandria sewage/wastewater service entity, Alexandria Renew, has four wastewater treatment plants that service the system.

1.4.3. Health and Medical

The Hazus data identifies one health and medical facility, Inova Alexandria Hospital, offering patient care, urgent care, emergency rooms, and other healthcare services in the City of Alexandria. Additionally, an Inova HealthPlex, with a comprehensive emergency room, is scheduled to open in the fall of 2023.

1.4.4. Energy

Dominion Energy provides electric power and Washington Gas provides gas services for the City of Alexandria. Covanta also generates some electricity which is distributed through Dominion Energy.

1.4.5. Communications

Most communications and information systems and infrastructure in the United States are privately owned; however, the City maintains authority and control over public safety communications for fire, police, and other responding agencies. The City of Alexandria Department of Emergency and Customer Communications (DECC) operates a Public Safety Answering Point (PSAP); 911 calls are routed through the PSAP where call takers then dispatch emergency services. Increasing reliance on information and communications infrastructure by individuals, businesses, and government increases vulnerabilities in the event of a disruption of service.

1.4.6. Transportation

The City of Alexandria is served by the following major highways:

- Interstates 395 and 95/495
- U.S. Highway 1 north (Patrick Street)
- U.S. Highway 1 south (Henry Street)
- State Highways 7 (King Street), 236 (Duke Street), 400 (Washington Street), 401 (Van Dorn Street), 402 (North Quaker Lane), 420 (Janney's Lane), and 90005 (George Washington Memorial Parkway)

Rail and Light rail lines that serve the jurisdiction include:

- Metrorail – Blue and Yellow Lines and Metro stations: Braddock Rd., King St., Eisenhower, Van Dorn, and Potomac Yard (expected to open in the Fall of 2022) (DC Metro Area Service)
- Virginia Railway Express (Northern Virginia Regional Service)
- Amtrak (National Service)

- CSX and Norfolk Southern

The City of Alexandria offers public transit through fare-free DASH buses. Most DASH routes operate 7 days a week. The Washington Metro Area Transit Authority (WMATA) also serves the city with stops at each metro station. Private transit service is available through services such as Uber and Lyft. Other available transportation options include shared mobility devices to include bicycles and scooters located throughout the city.

The maintenance of transportation facilities and systems is the responsibility of the owner or entity with authority, including municipal, state, and federal highway departments, and agencies; toll and rail authorities; and the military.

The Hazus database notes a total of 205 transportation structures, facilities, or segments, including the following:

- Highway Bridges: 74
- Highway Segments: 60
- Railway Bridges: 13
- Railway Facilities: 2
- Railway Segments: 44
- Light Rail Facilities: 5
- Light Rail Segments: 7

1.4.7. Hazardous Materials

While there are no hazardous materials facilities or storage sites currently listed in the Hazus database, the City is aware of and has identified several sites. One of these sites includes the Norfolk Southern Ethanol Transloading facility located at the Thoroughbred Bulk Transfer terminal. Other hazardous materials considerations include:

- Transportation of hazardous materials through the city via rail transport (CSX and Norfolk Southern railways)
- Existence of Colonial and Plantation pipelines running underground through the city
- Ground transportation of hazardous materials, particularly via interstate travel

The City of Alexandria and Arlington County have an automatic aid agreement allowing seamless integration and sharing of hazardous material response resources between jurisdictions.

1.4.8. Education

The City of Alexandria Public School District has approximately 20 pre-kindergarten through grade 12 schools and educational centers. Basic educational services are also offered at the City's juvenile detention facility. Some of the colleges and satellite campuses within the City of Alexandria include:

- George Washington University Alexandria Education Center
- Global Health College
- Northern Virginia Community College – Alexandria Campus
- Stratford University – Alexandria Campus
- Virginia Polytechnic Institute and State University – Alexandria Campus

- Strayer University – Alexandria Campus
- Virginia Tech Innovation Campus (under construction, expected completion 2024)

1.4.9. Cultural and Historic Sites, and Assets

Many of the City's premier historic sites fall under the administration of the Office of Historic Alexandria, the department of City government charged with the conservation, interpretation, and promotion of these links to the past. These sites bring Alexandria's varied and storied history to life. The Department of Planning and Zoning, Historic Preservation Division oversees local historic districts and sites and provides technical preservation and architectural assistance to property owners. Alexandria's two historic districts are the Old and Historic Alexandria District (OHAD) and the Parker Gray (PG) district. The Office of Historic Alexandria also promotes historic preservation initiatives throughout the City and conducts ongoing community outreach to the public.

Over 40 Alexandria districts, sites, buildings, and structures are listed on the National Register of Historic Places (NRHP). The NRHP, managed by the National Park Service, is the U.S. official list of structures, sites, objects, and districts that embody the historic and cultural foundations of the United States owing to their special architectural, historic, archaeological, or cultural value they hold to residents and visitors.

1.5. Growth and Development Trends

With a 2020 population of 159,467, the City of Alexandria is the 7th largest city in Virginia and the 169th largest city in the United States. Alexandria is currently growing at a rate of 0.22% annually and its population has increased by 14.42% since the 2010 Census.

The City has exhibited steady population growth in recent decades, driven primarily by the number of jobs in the area, including roles in the U.S. military, the Department of Defense, and other government and private entities.

2. Jurisdiction Planning Process

For the 2022 NOVA HMP update, the City of Alexandria followed the planning process described in **Section 2, Base Plan**. In addition to providing representation to the Northern Virginia Hazard Mitigation Planning Group, the City supported the local planning process requirements by coordinating with representatives from other departments and agencies within its jurisdiction. The table below lists the employees who participated in the 2022 City of Alexandria Planning Group. The positions/titles listed may have changed since the final publishing and approval of this plan.

Table 10: Local Planning Group Participants

Name	Position/Title	Department/Agency
Kevin Coleman	Deputy Emergency Management Coordinator	Alexandria Fire Department/Office of Emergency Management
Ray Whatley	Acting Emergency Management Coordinator	Alexandria Fire Department/Office of Emergency Management
Emily A. Baker	Deputy City Manager	City Manager's Office

Name	Position/Title	Department/Agency
Yon Lambert	Director, Transportation & Environmental Services	Transportation & Environmental Services
William J. Skrabak	Deputy Director, Infrastructure & Environmental Quality, T&ES	Transportation & Environmental Services
Jesse E. Maines	Division Chief, Stormwater Management, T&ES	Transportation & Environmental Services
Karl Mortiz	Director, Planning and Zoning	Department of Planning and Zoning
Teresa Scott Hoggard	Former Deputy Emergency Management Coordinator	Alexandria Fire Department/Office of Emergency Management

The jurisdiction identified its chief hazard mitigation planning responsibility as providing oversight in the planning process and representation in the Emergency Manager's Group. The City also identified the following tasks as part of its mitigation planning responsibilities:

- Provide management support for the planning effort
- Serve as Planning Group resource/subject matter experts
- Conduct hazard risk and vulnerability assessment
- Provide technical data and hazard information
- Conduct capabilities assessment
- Develop mitigation strategies
- Sponsor mitigation actions
- Review Plan drafts and provide input
- Conduct public outreach activities
- Implement the Plan
- Maintain the Plan

The City of Alexandria planning participants coordinated primarily by means of virtual meetings during the planning process, and as needed, worked independently to carry out 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 Group 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 posting of the NOVA hazard mitigation public survey on the City's social media account and access to the draft plan for review and input.

In addition to the survey, the public was offered the opportunity to review and provide input to the Draft 2022 Plan update. Notification of the release of the Draft Plan was made through the same social media account. Documentation of the public survey and draft plan review is in [Attachment 2](#) of this annex.

3. Jurisdiction-Specific Hazard Event History

The City of Alexandria'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 snowmelt and rain-related river flooding episodes, low-lying areas of the City 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 460 recorded natural meteorological events that took place in the City between January 1, 1950 and June 2021. The City has been included in three federal emergency and disaster declarations between May 2017 and May 2021.

Table 11: Federal Disaster and Emergency Declarations (2017-2021), City of Alexandria⁵

Declaration	Date	Hazard	Assistance Type
DR 4512	Apr. 2020	Virginia COVID-19 Pandemic	PA-B
EM 3448	Mar. 2020	Virginia COVID-19	PA-B
EM 3403	Sep. 2018	Virginia Hurricane Florence	PA-B

In addition to the hazard events profiled in [Section 5, Base Plan](#), the City identified additional significant events that occurred since 2001.

Table 12: Significant Hazard Events Identified by the City of Alexandria (2001–2021)⁶

Date	Hazard	Event and Description
October 2021	Flooding	Alexandria experienced a high tidal event and concurrent period of heavy rains resulting in severe coastal flooding. The Potomac River gauge indicated moderate flood stage flooding of historic Old Town.
September 2021	Flash Flooding	This was a 10-year flood event based on the City's IDF curve. Impacts were primarily centralized around Beach Park, but heavy rainfall and flooding occurred in SE Del Ray and near Mount Vernon.
August 2021	Flash Flooding	An intense overnight storm dropped between 3 to 5 inches of rain in an hour with heavier localized rainfall. The highest rain gauge reading was at George Mason Elementary, which recorded 3.19 inches in 30 minutes and a total of 4.43 inches in an hour. Based on the City's Intensity-Duration-Frequency (IDF) curves, these rainfall totals correspond to a 200–500-year event. Primary impacts included widespread flooding, power outages, sanitary backups, and sink holes.

⁵ FEMA, Federal Disaster Declarations.

⁶ <https://www.alexandriava.gov/flood-action/severe-storm-and-flash-flood-events>

Date	Hazard	Event and Description
September 2020	Severe Thunderstorms	The September 10, 2020 rainfall event dropped approximately 2.5 to 4 inches at a rate as high as 3 inches in 10 minutes. This was an intense, regional storm that caused widespread flooding throughout Alexandria, particularly in the eastern portion, and included storm sewer line surges and sanitary backups.
July 2020	Severe Thunderstorms	Heavy rain and strong winds from a line of strong storms caused City-wide flooding and downed trees.
July 2019	Severe Thunderstorms	On July 8, Alexandria received a month's worth of rain in approximately one hour, which resulted in widespread flooding. This historic weather event caused significant damage to public facilities, roads, businesses, and homes.
September 2018	Flooding	Old Town Alexandria experienced a coastal flooding event during high tide approximately 1 week prior to anticipated Hurricane Florence impacts. While Florence did not directly impact Alexandria, receipt of any anticipated rainfall (up to 16 inches was forecasted) would have exacerbated already saturated soils and high-water levels.
June 2012	Derecho	On Friday night, June 29, 2012, a widespread derecho event traveled 700 miles across the Mid-Atlantic states. More than 1.5 million customers in the NCR lost power as a result of this event. Some Alexandrians experienced prolonged power outages, all public schools closed the following Monday, and debris was scattered across the city.
August 2011	Earthquake	A 5.8 magnitude earthquake struck near Mineral, Virginia. Alexandria experienced damage to chimneys and other buildings. In Old Town Alexandria, historic Gadsby's Tavern and City Hall sustained damage, as well as several other historic buildings.
November 2010	Thunderstorm	A tree was knocked onto a car and several six-inch limbs were also down near the intersection of Van Dorn Street and Taney Avenue.
June 2005	Lightning	An upper-level disturbance, in conjunction with a very warm, moist, and unstable airmass, caused a large outbreak of severe weather. Associated with this event was a large squall line of strong to severe thunderstorms. Damage was reported in portions of the Washington and Baltimore Metropolitan areas. Strong winds also occurred on the maritime waters of the Potomac River and Chesapeake Bay.

4. Hazard Risk Ranking

After developing hazard profiles, the City of Alexandria Planning Group 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 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 sub-sections in [Section 5, Base Plan](#), and local details are provided in the Jurisdiction Annexes. Non-natural hazard profiles are presented in [Volume II](#) of this Plan.

Table 13: 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
Flood	2.0	4.2	6.2	High
High Wind/Severe Storm	2.7	3.3	6.0	High
Earthquake	2.3	4.7	7.0	High-Medium
Tornado	1.3	4.5	5.8	Medium
Drought	2.3	3.3	5.6	Medium
Dam Failure	1.0	4.4	5.4	Medium
Extreme Temperatures	2.7	2.5	5.2	Medium
Wildfire	1.0	3.0	4.0	Low
Karst/Sinkhole/Land Subsidence	1.0	2.5	3.5	Low
Landslide	1.0	2.5	3.5	Low

Table 14: Hazard Risk Ranking Summary: Non-Natural Hazards

Hazard	Total Probability Score	Total Consequence Score	Overall Risk Score	Hazard Ranking
Infectious Disease/Public Health	3.0	5.7	8.7	High
Terrorism	1.0	5.9	6.9	High
Cyberattack	2.0	4.4	6.4	High
Civil Unrest	1.0	4.7	5.7	Medium
Communication Disruption	1.3	3.5	4.9	Medium
Hazardous Materials	1.0	3.9	4.9	Low
Active Violence	1.3	3.0	4.4	Low

Based on the hazard risk scores, the City of Alexandria evaluated the level of risk for 18 hazards: 11 natural and 7 non-natural.

Eight natural hazards were identified as high, medium-high, or medium risk hazards to which the jurisdiction is vulnerable:

- **High:** Winter Weather, Flood (riverine/flash flood), and High Wind/Severe Storm
- **Medium-High:** Earthquake (this hazard is ranked as such due to the potential for severe impacts should one of significant magnitude strike the region.)
- **Medium:** Dam Failure, Drought, Extreme temperatures, and Tornado

Five non-natural hazards were ranked as high or medium risk:

- **High:** Infectious Disease/Public Health, Terrorism, and Cyber Attack
- **Medium:** Civil Unrest and Communication Disruption

All other hazards were ranked as “low,” signifying a minimal risk to the City of Alexandria.

4.1. Additional Hazard Risk Considerations

4.1.1. Dam Failure

There are no dams located in the City of Alexandria; any effect from a dam breach would come from the Lake Barcroft dam in Fairfax County towards the northern border. The last reported failure of Lake Barcroft dam was in 1972 as a result of Hurricane Agnes.

4.1.2. Flood/Flash Flood

This table presents the number of flood events documented in the NCEI Storm Events Database, including flood, flash flood, and impacts on people, property, and crops.

Table 15: Flood/Flash Flood Events in the City of Alexandria 1950–June 30, 2021⁷

Impact	Data
Flood/Flash Flood Events	40
Direct Deaths	0
Direct Injuries	0
Property Damage	\$695,000
Crop Damage	\$0
Total Property and Crop Damage	\$695,000

4.1.3. High Wind/Severe Storm

This table presents the number of severe storm events documented in the NCEI Storm Events Database, including high wind, and impacts on people, property, and crops.

Table 16: High Wind Events in the City of Alexandria, 1950–June 30, 2021⁸

Impact	Data
High Wind and Severe Storm Events	14
Direct Deaths	0
Direct Injuries	0
Property Damage	\$4,533,000
Crop Damage	\$0
Total Property and Crop Damage	\$4,533,000

4.1.4. Tornado

This table presents the number of tornado events documented in the NCEI Storm Events Database, including tornadic wind, and impacts on people, property, and crops.

Table 17: Tornado Events in the City of Alexandria, 1950–June 30, 2021⁹

Impact	Data
Tornado Events	2
Direct Deaths	0
Direct Injuries	0
Property Damage	\$7,500
Crop Damage	\$0
Total Property and Crop Damage	\$7,500

⁷ NOAA, National Centers for Environmental Information, Storm Events Database, 1950–June 30, 2021.

⁸ NOAA, National Centers for Environmental Information, Storm Events Database, 1950 – June 30, 2021.

⁹ NOAA, National Centers for Environmental Information, Storm Events Database, 1950 – June 30, 2021.

4.1.5. Winter Weather

Table 18 presents the number of winter weather events documented in the NCEI Storm Events Database, including blizzard, heavy snow, winter storm, and winter weather.

Table 18: Winter Weather Events in the City of Alexandria, 1950-June 30, 2021¹⁰

Impact	Data
Winter Storm Events	31
Direct Deaths	0
Direct Injuries	0
Property Damage	\$405,000
Crop Damage	\$0
Total Property and Crop Damage	\$405,000

Other hazard information for the City of Alexandria is presented in the [Base Plan](#).

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

The City of Alexandria is a participant in the National Flood Insurance Program (NFIP). In addition, the City participates in the voluntary Community Rating System (CRS) program under the NFIP with a CRS Class of 6, which is associated with a 20 percent flood insurance discount for policyholders. The *Floodplain Management Plan, Progress Report*, September 2019, describes the 24 mitigation actions related to flood developed since 2006 that were presented in the 2017 NOVA HMP. These actions cover a broad range of project types, including planning and regulatory, structural, natural system protection, and public outreach and education. The Progress Report provides an update as of September 2019 for maintenance of the City's CRS program, which documents continuing progress on the implementation of these actions.

¹⁰ NOAA, National Centers for Environmental Information, Storm Events Database, 1950 – June 30, 2021.

Table 19: National Flood Insurance Program Status, City of Alexandria¹¹

Initial FHBM Identified	Initial FIRM Identified	Current Eff FIRM Date	Reg-Emer Date	CRS Entry Date	Current Eff CRS Date	CRS Class	% Disc SFHA	% Disc Non-SFHA
8/22/1969	8/22/1969	6/16/2011	6/16/2011	10/1/1992	10/1/2021	6	20	20

Table 20: NFIP Policy Status, City of Alexandria¹²

Policies In-Force	Premiums Paid	Total Coverage
1,487	\$1,375,830	\$ 479,512,900

Table 21: NFIP Status, as of September 14th, 2021

Category	NFIP Topic	Source of Information	Comments
Staff Resources	Is the Community FPA or NFIP Coordinator certified?	Community FPA	Yes. Certified Floodplain Manager (ASFPM)
Staff Resources	Is floodplain management an auxiliary function?	Community FPA	No, Primary
Staff Resources	Provide an explanation of NFIP administration services (e.g., permit review, GIS, education or outreach, inspections, engineering capability)	Community FPA	Alexandria has a Class 6 designation in FEMA's Community Rating System (CRS), First in Virginia
Staff Resources	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
Compliance History	Are there any outstanding compliance		None

¹¹ National Flood Insurance Program (NFIP) Community Status Report, as of March 31, 2022
[Community Rating System | FEMA.gov](https://www.fema.gov/national-flood-insurance-program-community-status-report)

¹² NFIP Community Status Report, as of March 31, 2022

Category	NFIP Topic	Source of Information	Comments
	issues (i.e., current violations)?		
Compliance History	When was the most recent Community Assistance Visit (CAV) or Community Assistance Contact (CAC)?		FEMA's last review of the CRS program in Alexandria was 2018; the result of the CRS Cycle Verification Visit was a confirmation of the Class 6 designation by FEMA dated February 12, 2021

5.2. Population

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 depicts the vulnerability of communities at Census tract level, by county, into 15 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, and to human-caused threats, such as toxic chemical spills.

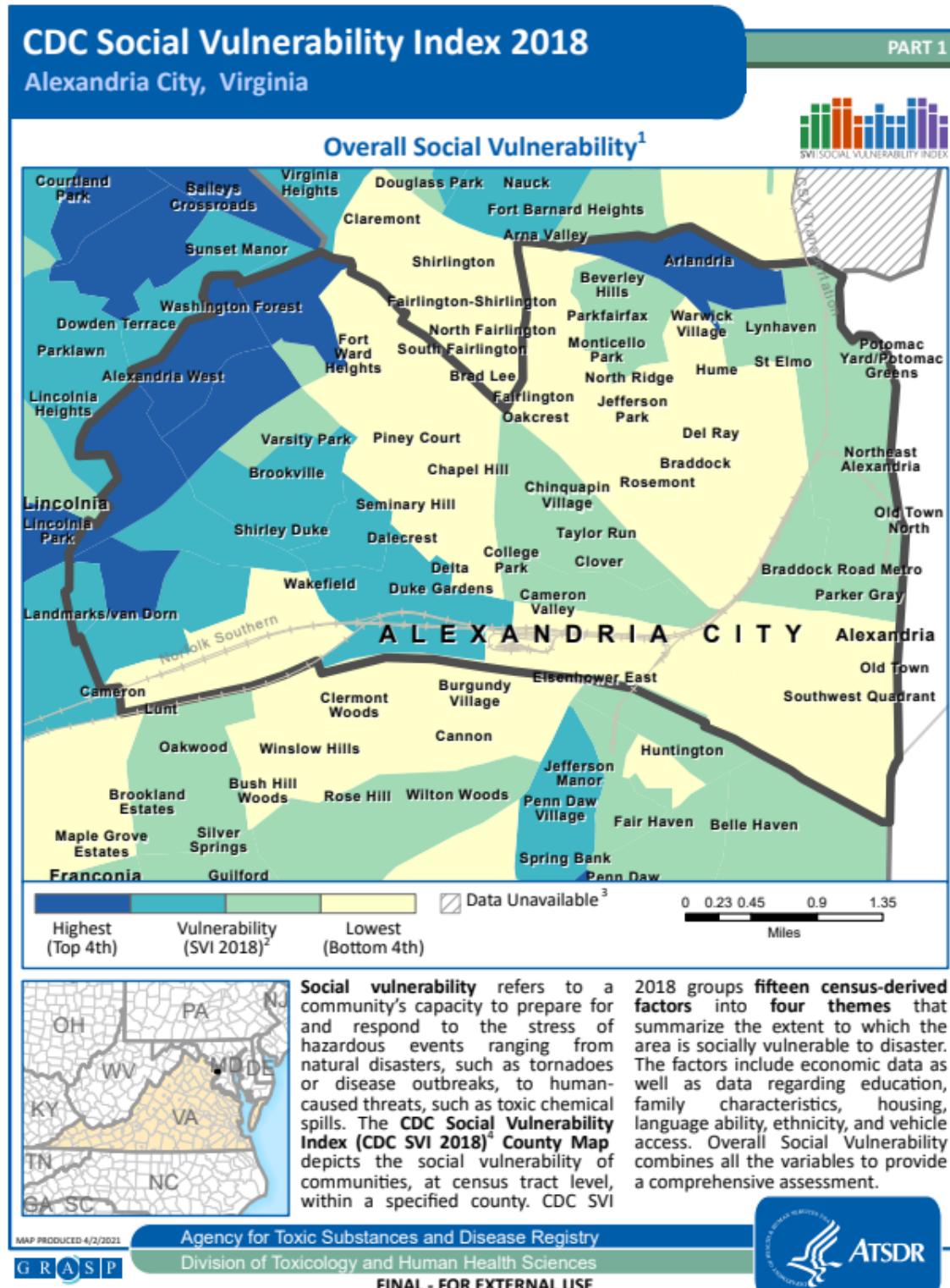
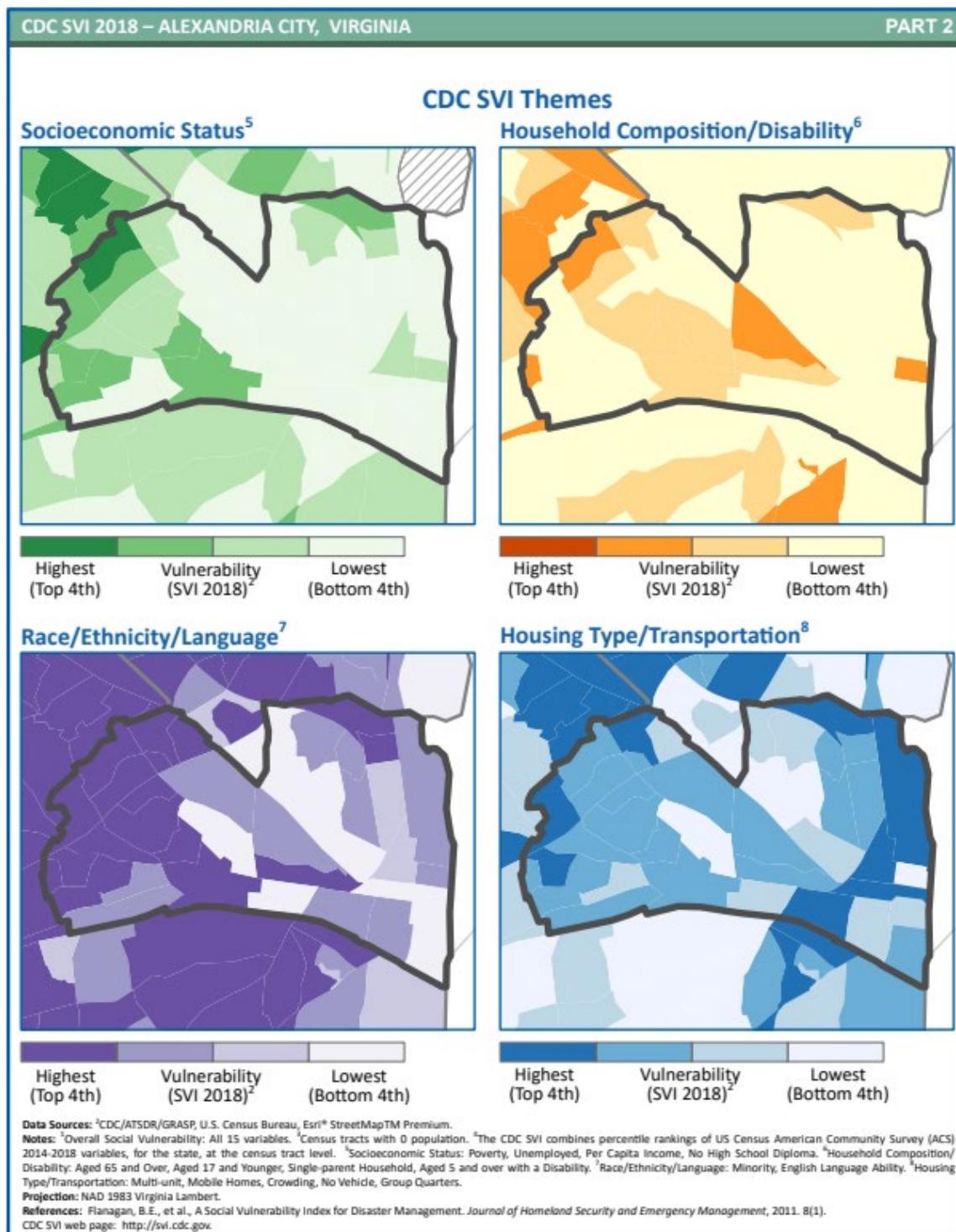


Figure 5: Overall Social Vulnerability (2018), City of Alexandria¹³

¹³ Centers for Disease Control and Prevention, Social Vulnerability Index, Virginia, 2018. Retrieved at: [Virginia2018_Alexandria_city.pdf \(cdc.gov\)](https://www.cdc.gov/niosh/corporate/svi/Virginia2018_Alexandria_city.pdf)



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Figure 6: Social Vulnerability, by Theme, City of Alexandria¹⁴

¹⁴ Centers for Disease Control and Prevention, Social Vulnerability Index, Virginia, 2018. Retrieved at: [Virginia2018_Alexandria city.pdf \(cdc.gov\)](http://svi.cdc.gov)

The themed maps illustrate the City'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.

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 winds.

Table 22: Building Stock Exposure by General Occupancy

Type	Amount
Residential	\$18,477,776,000
Commercial	\$3,608,216,000
Industrial	\$304,079,000
Agricultural	\$20,655,000
Religious	\$567,753,000
Government	\$128,869,000
Education	\$919,729,000
TOTAL	\$24,027,077,000

5.4. Community Lifelines and Assets

The City of Alexandria 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. The vulnerability of critical infrastructure is presented in the lifeline sector categories identified by FEMA. The data is extracted from the Hazus scenario models for flood, earthquake, and hurricane.

Table 23: Critical Facilities Exposed to FEMA Floodplains, City of Alexandria

Facility Type	Total Facilities	In 100-Year Floodplain	In 500-Year Floodplain
Wastewater Treatment Plants	4	2	0
Schools	42	1	2
Railway Segments	44	10	5
Highway Bridges	74	27	7
Highway Segments	60	11	3
Light Rail Facilities	5	0	4
Light Rail Segments	3	2	1
Police Stations	3	0	2
Railway Bridges	13	9	0

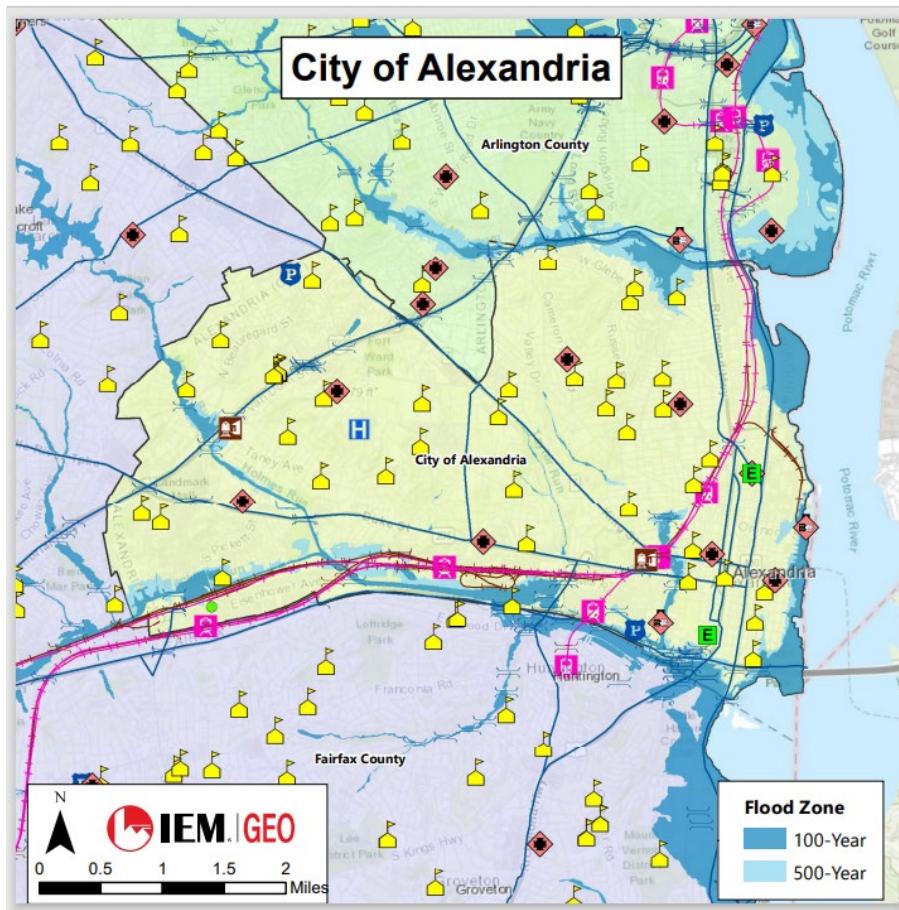


Figure 7: Critical Facilities in Flood Zones, City of Alexandria¹⁵

5.5. Environment

Information related to environmental vulnerability is presented in the hazard-specific sections of the [Base Plan](#).

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, 100-year flood event, and probabilistic hurricane wind event are identified by Hazus for specific assets.

¹⁵ FEMA Flood Insurance Rate Maps; Hazus Flood Scenarios (100- and 500-Year), August 3, 2021.

Table 24: Direct Economic Losses Related to Earthquake, Flood and Hurricane Wind

Hazard	Buildings (capital stock and income)	Transportation	Utilities
Earthquake	\$284,828,000	\$6,294,000	\$5,377,000
Flood	\$162,402,000	0	0
Hurricane Wind	\$15,168,000	0	0

5.7. Cultural/Historical

Information related to vulnerability of cultural and historical assets are presented in the hazard-specific sections of the [Base Plan](#).

Historic structures and sites 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.

Table 25: Cultural and Historic Properties Exposed to FEMA Floodplains, City of Alexandria¹⁶

Total Facilities	In 100-year Floodplain	In 500-year Floodplain
810	350	460

6. Capability Assessment

The City of Alexandria 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
 - City 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

¹⁶ City of Alexandria Planners

- 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, the City of Alexandria 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 levels 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 is generally unable to implement most mitigation actions.
- **Low:** The jurisdiction has some capabilities and can implement a few mitigation actions.
- **Moderate:** The jurisdiction has some capabilities, but improvement is needed to implement some mitigation actions.
- **High:** The jurisdiction has significant capabilities, as demonstrated by its authorities, programs, plans, and/or resources, and it can implement most mitigation actions.

Table 26: Capability Assessment Summary Ranking

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

6.1.1. Planning and Regulatory Capabilities Summary

The City utilizes the all-hazards approach when developing any jurisdictional plans, including the Emergency Operations Plan, Continuity of Operations Plan, and the Hazard Mitigation Plan.

The following plans have been newly developed or updated since the 2017 HMP:

- Comprehensive Plan
- Capital Improvements Plan
- Local Emergency Operations Plan
- Flood Action Alexandria – local website

Capability Analysis: High

Significant planning and regulatory tools are in place within the City of Alexandria and bring to light successes in integrating hazard mitigation planning with existing planning mechanisms. This demonstrates that the jurisdiction recognizes the benefit of incorporating hazard mitigation in local planning and regulatory processes such as the Comprehensive Plan, the Capital Improvement Plan, and floodplain regulations, as well as how to use these to develop and implement mitigation actions. The City recognizes improvement opportunities for updating codes and ordinances as science and information improves and continually implementing best practices based on after action reports.

6.1.2. Administrative and Technical Capabilities Summary

- Planning and Zoning staff include planners and engineers with an understanding of natural and non-natural hazards who are integrated into mitigation planning.
- Transportation and Environmental Services (T&ES) staff includes a Floodplain Manager and CRS Coordinator.
- The City maintains an Information Technology department with GIS personnel.
- City emergency management and other staff are familiar with the community's hazards.
- City administration has a grant writer who coordinates with the hazard mitigation program.

The City identified the following departments and agencies as key stakeholders in its hazard mitigation planning process and implementation of the plan.

- Code Administration
- Emergency and Customer Communications
- Emergency Management
- Fire Department
- General Services
- Health Department
- Planning and Zoning
- Police Department
- Public Works Services
- Sheriff's Office
- Transportation and Environmental Services

Capability Analysis: High

The City of Alexandria has a robust staffing capability that enables a high level of coordination for the purpose of mitigation planning and action implementation. As a result of COVID-19, the City increased its staffing levels, resulting in enhanced administrative and technical capabilities. There is a need to continue funding these positions and to provide ongoing education and training. Staffing models should be evaluated to ensure adequate response capability and current technologies should be monitored to find appropriate uses, where applicable. The City should continue to refresh training and update policies and procedures to implement best practices and lessons learned.

6.1.3. Safe Growth Capabilities Summary

- Growth guidance instruments discourage development or redevelopment in natural hazard areas.
- Transportation limits access to hazard areas.
- Environmental policies provide incentives for development located outside protective ecosystems.

Capability Analysis: High

The City of Alexandria has well-established safe growth regulatory and enforcement capabilities to limit or prevent inappropriate development in identified hazard areas and protect the natural environment. No additional enhancements are identified at this time.

6.1.4. Financial Capabilities Summary

- Capital Improvements projects: Storm management infrastructure
- Fees for water and sewer maintenance
- Federal funding: UASI, HMGP, and BRIC

Capability Analysis: Moderate

Rising operational costs and limited financial resources are an everyday challenge for most local governments. The process for identifying potential grants, developing and submitting applications, and managing grant-funded projects is both time-consuming and challenging, especially if multiple disasters are occurring simultaneously. In addition, onsite work restrictions imposed during the COVID-19 pandemic have presented challenges in staff availability and coordination. To address these shortfalls, the jurisdiction may access technical assistance available to potential applicants provided by many grant programs or expand its capabilities to develop and manage mitigation actions through contracted services. It should maintain awareness of potential grant programs and take advantage of them and evaluate effective use of budgetary funds and invest where it is most cost effective.

6.1.5. Education and Outreach Capabilities Summary

Community Rating System initiatives within the NFIP program can increase public awareness of and involvement in hazard mitigation.

- Work with local citizen groups and non-profits such as CERT and Volunteer Alexandria.
- Provide ongoing public education and information programs: community academy, and government, fire station, and police programs, for example.

Capability Analysis: Moderate

Jurisdictions have multiple opportunities to promote hazard mitigation and increase involvement of stakeholders and the public. There is a critical need to inform additional stakeholders and the public about the benefits of hazard mitigation planning and implementation. Virginia Department of Emergency Management mitigation staff can provide technical assistance to support increased jurisdictional involvement. Many hazard mitigation educational tools and materials are available from state agencies and disaster preparedness and response organizations, such as the American Red Cross, FEMA, as well as faith-based organizations with disaster response missions. It is important to locate best practices programs for educating and informing the public and capitalize on volunteer resources when implementing training programs.

6.2. Capability Summary – Activities that Reduce Natural Hazard Risk or Impacts

As a component of the capability assessment, the City of Alexandria identified activities related to each natural hazard that support risk reduction. They are listed in the following table.

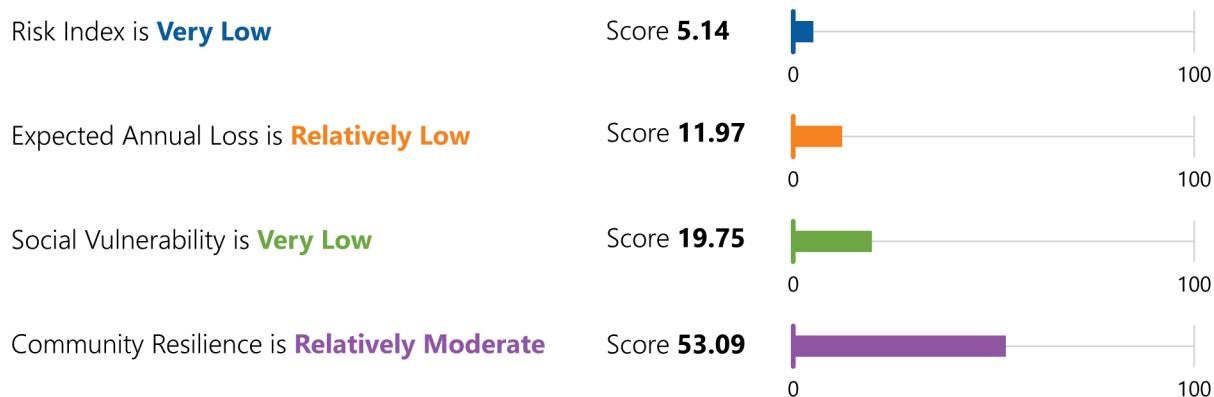
Table 27: Capability Summary – Activities that Reduce Natural Hazard Risk or Impacts

Hazard	Capability
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.
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 load 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 Storm	<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	<ul style="list-style-type: none"> Ongoing resilience planning will allow for identification and mitigation of climate change related issues in future planning cycles.

7. Resilience to Hazards

7.1. National Risk Index

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. The levels of risk are described in Figure 8.



[Community Report – Alexandria City, Virginia | National Risk Index \(fema.gov\)](#)

Figure 8: Summary of National Risk Index Findings, City of Alexandria¹⁷

Table 28: Comparison of City of Alexandria Scores with Virginia and National Average¹⁸

Index	City of Alexandria	Virginia Average	National Average
Risk	5.14	6.50	10.60
Expected Annual Loss	11.97	9.22	13.33
Social Vulnerability	19.75	35.32	38.35
Community Resilience	53.09	54.92	54.59

Table 29: City of Alexandria Risk Ranking¹⁹

Index	Rank
Risk	Very Low
Expected Annual Loss	Relatively Low
Social Vulnerability	Very Low
Community Resilience	Relatively Moderate

¹⁷ National Risk Index. Retrieved at: [Community Report - Alexandria City, Virginia | National Risk Index \(fema.gov\)](#)

¹⁸ Ibid.

¹⁹ Ibid.

The National Risk Index (NRI) is a dataset and online tool developed by the Federal Emergency Management Agency (FEMA) and other partners to help identify communities in the United States at risk for 18 types of natural hazards. Hazard risk is calculated based on data for a single hazard type and reflects the relative risk for that hazard type. However, it should be considered only as a baseline relative risk measurement for the purpose of a general comparison with the local hazard risk ranking in the Hazard Risk Ranking section of this annex. In addition, some hazards are defined differently from the hazards in this plan, so a direct hazard-to-hazard comparison of risk cannot be determined.

Based on the NRI findings, the highest five hazards by risk rating for the City of Alexandria are as follows: Winter Weather, Strong Wind, Tornado, Cold Wave (known within this plan as Extreme Cold), and Heat Wave (known within this plan as Extreme Heat). Lightning, Ice Storm, Hail, and Riverine Flooding received lower risk ratings; however, 14 of the 15 hazards rated for risk were all determined to be “very low,” with one hazard (Heat Wave) determined as “relatively low.”

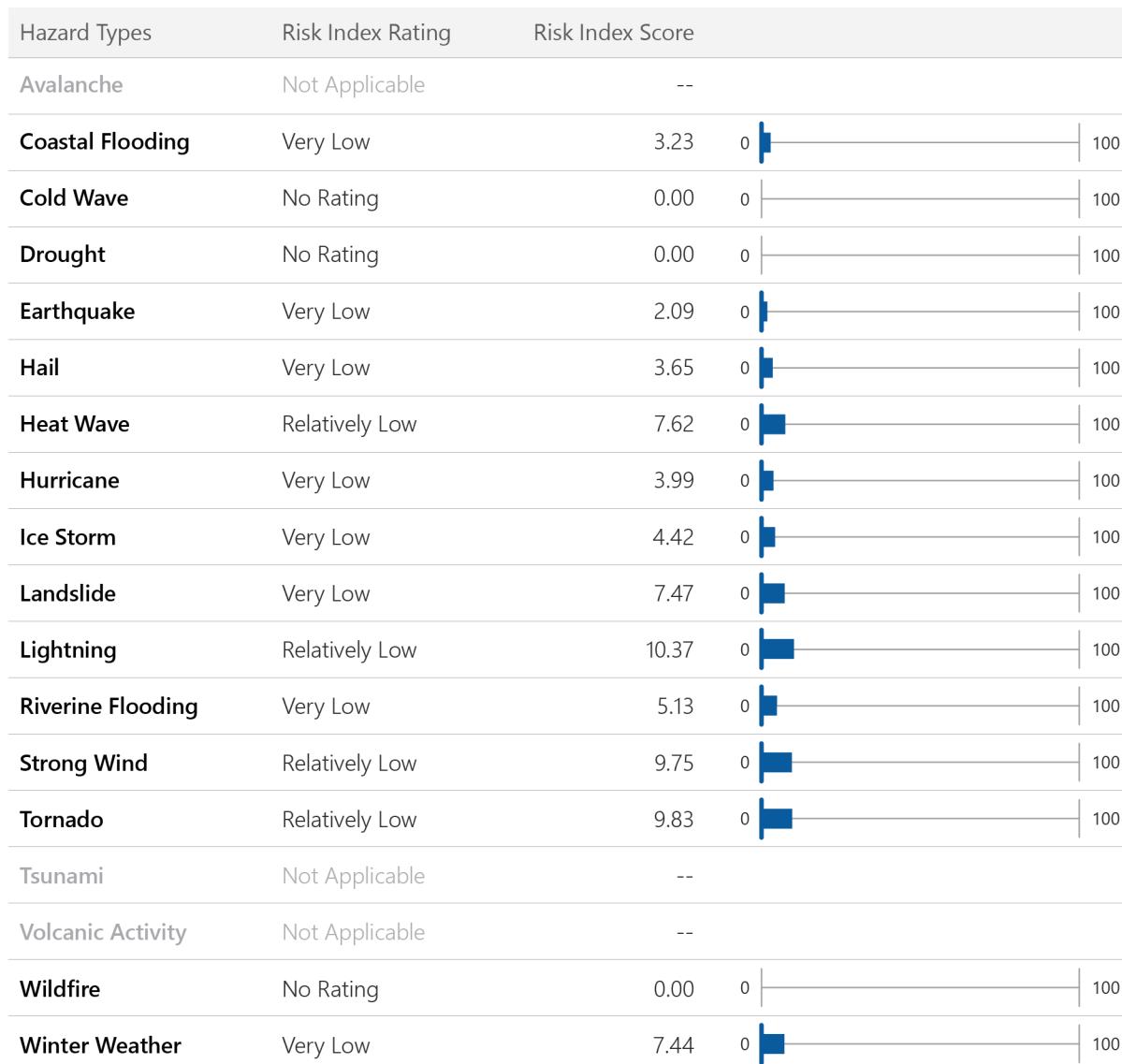


Figure 9: Hazard Type Risk Index, National Risk Index²⁰

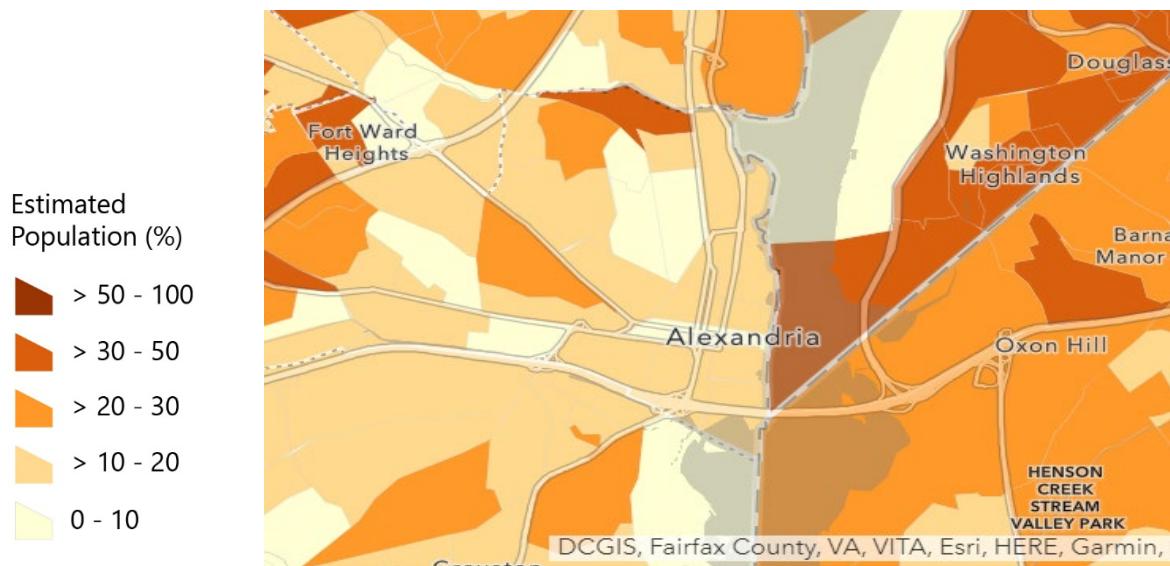
The NRI calculation does not follow the same criteria and formulas used in the hazard risk ranking methodology for this plan but is provided as a comparative measurement tool.

7.2. 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, thus providing a tool for evaluating how at-risk specific neighborhoods might be to disasters due to characteristics that potentially make specific segments of the population more vulnerable to the impacts and consequences of disasters. The ten risk factors²¹ include the following:

1. Income-to-poverty ratio
2. Single or zero caregiver household
3. Unit-level crowding
4. Communication barriers
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)



²⁰ National Risk Index, Community Report – Alexandria City, Virginia. Retrieved at: [Community Report – Alexandria City, Virginia | National Risk Index \(fema.gov\)](https://www.fema.gov/national-risk-index/community-report-alexandria-city-virginia)

Figure 10: Community Resilience Estimate, City of Alexandria²²

The estimate is categorized into three groups: zero risks, one or two risks, and three or more risks. The combination of data and analysis described in this section provides a comprehensive representation of the City's risk, vulnerability, and resilience to all hazards.

7.3. New Hazard Risk Challenges or Obstacles to be Monitored in the Next Planning Cycle

- The risk of cyber-related incidents on critical infrastructure and key resource sites
- Impacts of climate change
- Increases in the number of excessive rainfall events that impact new areas with flooding

8. Mitigation Actions

8.1. Goals and Objectives

The City of Alexandria Planning Team adopted the regional goal statement presented in **Section 8, Base Plan**.

8.2. Status of Previous Actions

The comprehensive list of previous mitigation actions, including descriptions of progress made and the current status, is presented in **Attachment 3** of this annex.

8.3. New Mitigation Actions

In addition to the actions carried forward from previous plans, the City of Alexandria Planning Team identified two new mitigation actions to include in this plan to address expansion and strengthening of the Office of Emergency Management and Homeland Security's continuity program by increasing the resilience of City operations and coordinating 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 3 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 Action Plan for Implementation and Integration describes how the City's hazard mitigation risk assessment and goals will be incorporated into its existing plans and procedures.

Table 30: Action Plan for Implementation and Integration, City of Alexandria

²² Community Resilience Estimate, 2019. Retrieved at: [2019 Community Resilience Estimates \(arcgis.com\)](https://arcgis.com)

Existing Plan or Procedure	Description of How Mitigation Will Be Incorporated or Integrated
Integrate goals into local comprehensive plan.	When the City's comprehensive emergency operations plan undergoes updates, add mitigation action goals and action items into the plan, as applicable.
Review/update land development regulations for consistency with mitigation goals.	Ensure Mitigation Goals are accounted for during annual building development review. Additionally, ensure input to the Commonwealth building code updating process reflects mitigation goals.
Review/update building/zoning codes for consistency with mitigation goals.	Ensure Mitigation Goals are accounted for during annual building development review. Additionally, ensure input to the commonwealth building code updating process reflects mitigation goals.
Maintain regulatory requirements of floodplain management program (NFIP).	This is maintained in the floodplain ordinance that has higher standards than the NFIP minimum requirements.
Enhance floodplain management through Community Rating System (CRS).	Ensure annual CRS report includes progress with mitigation goals.
Review/Update economic development plan and policies for consistency with mitigation goals.	
Continue public engagement in mitigation planning.	Continue holding events to educate the public about mitigation planning efforts during National Preparedness Month.
Identify opportunities for mitigation education and outreach.	Reach out to local NGOs to learn about potential community outreach opportunities that we can join.
Review/update stormwater plans and procedures for consistency with mitigation goals.	Mitigation goals are a review point when stormwater plans and procedures are updated.
Review/update emergency plans to address evacuation and sheltering plans.	
Maintain ongoing enforcement of existing policies.	All departments with mitigation goals consistently enforce existing policies.
Monitor funding opportunities.	Monitor for grant funding opportunities and complete budget-building process for longer term projects.
Incorporate goals and objectives into day-to-day government functions.	
Incorporate goals into day-to-day development policies, reviews, and priorities.	All departments include awareness of mitigating risks in the development of policies, reviews, and priorities.

9. Annex Maintenance Procedures

9.1. Maintenance of the NOVA HMP, Base Plan

The point of contact for the Northern Virginia Mitigation Project Team is the facilitator for the process to monitor, evaluate, and update the **NOVA HMP, Base Plan**. This facilitator is responsible for initiating the annual activities, convening the NOVA Planning Team (made up of the Emergency Managers Group and Planning Group), 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 31: City of Alexandria Plan Maintenance Responsibilities for the Northern Virginia Hazard Mitigation Plan (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 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 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 Planning Team. • Maintain records and documentation of all jurisdictional plan review and revision activities. • Help disseminate reports to stakeholders and the public.

9.2. Maintenance of the Jurisdiction Annex

In addition to maintenance of the **NOVA HMP Base Plan**, the City of Alexandria Mitigation Planning Coordinator will facilitate the method and schedule for maintaining the **Jurisdiction Annex**.

9.2.1. 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 the fifth year

Table 32: City of Alexandria Jurisdiction Annex Maintenance Procedure

Activity	Procedure and Schedule	Outcome
Monitoring the Annex	<ol style="list-style-type: none"> 1. Schedule the annual plan review with jurisdiction planning team. 2. Review the status of all mitigation actions, using the <i>Mitigation Action Implementation Worksheet</i> (Section 3, Attachment A, NOVA HMP Base Plan). 	<ul style="list-style-type: none"> • 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"> 1. Schedule the annual plan evaluation with jurisdiction planning team. 2. 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). 	<ul style="list-style-type: none"> • Submit the annual report to the NOVA HMP Planning Team Point of Contact
Updating the Annex	<ol style="list-style-type: none"> 1. Coordinate with Northern Virginia jurisdictions to identify the method and schedule for the five-year update of the NOVA HMP. 2. Participate in the planning process. 3. Provide input related to the plan components. 4. Following FEMA Approvable Pending Adoption (APA) designation, adopt the updated plan. 	<ul style="list-style-type: none"> • Adoption of the FEMA-approved plan every five years will maintain the jurisdiction's eligibility for federal post-disaster funding.

The City of Alexandria will continue to be a planning partner with multiple jurisdictions and regional entities to identify hazard mitigation opportunities that reduce the risk of the hazards identified in this plan.

10. Annex Adoption

The City of Alexandria Jurisdiction Annex will be adopted simultaneously with the adoption of the *Northern Virginia Hazard Mitigation Plan*.

11. Attachments

- Attachment 1: Adoption Resolution
- Attachment 2: Documentation of Public Participation
- Attachment 3: Mitigation Actions

11.1. Attachment 1: Adoption Resolution

[This page is a placeholder for the Adoption Resolution for this Jurisdiction]

11.2. Attachment 2: Documentation of Public Participation

The participants of the Northern Virginia All Hazards Mitigation Plan Update provided a survey link to the general public using public outreach on social media, county or city websites, and other means of outreach to their citizen for their comments and concerns about the natural and non-natural hazards that affect their area.

The survey was opened on August 8th, 2021, and closed on November 3rd, 2021, with over 1,000 responses coming in over that period of time. The City of Alexandria had 15 responses. A detailed summary of the survey is available in Appendix A of the Base Plan

There were 2 questions that got almost the same answer from everyone that took the survey, and those responses identified the natural hazard of climate change and the non-natural hazard of the pandemic to be the most concerning hazards for those who resided in the Northern Virginia Area.

A screenshot of a Facebook post from the "Office of Emergency Management, City of Alexandria, VA" page. The post, made 7 minutes ago, encourages community feedback on hazard experiences for updating the Northern Virginia Hazard Mitigation Plan. It includes a link to a SurveyMonkey survey. The SurveyMonkey interface shows a 'Create a FREE account' button and a 'What will you uncover?' section with a bar chart icon. Below the post, there's a call to action to take the Northern Virginia Hazard Mitigation Survey, powered by surveymonkey.com, and a reminder to create your own surveys for free. There are also standard Facebook interaction buttons for Like, Comment, Share, and a profile picture.

From: [Alexandria eNews](#)
To: [Kevin Coleman](#)
Subject: Public Input Wanted on Northern Virginia Hazard Mitigation Plan; Comment Period Open Through October 8
Date: Tuesday, September 13, 2022 12:05:12 PM

Public Input Wanted on Northern Virginia Hazard Mitigation Plan; Comment Period Open Through October 8

For Immediate Release: September 13, 2022

Winter weather, flooding, high wind/severe storms, and human infectious diseases are the natural disasters most likely to cause widespread economic loss and personal hardship in Northern Virginia. Public input on the draft 2022 Northern Virginia Hazard Mitigation Plan (NOVA HMP) will help identify steps needed to minimize damage from natural disasters.

The Federal Disaster Mitigation Act of 2000 requires communities to update their plan every five years to maintain eligibility for FEMA's Hazard Mitigation Assistance (HMA) grant programs. The NOVA HMP aims to minimize the long-term risk to human life and property from known hazards such as floods, winter weather high winds, and other major disasters. Hazard mitigation efforts could include projects such as flood channel clearing, road and bridge design changes, property buy-outs, building code changes, or public alert systems improvements.

The 2022 NOVA HMP is a multi-jurisdictional plan that covers the cities of Alexandria, Fairfax, Falls Church, Manassas, and Manassas Park; the counties of Arlington, Fairfax, Loudoun, and Prince William; and the towns of Clifton, Dumfries, Haymarket, Herndon, Leesburg, Lovettsville, Middleburg, Occoquan, Purcellville, Quantico, Round Hill, and Vienna. The plan update also incorporates the concerns and needs of other stakeholders.

"The City of Alexandria has experienced flooding in various parts of the jurisdiction for years, and it continues to be a hazard for our area," said Acting Emergency Manager Ray Whatley. "The Office of Emergency Management strongly encourages the Alexandria community to provide feedback on the draft NOVA Hazard Mitigation Plan to help guide future preparedness, prevention, and improvement efforts."

Community feedback and comments are currently being accepted. View the draft plan at <https://www.nvers.org/hmp>. Comments, questions, and feedback should be submitted no later than 5 p.m.

Saturday, October 8, 2022,
at NOVA2022PublicComment@iem.com.

For more information about the draft 2022 NOVA HMP, contact Deputy Emergency Manager Kevin Coleman at (703) 746-5267 or kevin.coleman@alexandriava.gov.

**For media inquiries only, contact Raytevia Evans, Senior Public Information Officer, at (703) 746-5190
or raytevia.evans@alexandriava.gov.**

###

This news release is available at alexandriava.gov/go/3954.

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- For assistance, please email enews@alexandriava.gov

12:29

5G 74%

[← Office of Emergency Management](#) **Office of Emergency Management, ...**
City of Alexandria, VA11 minutes ago · 

Your feedback on the Northern Virginia Hazard Mitigation Plan (NOVA HMP) is needed to help identify the necessary steps to minimize damage from natural disasters. Learn more about the plan and provide feedback: alexandriava.gov/go/3954



alexandriava.gov

**Public Input Wanted on
Northern Virginia Hazard ...** Like Comment Share

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Write a comment...

|||

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11.3. Attachment 3: Mitigation Actions

Table 33: Previous Mitigation Actions

Project Number	Agency/Department Mitigation Action	Lead Agency/Department/Organization	Hazard Type	Funding Source	Target Completion Date	Interim Measure of Success	Priority	Comments
2006-1	Adopt revised FIRM.	Transportation and Environmental Services	Flood, Wind, Severe Storm	Internal funding	11-May	Complete final adoption public review as prescribed by NFIP.	Critical	Completed
2006-6	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.	Transportation and Environmental Services	Flood, Wind, Severe Storm	FEMA Unified Hazard Mitigation Assistance funding,	Ongoing	Identify all priority flood-prone structures by December 2011.	Medium	Promotion of mitigation is included as part of the City's annual outreach program associated with FEMA's Community Rating System (CRS) annual recertification.
2010-3	Conduct annual outreach to each FEMA-listed repetitive loss and severe repetitive loss property owner, providing information on mitigation programs (grant assistance, mitigation measures, flood insurance information) that can assist them in reducing their flood risk.	Transportation and Environmental Services	Flood, Wind, Severe Storm	Internal funding	Ongoing	Develop outreach materials or identify appropriate outreach materials for dissemination by June 2011.	Medium	Included as part of the City's annual outreach program associated with FEMA's Community Rating System (CRS) annual recertification.

Project Number	Agency/Department Mitigation Action	Lead Agency/Department/Organization	Hazard Type	Funding Source	Target Completion Date	Interim Measure of Success	Priority	Comments
2010-4	Promote structural mitigation to assure redundancy of critical facilities, to include but not limited to roof structure improvement to meet or exceed building code standards, upgrade of electrical panels to accept generators, etc.	Emergency Management	Flood, Wind, Severe Storm	FEMA Unified Hazard Mitigation Assistance funding	Ongoing	Query local government building services staff as to effectiveness of provided information regarding the structural review.	Medium	Submitted LEMPG for generators
2010-5	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 filing form FEMA AW-501.	Transportation and Environmental Services	Flood, Wind, Severe Storm	Local program	Ongoing	Establish a schedule of review and review committee (if necessary) by June 2011.	Medium	The City's floodplain ordinance was revised in April 2011 to comply with NFIP minimum standards. The city conducted a Repetitive Loss Area Analysis in 2012. Annual report updates are published as part of the annual CRS recertification.
2010-7	Re-grade section of lower King Street, Union Street and The Strand to improve drainage and minimize flooding.	Project Implementation	Flood, Wind, Severe Storm	Alexandria Capital Improvement Project funding	Ongoing	Integrate into capital improvement budgets; complete design and permitting.	Low	Engineering Feasibility Study completed in 2013. Project now part of the Water Front Plan Implementation.

Project Number	Agency/Department Mitigation Action	Lead Agency/Department/Organization	Hazard Type	Funding Source	Target Completion Date	Interim Measure of Success	Priority	Comments
2010-8	Construct an elevated walkway along Potomac riverfront to elevation 6.0 feet (NAVD88) to mitigate flooding.	Project Implementation	Flood, Wind, Severe Storm	Alexandria Capital Improvement Project funding and developer contributions	Ongoing	Integrate into capital improvement budgets; complete design and permitting.	Low	Part of the Waterfront Plan Implementation. Design contract in place February 2016.
2016-1	Build permanent standalone EOC.	Emergency Management	All Hazards	CIP	Dec-18	Entering Phase 2 of construction process.	High	Completed
2016-2	Identify and exploit the most effective tools for communications with the public during emergencies, including leveraging emerging technologies.	Emergency Management	All Hazards	Internal funding	Ongoing	3,000 new subscribers to e-News for receipt of emergency alerts by end of 2018.	Medium	No
2016-3	Four Mile Run Stream Restoration.	Transportation and Environmental Services	Flood, Wind, Severe Storm	Internal funding	Nov-18	Complete final adoption public review as prescribed by NFIP.	High	Project completed.
2016-4	Litter control infrastructure to provide a capture area for debris before it flows into the Potomac River.	Recreation, Parks, Cultural Activities	Flood	Alexandria Capital Improvement Project funding with matching funds from Arlington County	Nov-18		Medium	Approved FY 2017 - FY 2026 CIP. Page 126

Project Number	Agency/Department Mitigation Action	Lead Agency/Department/Organization	Hazard Type	Funding Source	Target Completion Date	Interim Measure of Success	Priority	Comments
2016-5	Excavate sediment from channel bed of Cameron Run - I495 bridge to upstream, as needed.	Transportation and Environmental Services	Flood	City of Alexandria CIP	Ongoing	Secure funding for project by March 2011	High	The City does excavate sediment from Cameron Run starting at the I495 bridge to upstream as needed.

Table 34: New Mitigation Actions

Project Number	Agency/Department Mitigation Action	Lead Agency/Department/Organization	Hazard Type	Funding Source	Target Completion Date	Interim Measure of Success	Priority	Comments
2022-1	Identify and exploit the most effective tools for communication and coordination with all internal agencies and stakeholders in the EOC.	Emergency Management	All Hazards	Internal funding	Ongoing		Medium	
2022-2	Alexandria Flood Action Initiative	Transportation and Environmental Services	Flood, Wind, Severe Storm	Alexandria Operating Budget	Ongoing	Communication and engagement of the community for flooding related information, large stormwater capital infrastructure projects, small stormwater spot improvement projects, updates on maintenance activities, grant programs, etc.	High	Initiative to provide improved communications to the community and consolidate improvements to city infrastructure, including maintenance activities, storm sewer capital improvements, and flood early warning. Serves as a portal to stormwater and flooding related activities citywide.
2022-3	Public Flood Watch Rain Gauge Portal	Transportation and Environmental Services	Flood	Alexandria Operating Budget	Ongoing	Publicly available on October 1, 2021	High	Part of the Flood Action initiative for engagement. Allows anyone to view near real-time rainfall and monitor storms as they move through the city, providing residents an early-warning in the case of extreme rainfall.

Project Number	Agency/Department Mitigation Action	Lead Agency/Department/Organization	Hazard Type	Funding Source	Target Completion Date	Interim Measure of Success	Priority	Comments
2022-4	E Glebe & Commonwealth & Ashby Storm Sewer Capacity Project	Transportation and Environmental Services	Flood	Alexandria Capital Improvement Program funding	25-Mar	When contracts executed for Design & Construction.	High	Major storm sewer infrastructure capacity improvement in the Four Mile Run Watershed.
2022-5	Hooffs Run Timber Branch Bypass.	Transportation and Environmental Services	Flood	Alexandria Capital Improvement Program funding	25-Mar	When contracts executed for Design & Construction.	High	Major storm sewer infrastructure capacity improvement in the Hooffs Run Watershed.
2022-6	Hume Ave Inlets & Check Valve.	Transportation and Environmental Services	Flood	Alexandria Capital Improvement Program funding and ARPA funding	22-May	When contracts executed for Design & Construction.	High	Local storm sewer system spot improvement. Addresses inlet capacity at the curb and installs a check valve to improve local neighborhood drainage in flood prone neighborhood.
2022-7	Hume Ave Storm Sewer Bypass.	Transportation and Environmental Services	Flood	Alexandria Capital Improvement Program funding and ARPA funding	23-Mar	When contracts executed for Design & Construction.	High	Local storm sewer system spot improvement. Addresses storm sewer capacity with a new pipe alignment to improve local neighborhood drainage in flood prone neighborhood.

Project Number	Agency/Department Mitigation Action	Lead Agency/Department/Organization	Hazard Type	Funding Source	Target Completion Date	Interim Measure of Success	Priority	Comments
2022-8	Mt Vernon Ave cul de sac Storm Sewer Improvements.	Transportation and Environmental Services	Flood	Alexandria Capital Improvement Program funding and ARPA funding	23-Mar	When contracts executed for Design & Construction.	High	Local storm sewer system spot improvement. Addresses inlet capacity with new inlets, storm sewer extension, and check valves to improve local neighborhood drainage in flood prone neighborhood.

RESOLUTION NO. 3195

A RESOLUTION TO SUPPORT A GRANT APPLICATION TO THE VIRGINIA COMMUNITY FLOOD PREPAREDNESS FUND PROGRAM TO DEVELOP A FLOOD RESILIENCE PLAN

WHEREAS, the City Council of the City of Alexandria desires to apply for an allocation of funds from the Virginia Department of Conservation and Recreation (DCR) of up to \$525,000 for the Round 4 Virginia Community Flood Preparedness Fund (CFPF) grant; and,

WHEREAS, the City of Alexandria hereby supports this application for an allocation of \$525,000 through the DCR CFPF grant program.

**NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL
OF ALEXANDRIA, VIRGINIA**

That the City Council of Alexandria, Virginia:

1. Endorses this application for an allocation of \$525,000 through the Round 4 Virginia Community Flood Preparedness Fund (CFPF) grant.
2. Grants authority for the City Manager to execute project administration agreements for any approved revenue sharing projects.
3. Commits to fund its local share of the development of the Flood Resilience Plan in accordance with the cost estimate.

Adopted: October 24, 2023



JUSTIN WILSON MAYOR

ATTEST:



GLORIA A. SITTON, CMC CITY CLERK

Ms. Angela Davis, C.F.M.
State NFIP Coordinator/Lead Floodplain Program Planner
Virginia Department of Conservation and Recreation
600 East Main Street, 4th floor
Richmond, VA 23219

November 8, 2023

Dear Ms. Davis,

On behalf of the City of Alexandria's Ad Hoc Stormwater Utility and Flood Mitigation Advisory Group (Advisory Group), we would like to express our support for their application to the Community Flood Preparedness Fund (CFPF) Round 4 'Capacity Building and Planning' category to develop a city-wide Flood Resilience Plan.

The new Flood Resilience Plan will include hazard identification, flood mitigation, flood preparedness and response, policies and regulations, funding strategies and communication and information dissemination.

The Flood Resilience Plan will guide the Flood Action Alexandria program which formed in 2021 on the heels of severe storm events causing significant flooding over three separate occasions in a span of only 14-months. This program has made significant progress on several fronts across the community. The development of a comprehensive Flood Resilience Plan is the next logical step.

Established in fall 2021, the Advisory Group is comprised of nine appointed members and a City Council Representative; many of whom have been personally affected by flooding. The Advisory Group will be engaged in the development of the Flood Resilience Plan throughout the entire process and looks forward to providing guidance and input from a community-oriented perspective.

We encourage you to fund the City of Alexandria's Flood Resilience Plan grant application and we are grateful for your continued support of Virginia communities impacted by climate change.

Sincerely,



John Hill, Chair, City of Alexandria's Ad Hoc Stormwater Utility and Flood Mitigation Advisory Group

City of Alexandria Flood Resilience Plan
Community Flood Preparedness Fund Round 4 Application

Appendix C: Checklist All Categories -- Capacity Building and Planning

Social Vulnerability Index Score

City-Wide = -0.43 (Low Social Vulnerability (-1.0 to 0.0))

Census Block	SVI
515102001021	1.485
515102001022	1.47
515102001023	-1.245
515102001041	1.665
515102001042	1.1125
515102001043	1.1425
515102001051	0.23
515102001052	0.635
515102001061	-1.685
515102001062	0.285
515102001063	0.805
515102001064	1.545
515102001081	0.28
515102001091	-1.46
515102001092	1.7625
515102001093	1.53
515102001101	-0.32
515102001102	-0.74
515102001111	-0.495
515102001112	0.125
515102001113	-0.99
515102002011	-0.69
515102002012	-1.08
515102002013	-0.35
515102002021	-1.675
515102002022	-1.97
515102003011	-0.53
515102003012	1.085
515102003021	-0.78
515102003022	1.1675
515102003023	0.435
515102003041	2.4
515102003042	0.315
515102003043	-0.305
515102003051	-0.235
515102003052	-0.225
515102004031	-1.105
515102004041	-1.605
515102004042	-1.645
515102004061	0.97
515102004062	1.2075

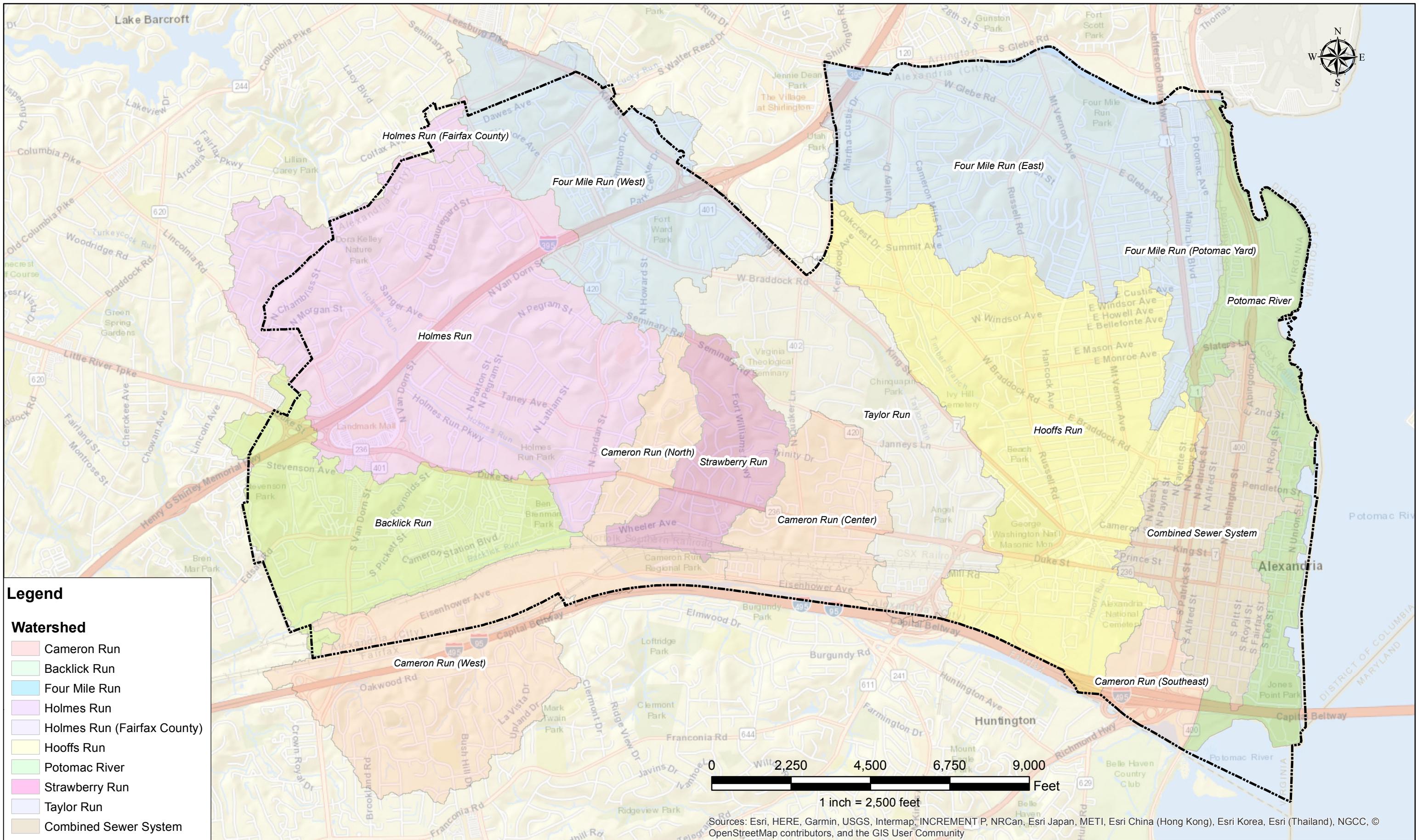
City of Alexandria Flood Resilience Plan
Community Flood Preparedness Fund Round 4 Application

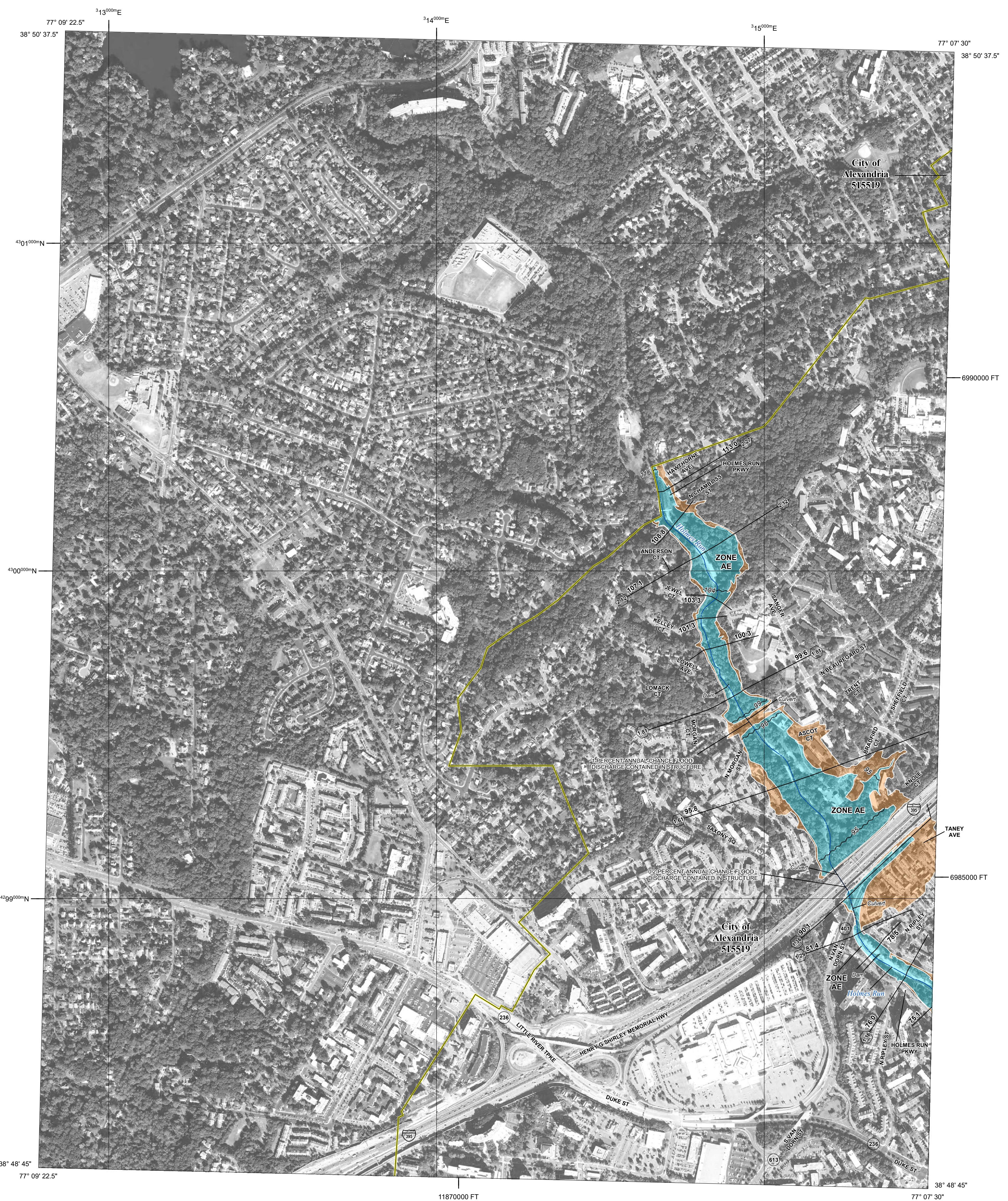
Census Block	SVI
515102004063	0.63
515102004064	-1.585
515102004071	-0.275
515102004072	1.04
515102004073	-0.005
515102004081	1.25
515102004082	0
515102004083	-0.215
515102004091	1.2425
515102004092	2.6325
515102004093	0.025
515102004094	-0.76
515102005001	0.545
515102005002	1.635
515102005003	1.3625
515102006001	-1.375
515102006002	0.225
515102006003	0.89
515102006004	-1.34
515102007011	-1.745
515102007031	-1.745
515102007032	1.25
515102007033	-1.845
515102007034	-0.05
515102007041	-0.63
515102007042	-1.2
515102007043	-1.07
515102007051	-1.67
515102007052	-1.01
515102007053	-1.64
515102008011	-0.255
515102008012	-1.46
515102008021	-0.835
515102008022	1.4575
515102008023	-1.97
515102009001	-1.865
515102009002	-1.745
515102009003	-1.94
515102009004	-1.78
515102010001	-1.15
515102010002	-1.845
515102010003	-0.005
515102011001	1.4375
515102011002	-1.805
515102011003	-1.88
515102012021	-1.97
515102012022	0.395

City of Alexandria Flood Resilience Plan
Community Flood Preparedness Fund Round 4 Application

Census Block	SVI
515102012023	-0.92
515102012024	-1.655
515102012041	0.875
515102012042	-0.96
515102012051	-0.535
515102012052	1.17
515102012061	2.7675
515102012062	1.1225
515102012063	2.3625
515102013001	-1.805
515102013002	-1.835
515102013003	-1.97
515102013004	-1.865
515102014001	-1.69
515102014002	-1.585
515102014003	-0.615
515102014004	-0.52
515102015001	-1.73
515102015002	-1.705
515102015003	-1.705
515102016011	-0.24
515102016012	-1.73
515102016013	-0.77
515102016014	0.505
515102016021	-1.685
515102016022	0.74
515102016023	-1.1
515102018021	0.315
515102018022	-1.97
515102018031	-0.385
515102018032	-1.685
515102018041	-1.265
515102018042	-0.72
515102018043	-1.55
515102018051	-0.72
515102018052	2.055
515102018053	-1.705
515102018054	-1.735
515102019001	-1.175
515102019002	-1.97
515102020011	-1.83
515102020012	-1.845
515102020013	-1.97
515102020021	-1.665
515102020022	-0.69
515109800001	0
Average	-0.43

City of Alexandria Flood Resilience Plan
Community Flood Preparedness Fund Round 4 Application





FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT
[HTTPS://MSC.FEMA.GOV](https://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 Area with Flood Risk due to Levee Zone D
OTHER AREAS	NO SCREEN Areas of Minimal Flood Hazard Zone X Area of Undetermined Flood Hazard Zone D Channel, Culvert, or Storm Sewer Levee, Dike, or Floodwall
GENERAL STRUCTURES	Cross Sections with 1% Annual Chance Water Surface Elevation Coastal Transect Coastal Transect Baseline Profile Baseline Hydrographic Feature Base Flood Elevation Line (BFE) Limit of Study Jurisdiction Boundary
OTHER FEATURES	

NOTES TO USERS

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

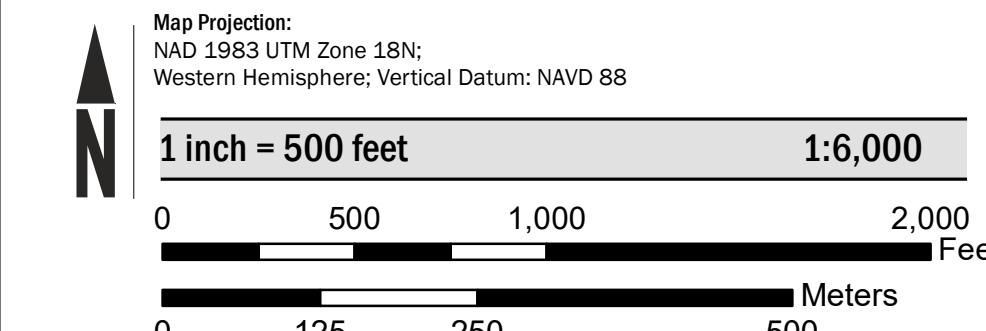
Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Flood Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study Report for this jurisdiction.

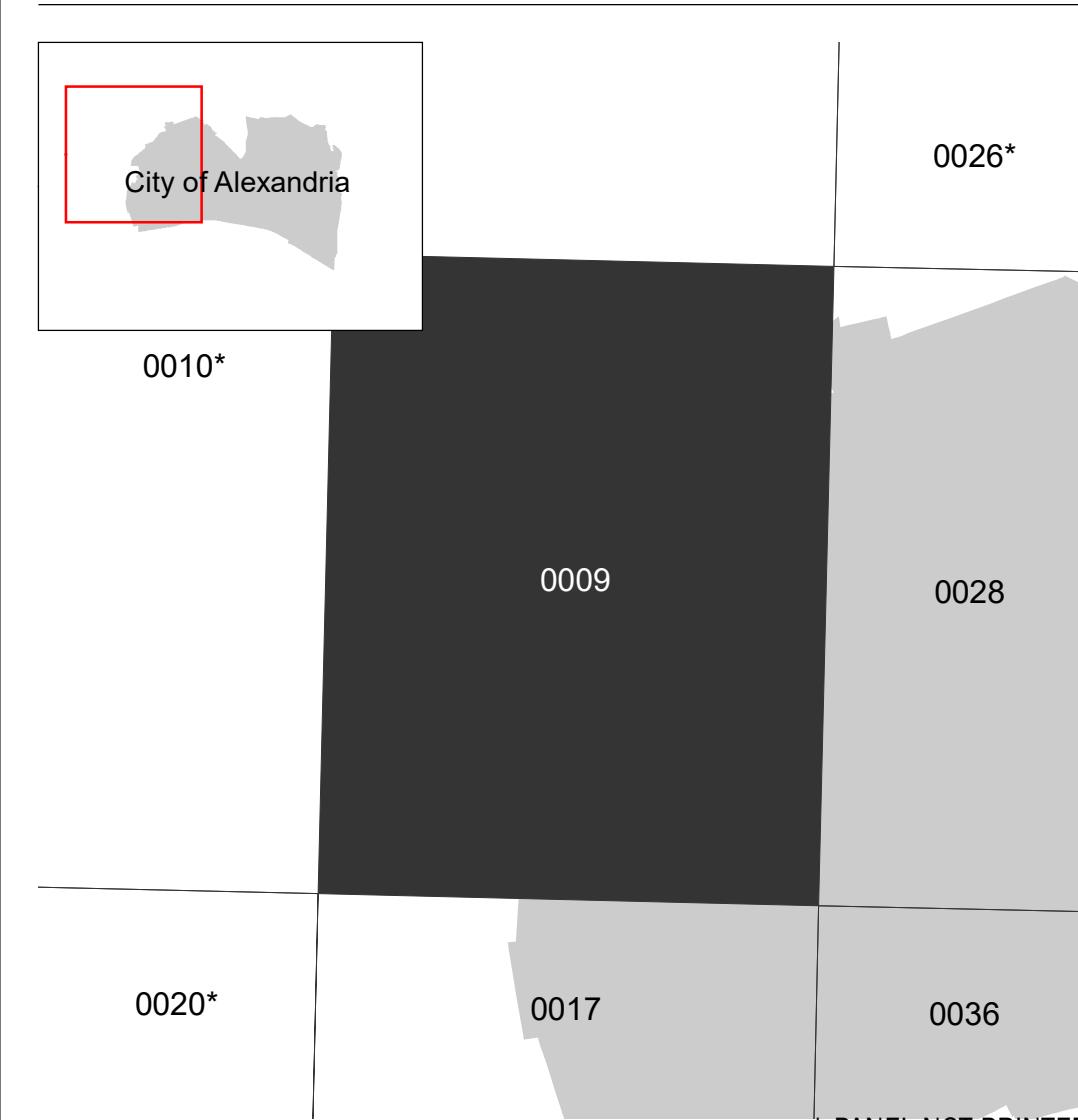
To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6220.

Base map information shown on this FIRM was provided in digital format by the United States Department of Agriculture - Aerial Photography Field Office (USDA - APFO), National Agriculture Imagery Program (NAIP). This information was derived from digital orthophotography at a 2-foot resolution from photography dated 2019.

SCALE



PANEL LOCATOR



NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

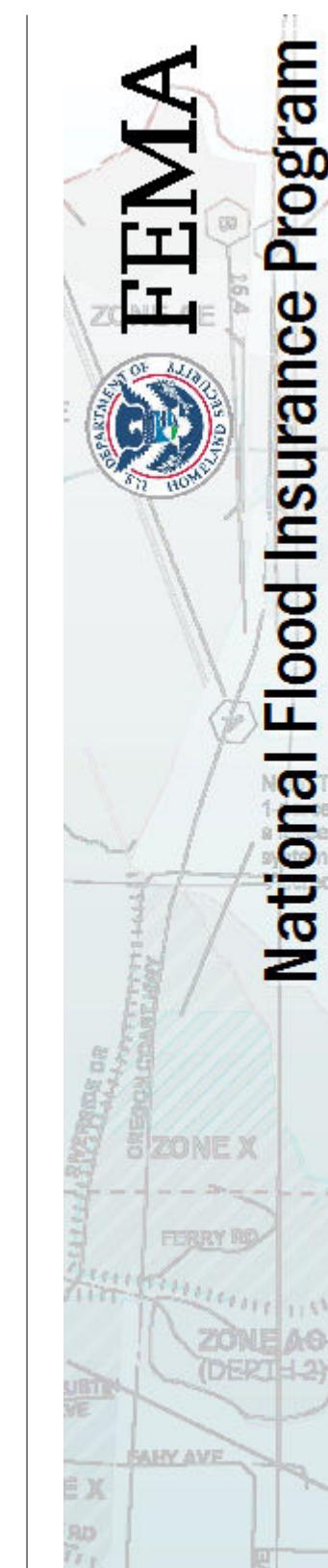
ALEXANDRIA, VIRGINIA
Independent City
PANEL 9 of 45



Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
ALEXANDRIA, CITY OF	515519	0009	F

REVISED PRELIMINARY
5/31/2022



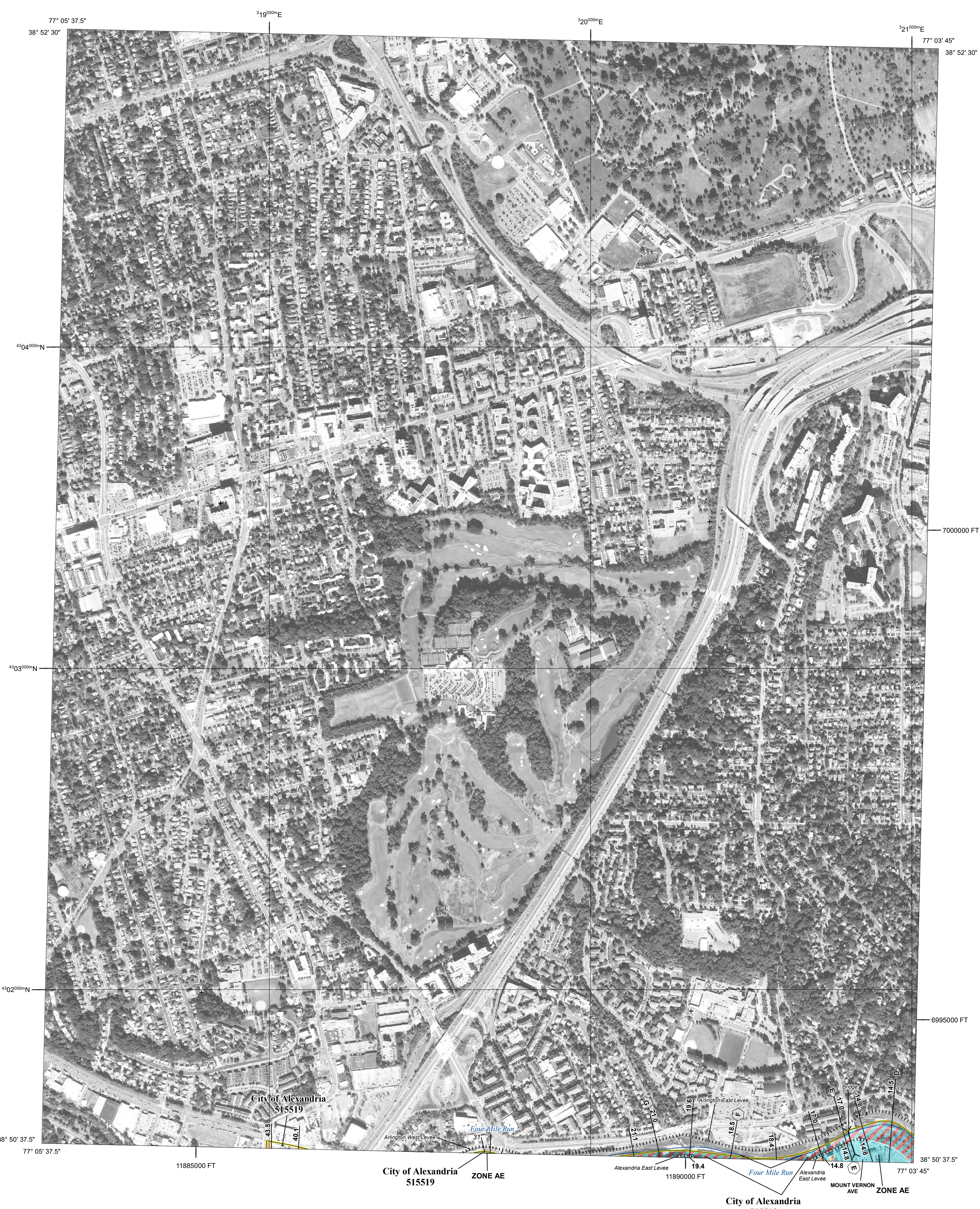
VERSION NUMBER

2.6.4.6

MAP NUMBER

5155190009F

MAP REVISED



FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT
[HTTPS://MSC.FEMA.GOV](https://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
OTHER AREAS OF FLOOD HAZARD	0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
	Future Conditions 1% Annual Chance Flood Hazard Zone X
	Area with Reduced Flood Risk due to Levee See Notes. Zone X
	Area with Flood Risk due to Levee Zone D
OTHER AREAS	NO SCREEN Areas of Minimal Flood Hazard Zone X
	Area of Undetermined Flood Hazard Zone D
GENERAL STRUCTURES	Channel, Culvert, or Storm Sewer
	Levee, Dike, or Floodwall
OTHER FEATURES	18.2 Cross Sections with 1% Annual Chance Water Surface Elevation 17.5
	8 Coastal Transect
	Profile Baseline
	Hydrographic Feature
	~~~~ 513 ~~~~ Base Flood Elevation Line (BFE)
	Limit of Study
	Jurisdiction Boundary

## NOTES TO USERS

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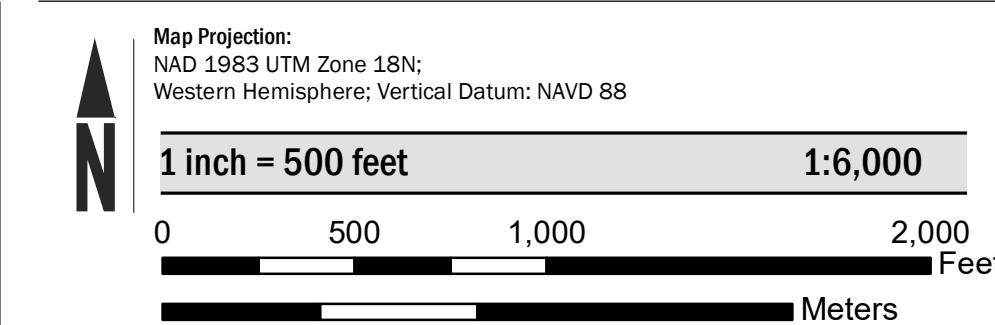
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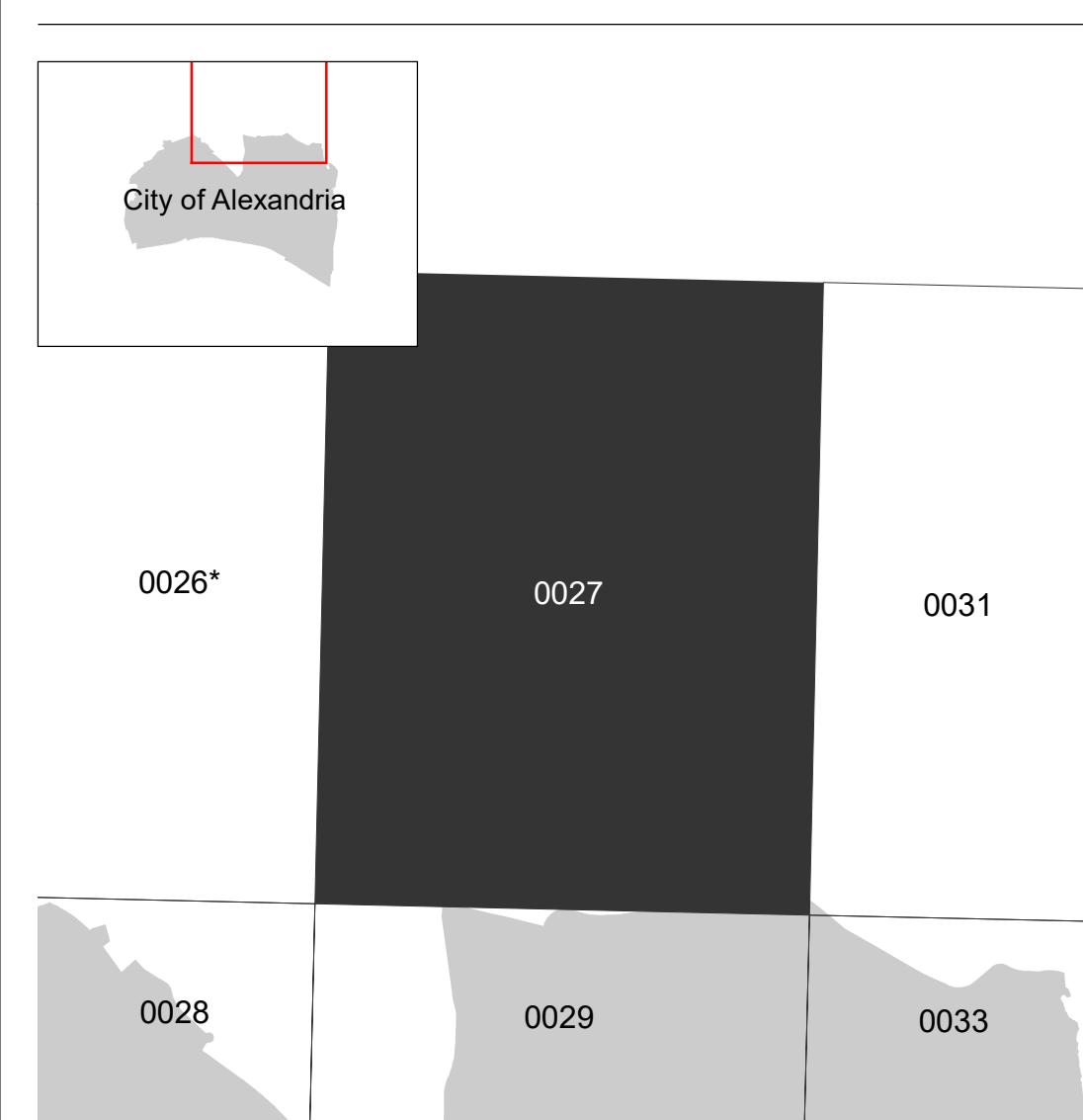
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NON-ACCREDITED LEVEE SYSTEM: This panel contains a levee system that has not been accredited and is therefore not recognized as reducing the 1-percent-annual-chance flood hazard.

## SCALE



## PANEL LOCATOR



NATIONAL FLOOD INSURANCE PROGRAM  
FLOOD INSURANCE RATE MAP

ALEXANDRIA, VIRGINIA  
Independent City  
PANEL 27 OF 45



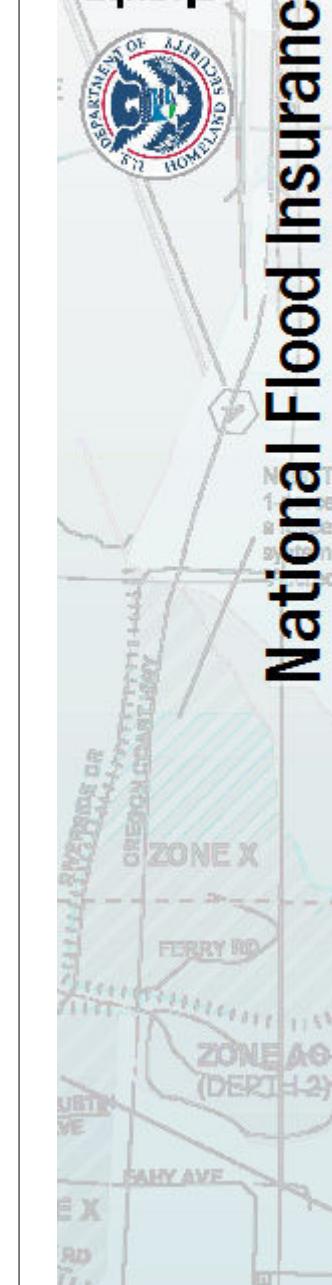
Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
ALEXANDRIA, CITY OF	515519	0027	F

**REVISED PRELIMINARY**  
**5/31/2022**



National Flood Insurance Program



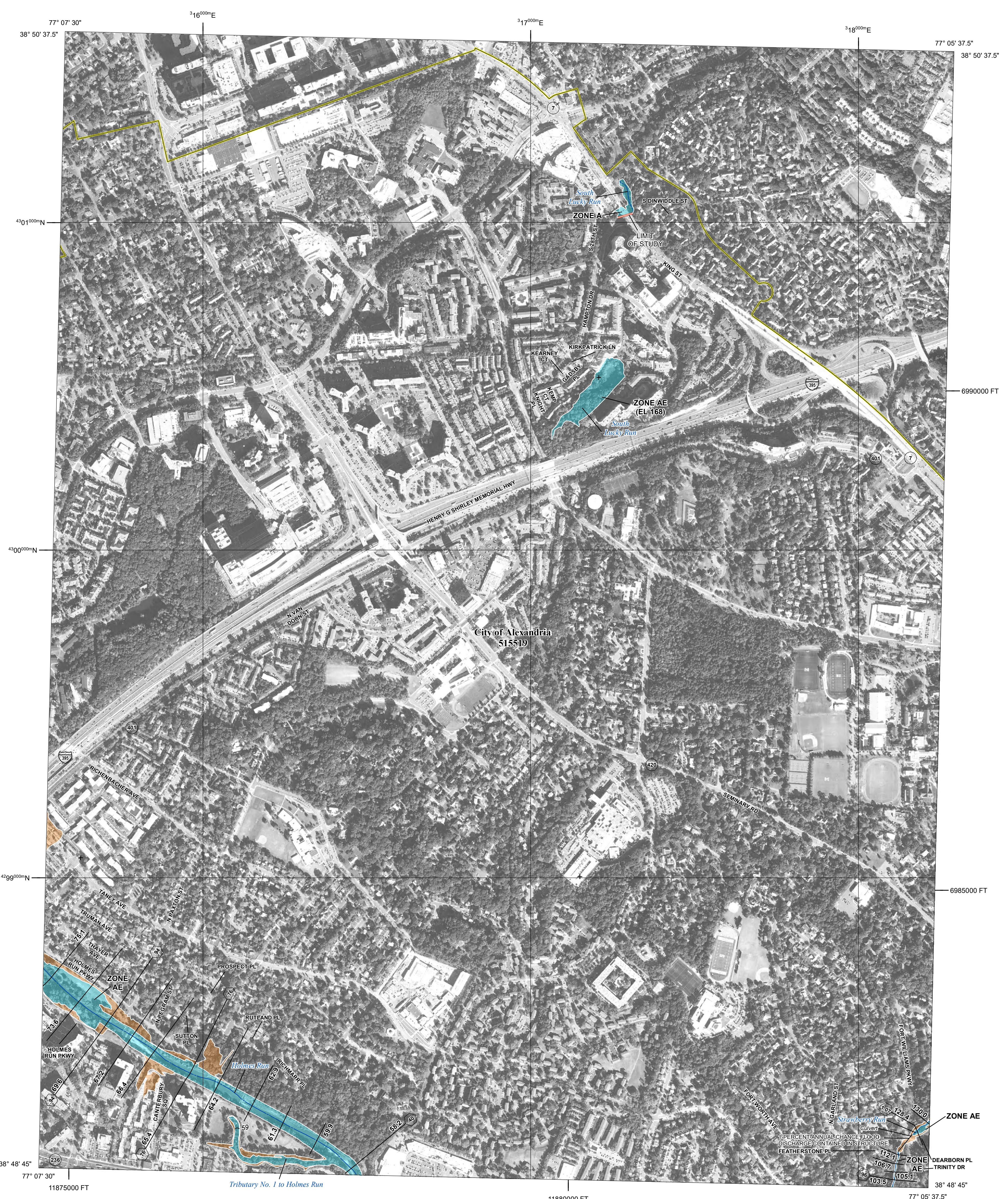
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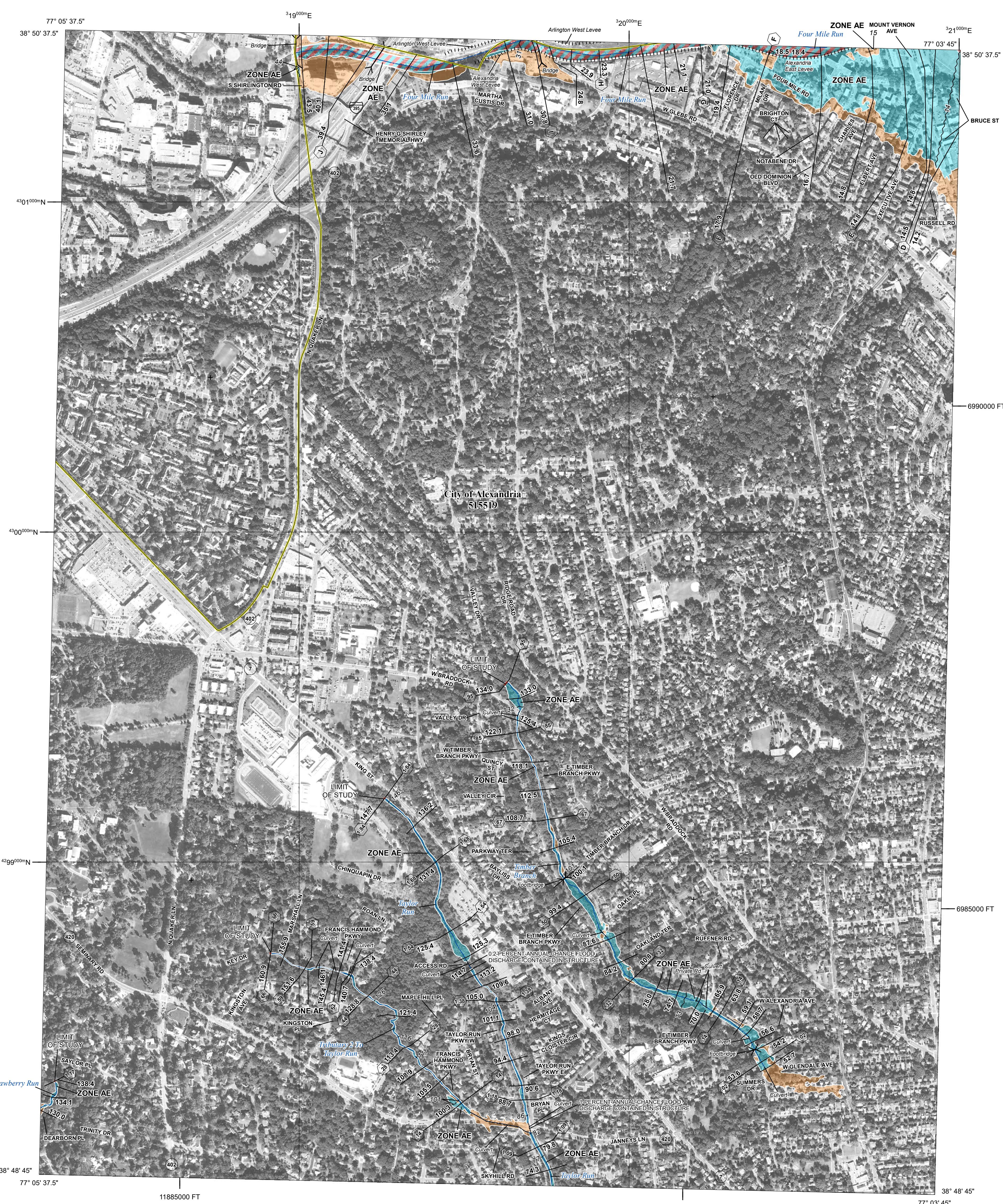
2.6.4.6

MAP NUMBER

5155190027F

MAP REVISED





## FLOOD HAZARD INFORMATION

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<b>SPECIAL FLOOD HAZARD AREAS</b>	Without Base Flood Elevation (BFE) Zone A, V, A99
	With BFE or Depth Zone AE, AO, AH, VE, AR
<b>OTHER AREAS OF FLOOD HAZARD</b>	Regulatory Floodway
	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
<b>OTHER AREAS</b>	Future Conditions 1% Annual Chance Flood Hazard Zone X
	Area with Reduced Flood Risk due to Levee See Notes. Zone X
<b>GENERAL STRUCTURES</b>	Area with Flood Risk due to Levee Zone D
	NO SCREEN Areas of Minimal Flood Hazard Zone X
<b>OTHER FEATURES</b>	Area of Undetermined Flood Hazard Zone D
	Channel, Culvert, or Storm Sewer
<b>OTHER FEATURES</b>	Levee, Dike, or Floodwall
	18.2 Cross Sections with 1% Annual Chance Water Surface Elevation
<b>OTHER FEATURES</b>	17.5 Coastal Transect
	Coastal Transect Baseline
<b>OTHER FEATURES</b>	Profile Baseline
	Hydrographic Feature
<b>OTHER FEATURES</b>	~~~~ 513 ~~~~ Base Flood Elevation Line (BFE)
	Limit of Study
<b>OTHER FEATURES</b>	Jurisdiction Boundary

## NOTES TO USERS

For information and questions about this Flood Insurance Rate Map (FIRM), available products associated with this FIRM, including historic versions, the current map date, contact FEMA for how to order products, or the National Flood Insurance Program (NFIP) in general, please visit the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-6267) or visit the FEMA Flood Map Service Center website at <https://msc.fema.gov>. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website.

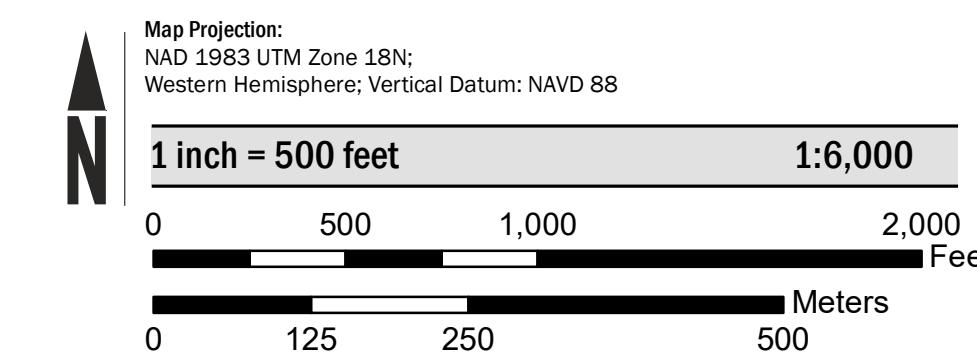
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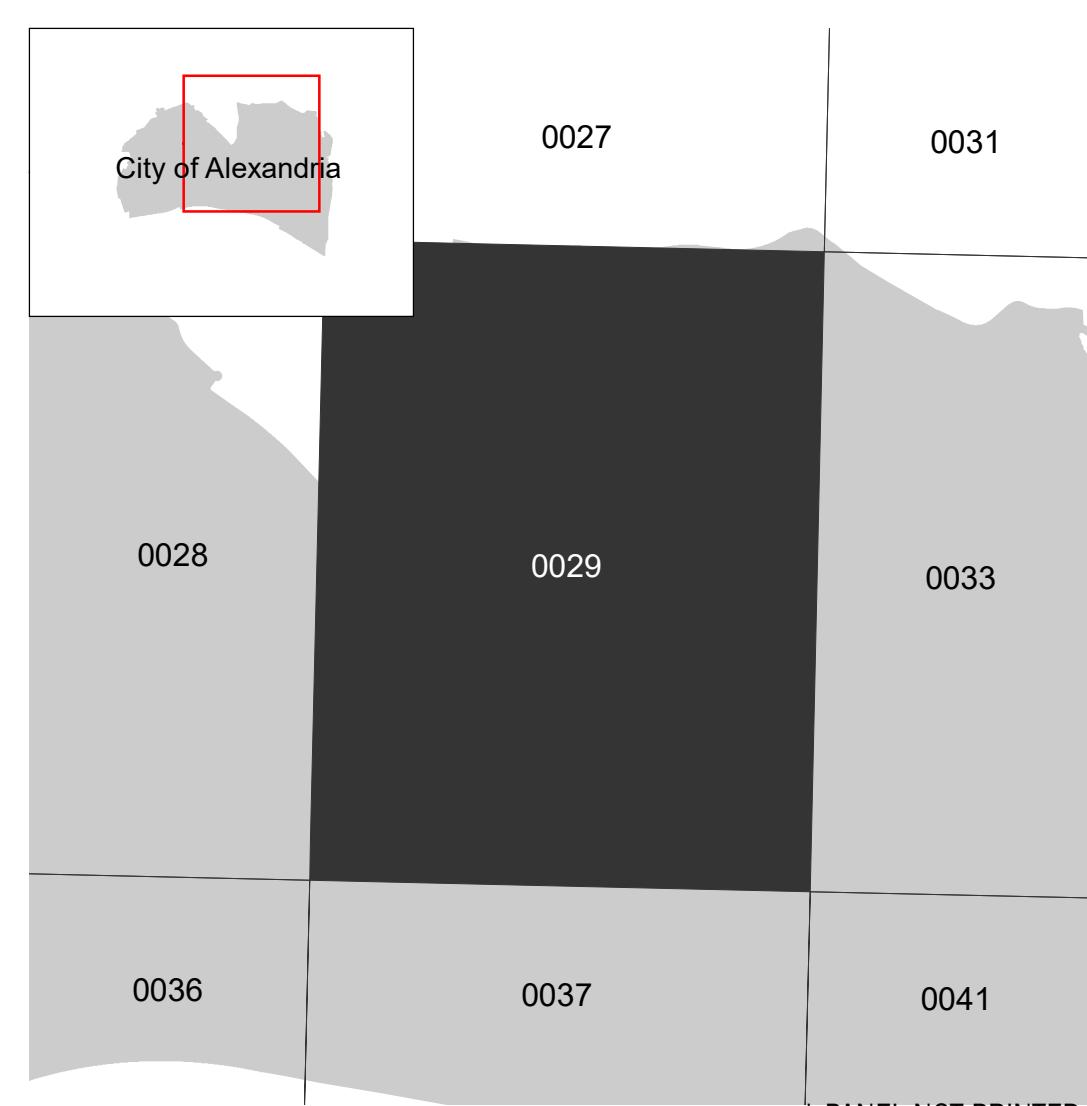
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## SCALE

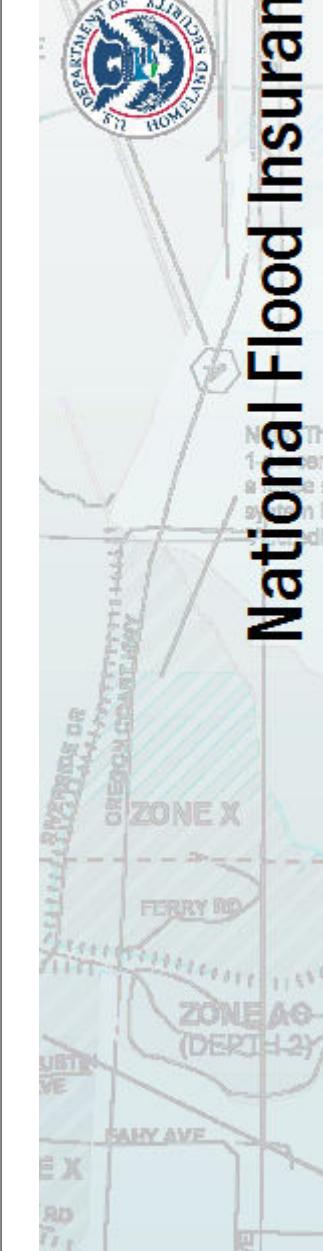


## PANEL LOCATOR



NATIONAL FLOOD INSURANCE PROGRAM  
FLOOD INSURANCE RATE MAP

ALEXANDRIA, VIRGINIA  
Independent City  
PANEL 29 OF 45



REVISED  
PRELIMINARY  
5/31/2022

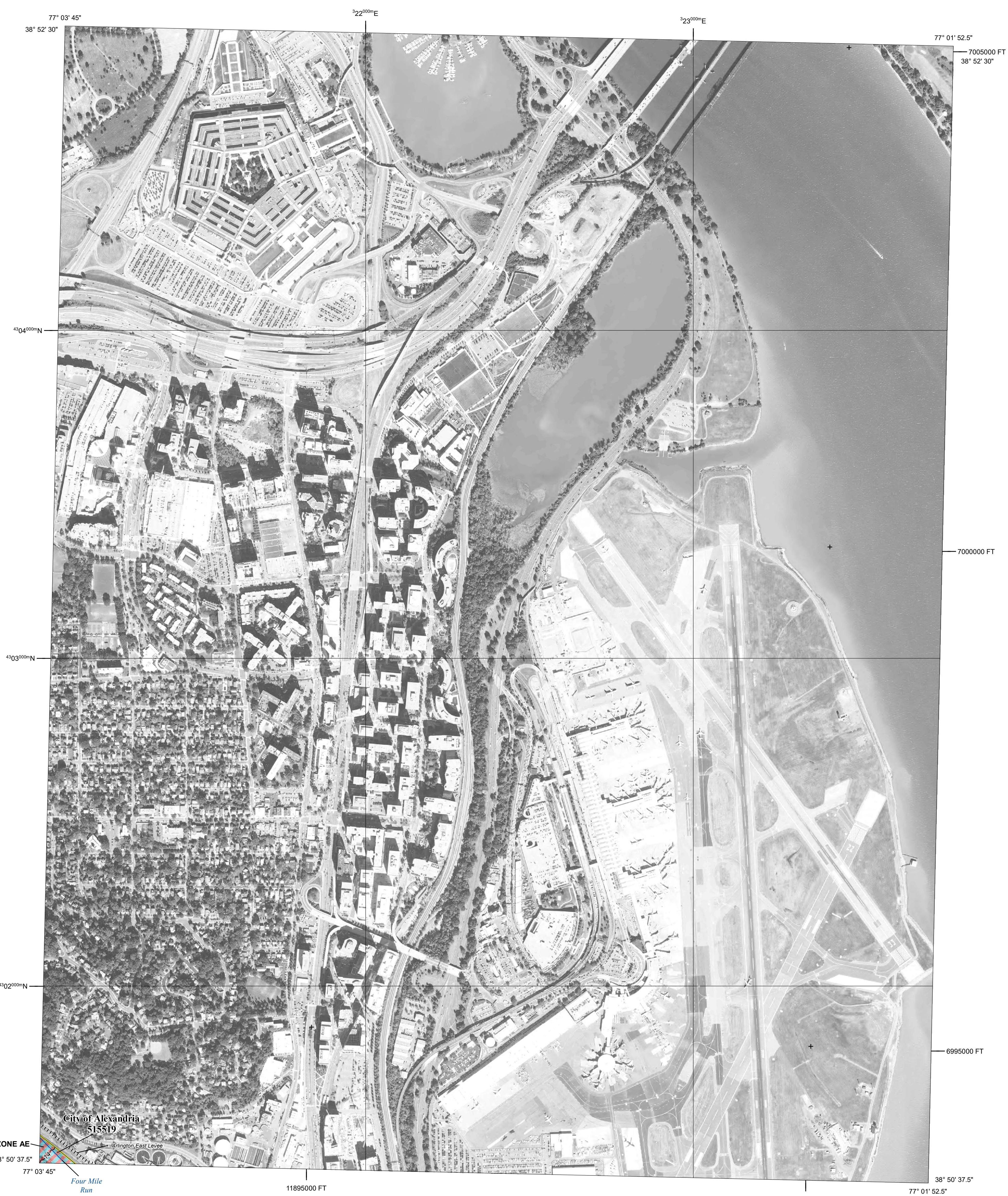
VERSION NUMBER

2.6.4.6

MAP NUMBER

5155190029F

MAP REVISED



## FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT  
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[HTTPS://MSC.FEMA.GOV](https://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
- Area with Flood Risk due to Levee Zone D

**OTHER AREAS**

- NO SCREEN Areas of Minimal Flood Hazard Zone X
- Area of Undetermined Flood Hazard Zone D
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

**GENERAL STRUCTURES**

- 18.2 Cross Sections with 1% Annual Chance Water Surface Elevation
- 17.5
- 8 Coastal Transect
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

**OTHER FEATURES**

- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary

## NOTES TO USERS

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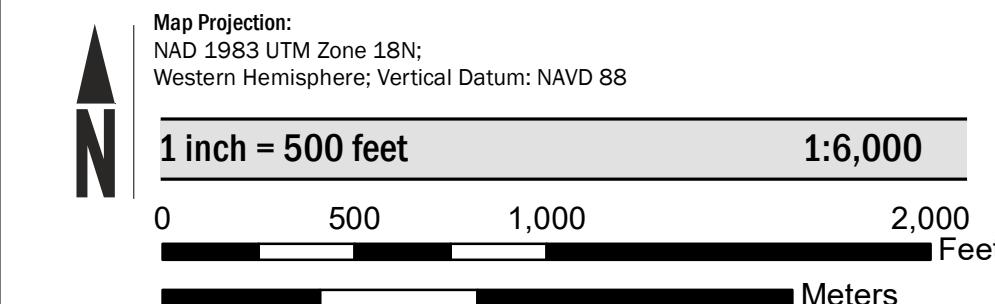
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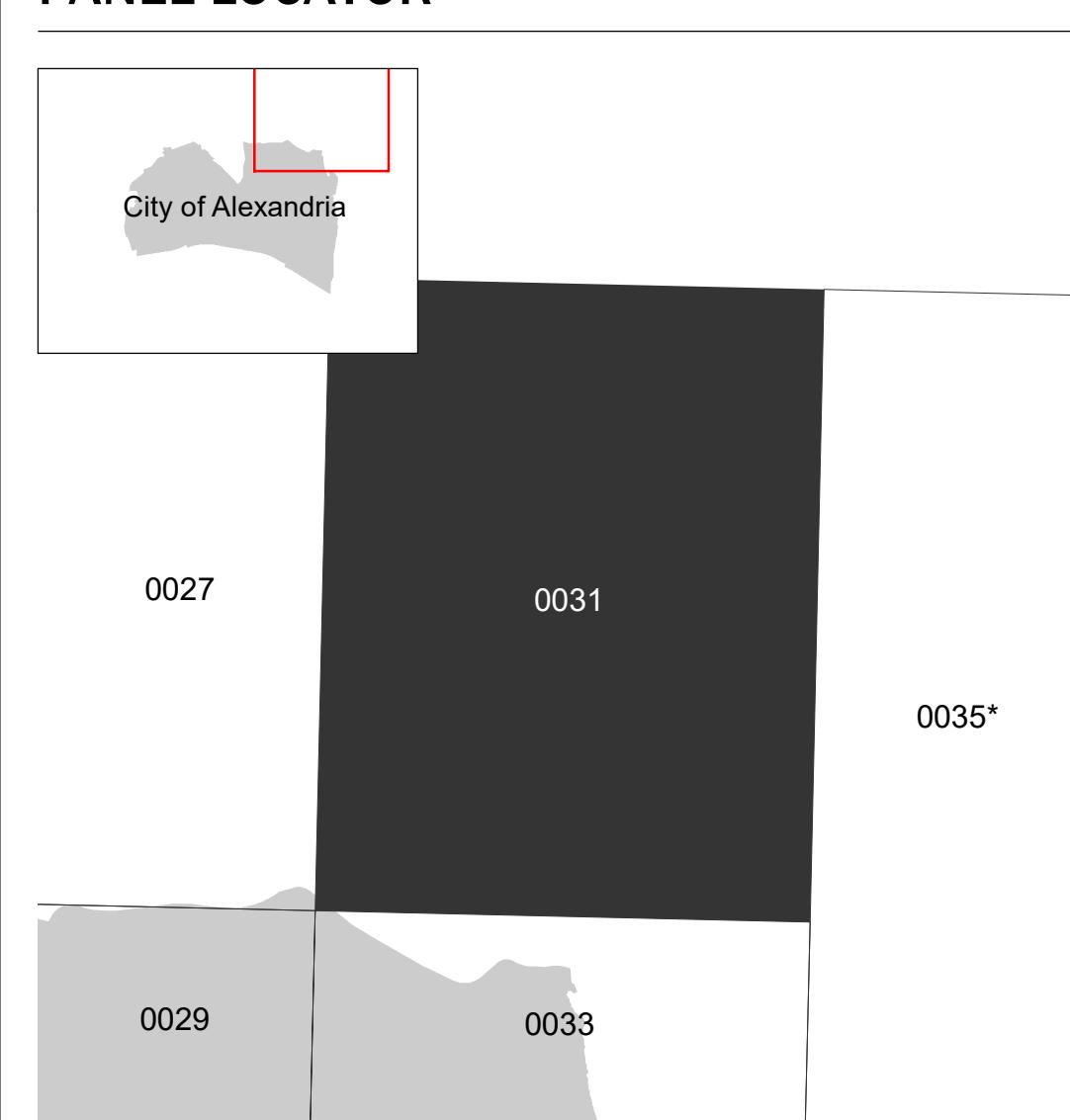
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NON-ACCREDITED LEVEE SYSTEM: This panel contains a levee system that has not been accredited and is therefore not recognized as reducing the 1-percent-annual-chance flood hazard.

## SCALE



## PANEL LOCATOR



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

**ALEXANDRIA, VIRGINIA**  
 Independent City  
**PANEL 31 OF 45**



Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
ALEXANDRIA, CITY OF	515519	0031	F

**REVISED PRELIMINARY**  
**5/31/2022**

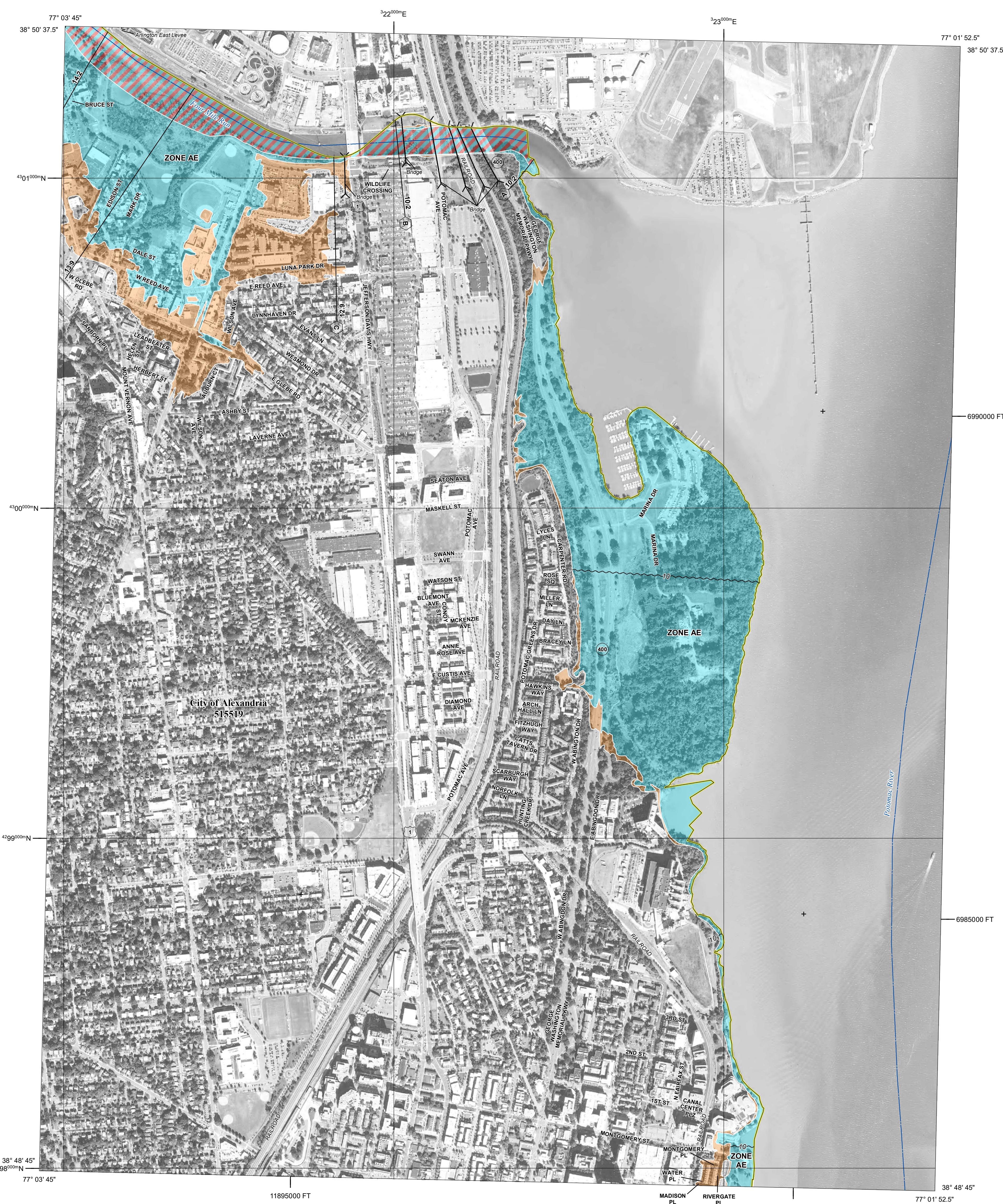
**VERSION NUMBER**

2.6.4.6

**MAP NUMBER**

5155190031F

**MAP REVISED**



## FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT  
**THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT**  
[HTTPS://MSC.FEMA.GOV](https://msc.fema.gov)

<b>SPECIAL FLOOD HAZARD AREAS</b>	Without Base Flood Elevation (BFE) Zone A, A99
	With BFE or Depth Zone AE, AO, AH, VE, AR
<b>OTHER AREAS OF FLOOD HAZARD</b>	Regulatory Floodway
	0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
	Future Conditions 1% Annual Chance Flood Hazard Zone X
	Area with Reduced Flood Risk due to Levee See Notes. Zone X
	Area with Flood Risk due to Levee Zone D
<b>OTHER AREAS</b>	NO SCREEN Areas of Minimal Flood Hazard Zone X
	Area of Undetermined Flood Hazard Zone D
<b>GENERAL STRUCTURES</b>	Channel, Culvert, or Storm Sewer
	Levee, Dike, or Floodwall
<b>OTHER FEATURES</b>	Cross Sections with 1% Annual Chance Water Surface Elevation Coastal Transect Profile Baseline Hydrographic Feature Base Flood Elevation Line (BFE) Limit of Study Jurisdiction Boundary

## NOTES TO USERS

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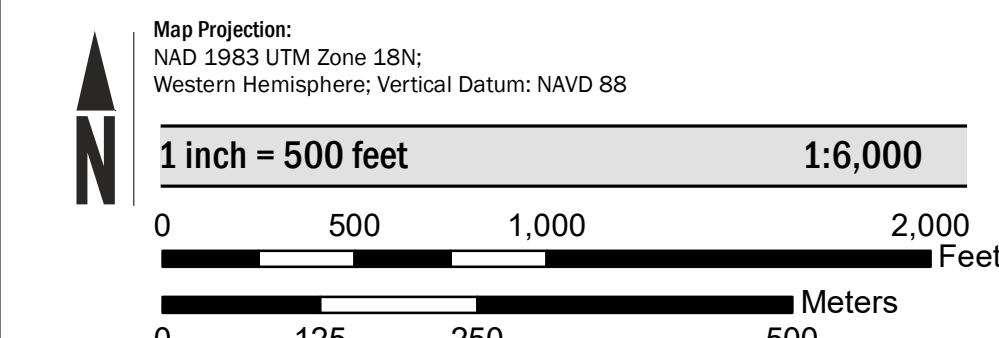
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NON-ACCREDITED LEVEE SYSTEM: This panel contains a levee system that has not been accredited and is therefore not recognized as reducing the 1-percent-annual-chance flood hazard.

## SCALE



## PANEL LOCATOR



NATIONAL FLOOD INSURANCE PROGRAM  
FLOOD INSURANCE RATE MAP

ALEXANDRIA, VIRGINIA  
Independent City  
PANEL 33 OF 45



**FEMA**  
National Flood Insurance Program

Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
ALEXANDRIA, CITY OF	515519	0033	F

**REVISED PRELIMINARY**  
**5/31/2022**

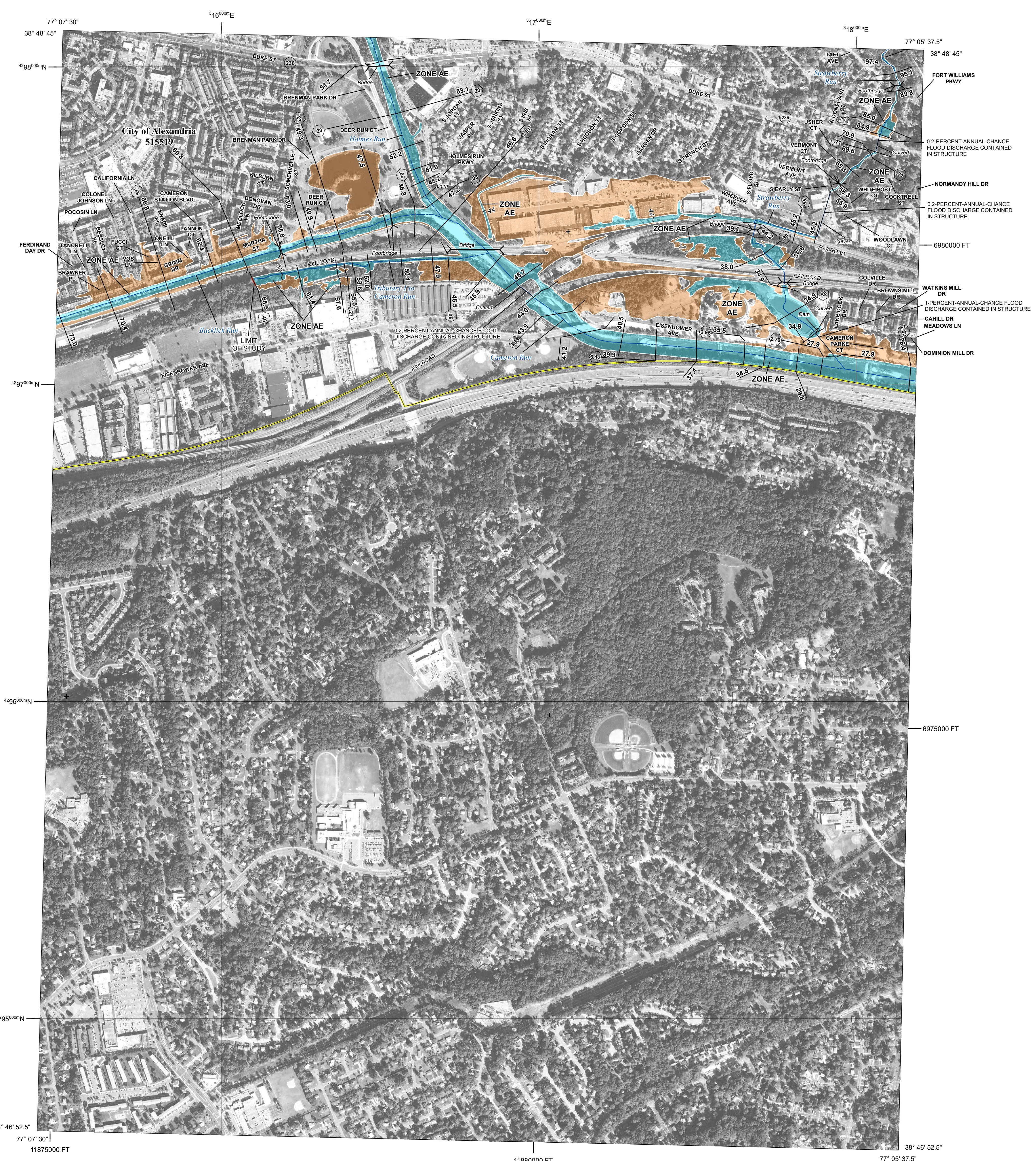
VERSION NUMBER

2.6.4.6

MAP NUMBER

5155190033F

MAP REVISED



## FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT  
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<b>SPECIAL FLOOD HAZARD AREAS</b>	Without Base Flood Elevation (BFE) Zone A, V, A99
	With BFE or Depth Zone AE, AO, AH, VE, AR
<b>OTHER AREAS OF FLOOD HAZARD</b>	Regulatory Floodway
	0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
	Future Conditions 1% Annual Chance Flood Hazard Zone X
	Area with Reduced Flood Risk due to Levee See Notes. Zone X
	Area with Flood Risk due to Levee Zone D
<b>OTHER AREAS</b>	NO SCREEN Areas of Minimal Flood Hazard Zone X
	Area of Undetermined Flood Hazard Zone D
<b>GENERAL STRUCTURES</b>	Channel, Culvert, or Storm Sewer
	Levee, Dike, or Floodwall
<b>OTHER FEATURES</b>	18.2 Cross Sections with 1% Annual Chance Water Surface Elevation 17.5
	8 Coastal Transect
	Profile Baseline
	Hydrographic Feature
	~~~~ 513 ~~~~ Base Flood Elevation Line (BFE)
	Limit of Study
	Jurisdiction Boundary

NOTES TO USERS

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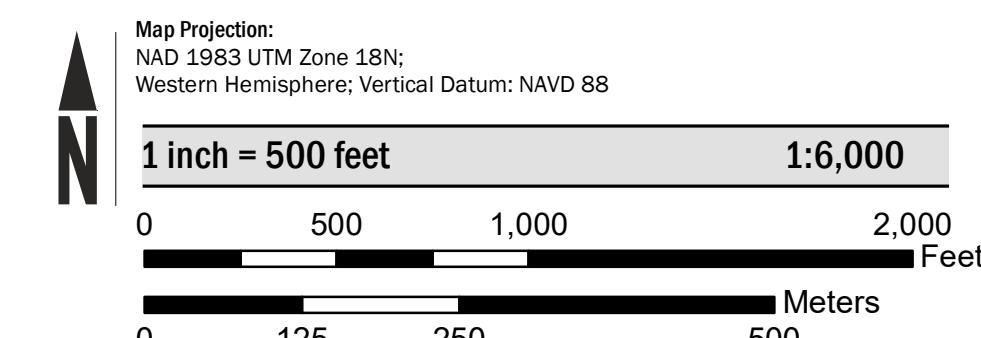
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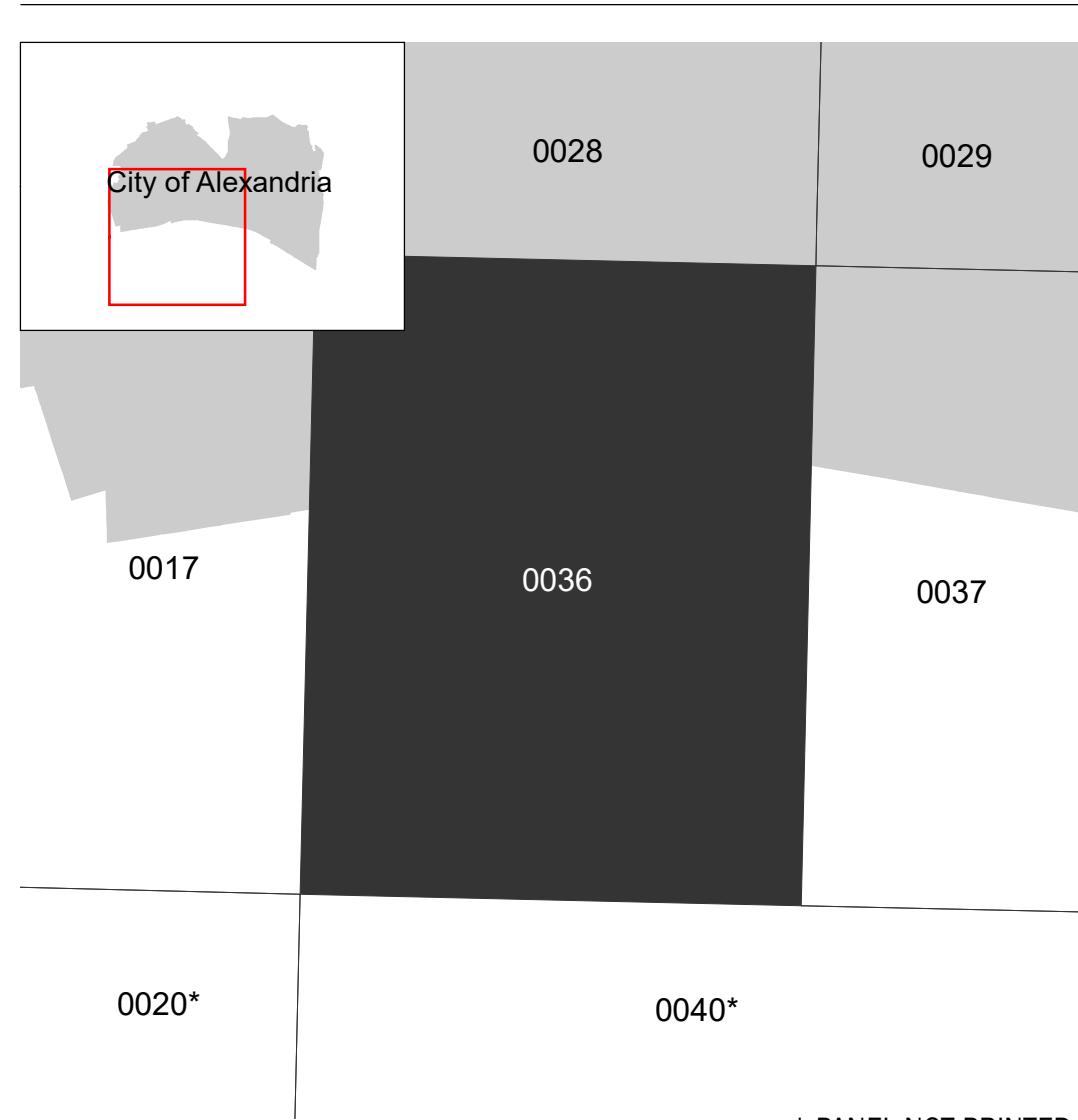
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SCALE



PANEL LOCATOR



NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

ALEXANDRIA, VIRGINIA
Independent City
PANEL 36 OF 45



FEMA
National Flood Insurance Program

Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
ALEXANDRIA, CITY OF	515519	0036	F

REVISED PRELIMINARY
5/31/2022

VERSION NUMBER

2.6.4.6

MAP NUMBER

5155190036F

MAP REVISED



FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT
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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
	0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
	Future Conditions 1% Annual Chance Flood Hazard Zone X
	Area with Reduced Flood Risk due to Levee See Notes. Zone X
	Area with Flood Risk due to Levee Zone D
	NO SCREEN Areas of Minimal Flood Hazard Zone X
	Area of Undetermined Flood Hazard Zone D
	Channel, Culvert, or Storm Sewer
	Levee, Dike, or Floodwall
	18.2 Cross Sections with 1% Annual Chance Water Surface Elevation
	17.5
	8 Coastal Transect
	— Coastal Transect Baseline
	— Profile Baseline
	Hydrographic Feature
	~~~ 513 ~~~ Base Flood Elevation Line (BFE)
	Limit of Study
	Jurisdiction Boundary

## NOTES TO USERS

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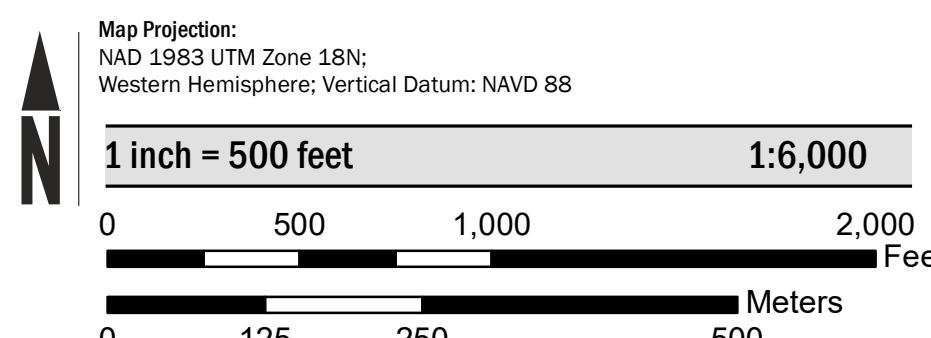
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## SCALE



## PANEL LOCATOR



NATIONAL FLOOD INSURANCE PROGRAM  
 FLOOD INSURANCE RATE MAP

ALEXANDRIA, VIRGINIA  
 Independent City  
 PANEL 37 OF 45



**FEMA**  
 National Flood Insurance Program

Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
ALEXANDRIA, CITY OF	515519	0037	F

**REVISED PRELIMINARY**  
**5/31/2022**

VERSION NUMBER  
 2.6.4.6

MAP NUMBER  
 5155190037F

MAP REVISED



## FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT  
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[HTTPS://MSC.FEMA.GOV](https://msc.fema.gov)

	Without Base Flood Elevation (BFE) Zone A, A99
	With BFE or Depth Zone AE, AO, AH, VE, AR

	Regulatory Floodway
--	---------------------

	0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
	Future Conditions 1% Annual Chance Flood Hazard Zone X

	Area with Reduced Flood Risk due to Levee See Notes. Zone X
	Area with Flood Risk due to Levee Zone D

	NO SCREEN Areas of Minimal Flood Hazard Zone X
	Area of Undetermined Flood Hazard Zone D

	Channel, Culvert, or Storm Sewer
	Levee, Dike, or Floodwall

	18.2 Cross Sections with 1% Annual Chance Water Surface Elevation
	17.5 Coastal Transect

	Profile Baseline
	Hydrographic Feature

	513 Base Flood Elevation Line (BFE)
--	-------------------------------------

	Limit of Study
--	----------------

	Jurisdiction Boundary
--	-----------------------

## NOTES TO USERS

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

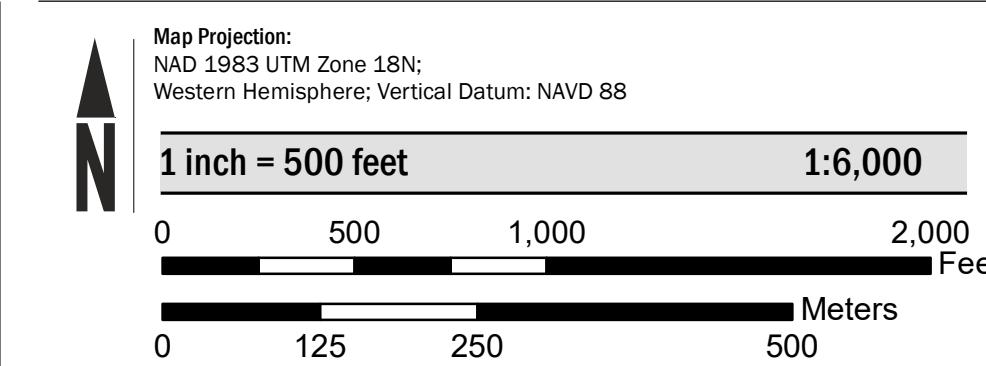
Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Flood Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study Report for this jurisdiction.

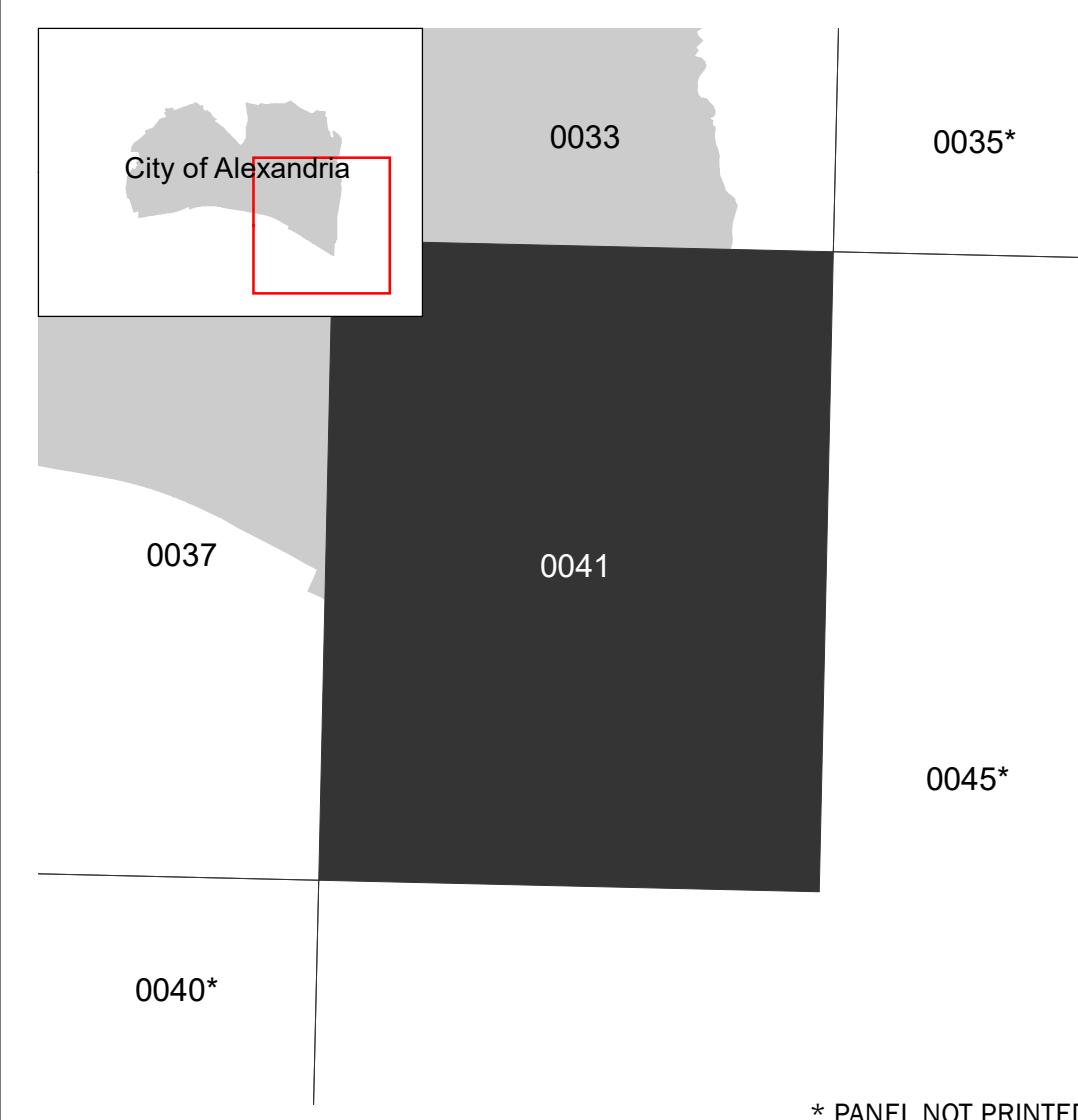
To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6220.

Base map information shown on this FIRM was provided in digital format by the United States Department of Agriculture - Aerial Photography Field Office (USDA - APFO), National Agriculture Imagery Program (NAIP). This information was derived from digital orthophotography at a 2-foot resolution from photography dated 2019.

## SCALE



## PANEL LOCATOR



NATIONAL FLOOD INSURANCE PROGRAM  
FLOOD INSURANCE RATE MAP

ALEXANDRIA, VIRGINIA  
Independent City  
PANEL 41 OF 45



Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
ALEXANDRIA, CITY OF	515519	0041	F

REVISED  
PRELIMINARY  
5/31/2022

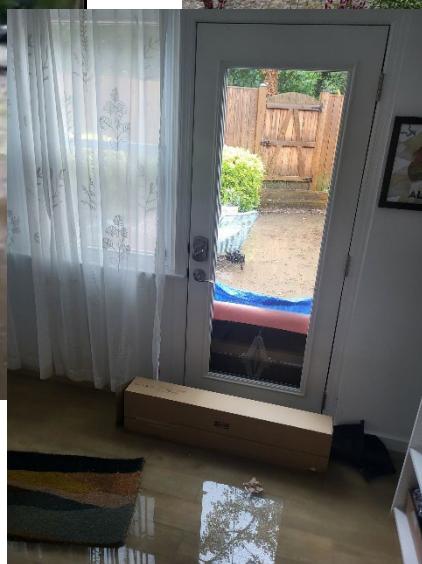
VERSION NUMBER  
2.6.4.6

MAP NUMBER  
5155190041F

MAP REVISED

City of Alexandria Flood Resilience Plan  
Community Flood Preparedness Fund Round 4 Application

**Photos from Various Flood Events Across the City**



*Page Menu*

*What can we help you find?*



# Severe Storm and Flash Flood Events

*Page updated on March 28, 2022 at 8:53 AM*

 Translate

## Introduction

Since 2019, the City of Alexandria has experienced more intense and severe storm events. Three severe storms that took place over a 14-month period between 2019-2020 prompted the City Manager to establish an interdepartmental task force focused on flooding. This task force launched the Flood Action Alexandria [initiative](#) in 2021. Also starting in the summer of 2021, the City installed several local rain gauges [across the City](https://alxfloodwatch.onerain.com/) to provide a more localized assessment of storm events. This webpage provides an overview of recent severe storm and flash flood events.

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Radar Rainfall Analysis Report, Alexandria, VA, October 29, 2021 [PDF](#)[Page Menu](#)

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# Flash Flood Event History

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 September 16, 2021

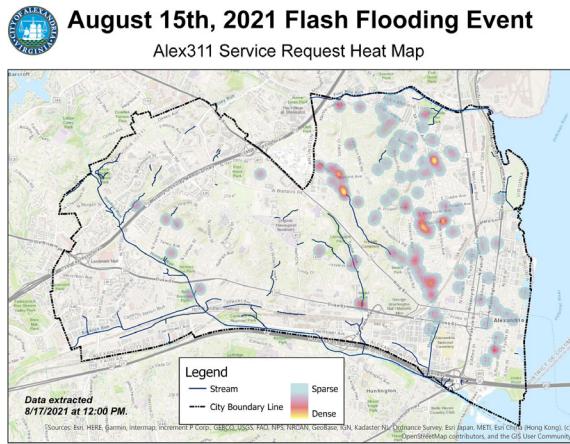
Staff characterizes the Sept. 16, 2021 storm as a 10-year* event according to the city's Intensity-Duration-Frequency curves. The characterization the City uses is more conservative than the state standard, which would rate the storm at a 25 to 50-year event.

The main area of impact appeared to be nearest the Beach Park gauge, but it appears rainfall was also extremely intense between Beach Park and the Mount Vernon gauges, in SE Del Ray, based on resident reports. T&ES staff were active during this after-hours event and responded to 12 requests from the 311 system, a mix of public (street flooding, manholes) and private property impact reports. Staff is in process of assigning some of the requests to stormwater design for further assessment and three tickets remain open for further Public Works Services staff investigation of inlets and manhole structures.

Public safety was also active. The Office of Emergency Management closely monitored the storm and sent an emergency alert message to about 2,800 people, near Pickett and Van Dorn. The water level at Backlick Run was 3.94' at 5:16 pm. APD did send an officer out to investigate and reported no impacts. APD and Fire also responded to the Braddock-West intersection which was closed for a brief period of time, before reopening soon after 6 pm. Separately, the Lake Barcroft Water Improvement District did reach out to OEM during the storm. OEM also sent several messages to its Alexandria Tech Center/Pickett group. This was a separate notification.

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## – August 15, 2021 Page Menu

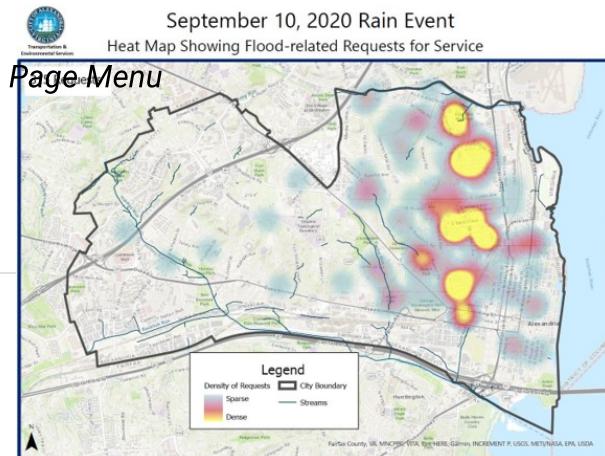


Starting around midnight on August 15, Alexandria experienced flash flooding from an intense, severe storm. Preliminary rainfall data from the newly installed City rain gauge network indicates that between 3 to 5 inches of rain fell in about an hour, with very heavy rainfall rates for 30 minutes. The storm caused widespread flooding, as well as power outages, sanitary backups, road closures, displaced manhole covers, traffic light outages, sink holes and other impacts on City infrastructure.

The highest rain gauge reading was at George Mason Elementary, which recorded a massive 3.19 inches in 30 minutes, 4.43 inches in one hour, and 5.19 inches in two hours, finishing the event with a total of 5.47 inches at the six-hour mark. From a historical perspective, these rainfall intensities correspond to a 200 – 500-year storm event based on the City's Intensity, Duration, Frequency (IDF) curves. The amount of rainfall from this event corresponds to approximately the amount of rain the City receives in one month. These climate-change induced flash floods are much more intense, bringing more rain in less time and are therefore less predictable and more dangerous.

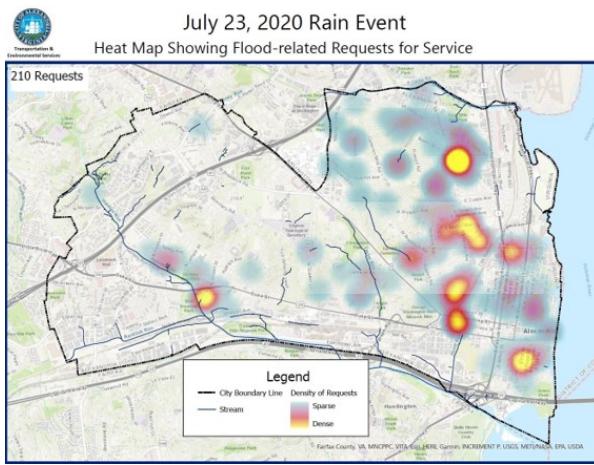
## – September 10, 2020

The September 10, 2020 rainfall event was approximately 2.5 to 4 inches at a rate as high as 3 inches in 10 minutes. This was an intense, regional storm that caused widespread flooding throughout Alexandria, particularly in the eastern portion, and included storm sewer line surges and sanitary backups.



### July 23, 2020

The severe storms and flash flooding of July 23 dropped 2 to 3 inches of rain in 30 minutes, creating a brief, extremely high-intensity event that caused significant flash flooding in many areas, including some not normally impacted by flooding.



### July 8, 2019

The regionally significant severe storm on July 8, 2019 dropped up to four inches of rain in an hour.

*Page Menu*

## What You Can Do

Flash floods develop quickly during periods of heavy rainfall, sometimes in just a few minutes. Staying informed to prepare for flooding is one of the best ways to protect yourself and your property. Sign up to receive severe weather alerts through the free Alexandria eNews service. Consider having a weather radio on hand to receive all watches, advisories or warning messages from the National Weather Service and subscribing to receive text messages or email alerts from a private weather app.

**SHARE**

### Contact Us

Alex311 </alex311> | 703.746.4311

### Follow Us

### Visitor Information

VisitAlexandriaVA.com <<https://www.visitalexandriava.com/>>

Alexandria City Hall  
301 King Street  
Alexandria, VA 22314



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City of Alexandria Flood Resilience Plan  
Community Flood Preparedness Fund Round 4 Application

## **City of Alexandria Census Tracts***

*Project is City-Wide*

200102	200406	201204
200104	200407	201205
200105	200408	201206
200106	200409	201300
200108	200500	201400
200109	200600	201500
200110	200701	201601
200111	200703	201602
200201	200704	201802
200202	200705	201803
200301	200801	201804
200302	200802	201805
200304	200900	201900
200305	201000	202001
200403	201100	202002
200404	201202	980000

*Tracts provided instead of blocks at the direction of Mr. Jake Shaw, DCR, 11/8/2023 during WebGrants Office Hours.

**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**

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

**Name of Local Government:** City of Alexandria, VA

**Category Being Applied for (check one):**

Capacity Building/Planning

Project

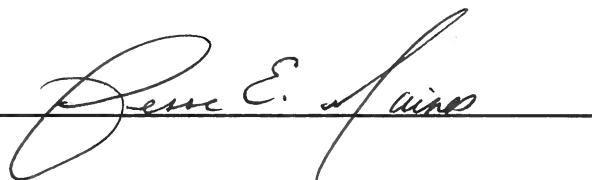
Study

**NFIP/DCR Community Identification Number (CID):** CID515519

**Name of Authorized Official and Title:** Jesse Maines, PMP, Division Chief, T&ES

**Stormwater Management**

**Signature of Authorized Official:**



**Mailing Address (1):** 2900-B Business Center Drive

**City:** Alexandria **State:** VA **Zip:** 22314

**Telephone Number:** (703) 746.4643 **Cell Phone Number:** (571) 414.8237

**Email Address:** jesse.maines@alexandriava.gov

**Contact and Title (If different from authorized official):** Jessica Lassetter, Senior

**Environmental Specialist**

**Mailing Address (1): 2900-B Business Center Drive**

City: Alexandria State: VA Zip: 22314

**Telephone Number: (703) 746.4643 Cell Phone Number: (571) 915.5695**

**Email Address: jessica.lassetter@alexandriava.gov**

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): City-Wide, Alexandria, VA**

**NFIP Community Identification Number (CID#) : CID515519**

**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): City Wide**

**Flood Insurance Rate Map Number(s) (If Applicable): 515519IND0B, 5155190009F, 5155190027F, 5155190028F, 5155190029F, 5155190031F, 5155190033F, 5155190036F, 5155190037F, 5155190041F**

**Total Cost of Project: \$700,000**

**Total Amount Requested \$525,000**

**Amount Requested as Grant \$525,000**

**Amount Requested as Project Loan (not including short-term loans for up-front costs) \$0**

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

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

**Additional Information for Loan Requests** -- N/A

**Requested Loan Security:** _____

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

**Desired loan term:** _____

**Since the date of your latest financial statements, did the applicant issue any new debt?** _____  
(If yes, provide details)

**Is there any pending or potential litigation by or against the applicant?** _____

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

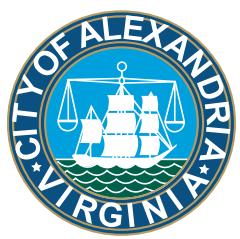
**Attach FY2024 adopted budget or refer to website**

**Attach current Capital Improvement Plan**

**Attach adopted Financial Policies**

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

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



# CITY OF ALEXANDRIA FLOOD RESILIENCE PLAN

*Community Flood Preparedness Fund Round 4 Application*  
*November 12, 2023*

# City of Alexandria Flood Resilience Plan

## Community Flood Preparedness Fund Application

### I. Scope of Work Narrative

The City of Alexandria (City) is applying for grant assistance under the Virginia Department of Conservation and Recreation (DCR) Community Flood Preparedness Fund (CFPF) Round 4 ‘Capacity Building and Planning’ category to develop a *Flood Resilience Plan*. The project will employ a comprehensive approach to planning to help Alexandria and its residents better prepare for future storm events that cause flooding in the City.

#### 1. Needs and Problems

Several large storms in 2019, 2020 and 2021 prompted the immediate need for aggressive action pertaining to flood mitigation. The City’s [Flood Action Alexandria](#) program, a comprehensive effort to address flooding in the City, was launched in 2021 and has made progress on several fronts across the city. However, a comprehensive *Flood Resilience Plan* is needed as a roadmap to address current flooding citywide as well as to prepare for future flooding due to climate change.

This effort builds on the existing efforts to date as incorporated in the previously approved [Resilience Plan](#) submitted to DCR, [effective through September 13, 2024](#). This Plan was submitted as a compendium of plans, many of which have been updated and developed since September 2021. Notably, the [2022 Northern Virginia Hazard Mitigation Plan](#) and [City of Alexandria Annex](#) and the City’s 2023 [Energy and Climate Change Action Plan](#) have been recently revised and recommendations will be included in the *Flood Resilience Plan*.

**What is Resilience?**  
The capability to anticipate, prepare for, respond to and recover from significant multi-hazard threats with minimum damage to social well-being, health, the economy and the environment. (Source: VA DCR)

Up until 2016, the City relied on studies focused on [storm sewer capacity](#) and resident complaints obtained through the City’s online reporting system ([Alex311](#)) to determine areas in need of improvement. Since 2016, the City collected further information on areas of concern via residential surveys and yard sign initiatives (Figure 1), as well as via communication between residents, City elected officials, and City staff.

#### *Flood Action Alexandria*

The Flood Action Alexandria program is led jointly by the Department of Transportation and Environmental Services (T&ES) and the Department of Project Implementation (DPI) and interacts with the Ad Hoc Stormwater Utility and Flood Mitigation Advisory Group that is appointed by the City Council. The program consists of acceleration of capital projects; improvement of operations and maintenance activities; administration of the City’s Flood Mitigation Pilot Program; operation of the Early Warning Rain and Stream Gauge Network; and implementation of community engagement and communications initiatives.

In addition to large capacity projects, the program works across impacted communities to mitigate flooding at the neighborhood scale through the Spot Improvement component of the program. Using historical studies and reports, such as the City of Alexandria Storm Sewer Capacity Analysis (CASSCA,

2016) combined with Alex311 customer service requests and anecdotal information, flood mitigation efforts have been initiated in the Four Mile Run and Hooffs Run watersheds as well as the City's CSO area in Old Town (Potomac River watershed).

The City's Flood Mitigation Pilot Grant Program launched in August 2021 has approved over 250 applications and awarded over \$700,000 to local property owners for installing floodproofing and mitigation measures to protect properties while the City continues to design and implement Spot Improvement and Large Capacity stormwater capital projects. However, there is more work to do to better protect the City's expanding population as climate change causes increasingly more frequent and intense storm events.



Figure 1. Residential Yard Sign Campaign (Source: City of Alexandria, 2020)

### Plan Components

In addition to providing direction for the Flood Action Alexandria program, the new *Flood Resilience Plan* will satisfy the requirements of the CFPF grant program requirement to have an approved Resilience Plan to remain eligible for future grant funding. The Plan will also achieve the strategies indicated in the City's recently updated Energy and Climate Change Action Plan. The Plan components include hazard identification, flood mitigation, flood preparedness and response, policies and regulations, funding strategies and communication and information dissemination. The plan will build upon the 2016 CASSCA study, which identified and prioritized capital improvement projects over the next 10-years and identified areas of further study.

A key component of the *Flood Resilience Plan* will be engaging with residents with communication and information efforts to help identify areas where flooding may have occurred but, due to social barriers and lack of access to technology, this information has not yet been relayed to City staff. A survey instrument will be developed and deployed across the City to gather information from residents about their first-hand experiences. Targeted engagement tactics will

Even though the City met with 20 neighborhood groups beginning in the winter of 2020-2021 to discuss their flooding issues and gather information directly from residents and business owners, the City learned of a severely flooded building months after a storm only when the property owner contacted the City after returning to town to make repairs. The residents of the building never contacted the City even though they had been displaced by flooding.

be deployed to reach non-English speaking communities, populations without internet or computer access, low income households, and renter populations who may have not reached out to the City previously although they may have been impacted by flooding. This outreach, combined with other data collection tools such as 2D modeling, will help shed light on future areas to focus flood mitigation efforts.

### a) Factors, Project Need, & Flood Risk Reduction

The City is experiencing more frequent and more severe flash flooding from extreme precipitation events that have occurred more frequently in the last few years due to climate change. These flash flood events damage residential and commercial properties, impact critical assets, and cause day-to-day disruptions and economic losses. The City has experienced several major flooding events on July 8, 2019, July 23, 2020, September 10, 2020, August 15, 2021, and September 16, 2021. The recurrence of these events is estimated to be between 50 to 500 years. The City's Intensity-Duration-Frequency (IDF) curves developed in the 1980s were compared to other localities in the region and available climate predictions from the CASSCA study completed in 2016. The IDF curves were found to be more conservative than many surrounding localities' design storms, more conservative than the NOAA Atlas-14, and were found to compare favorably to climate predictions available in 2016. The City is currently planning to further analyze these IDF curves in comparison to regional efforts and more recent climate predictions.

The Northern Virginia Hazard Mitigation Plan identified flooding as one of Alexandria's predominant hazards due to riverine, precipitation, tidal, and storm surge flooding (Figure 2). The Hazard Mitigation Plan ranked natural hazards for Alexandria using historical weather-related events based on the Storm Event Database by NOAA.

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

Figure 2. Hazard Ranking for Alexandria (Northern Virginia Hazard Mitigation Plan, 2022).

Alexandria's watersheds have a significant fraction of impervious surfaces. Forty-three percent of the City's surface area is comprised of roads, buildings, parking lots, and sidewalks. Flooding threatens the continuous operation of roads, emergency access, and property.

### b) Who is Protected; Groups to be Targeted who might Directly Benefit from this Effort

Alexandria has a population of 159,467 (U.S. Census Bureau, 2020) and is the densest city in Virginia with a population density of about 9,460 people per square mile. A snapshot of the City's demographics are shown in Figure 3.

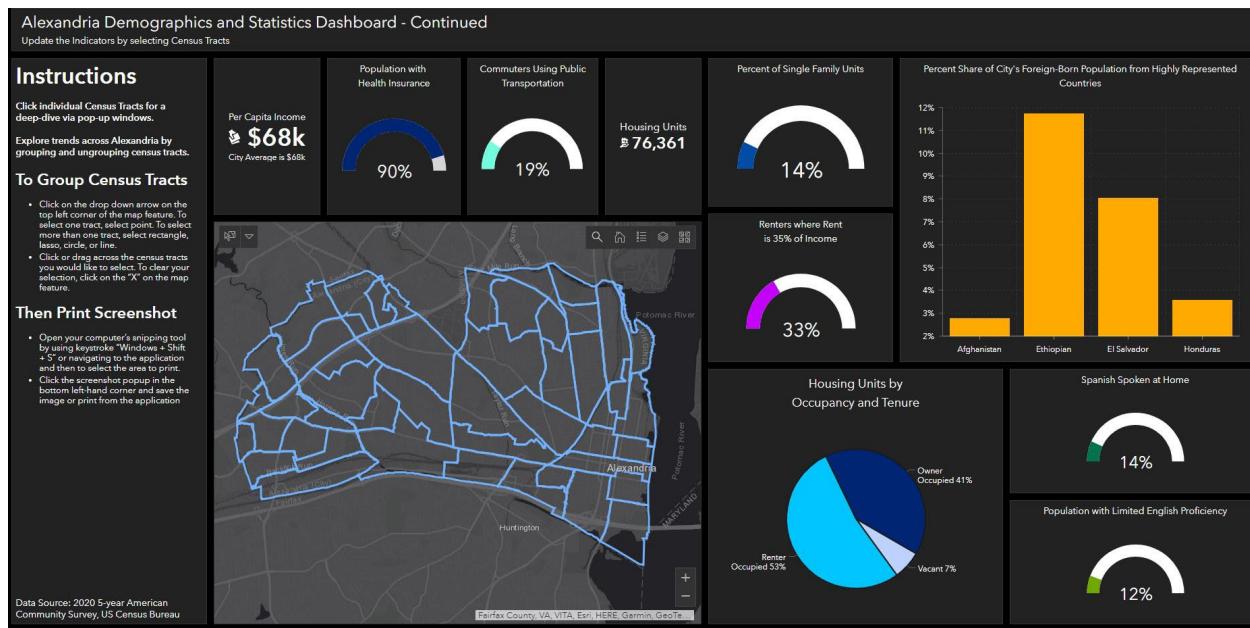


Figure 3. Alexandria Demographics and Statistics Dashboard

Through the development of a *Flood Resilience Plan*, the City aims to place emphasis on the most vulnerable populations as identified through the Energy and Climate Change Action Plan process (Figure 4).

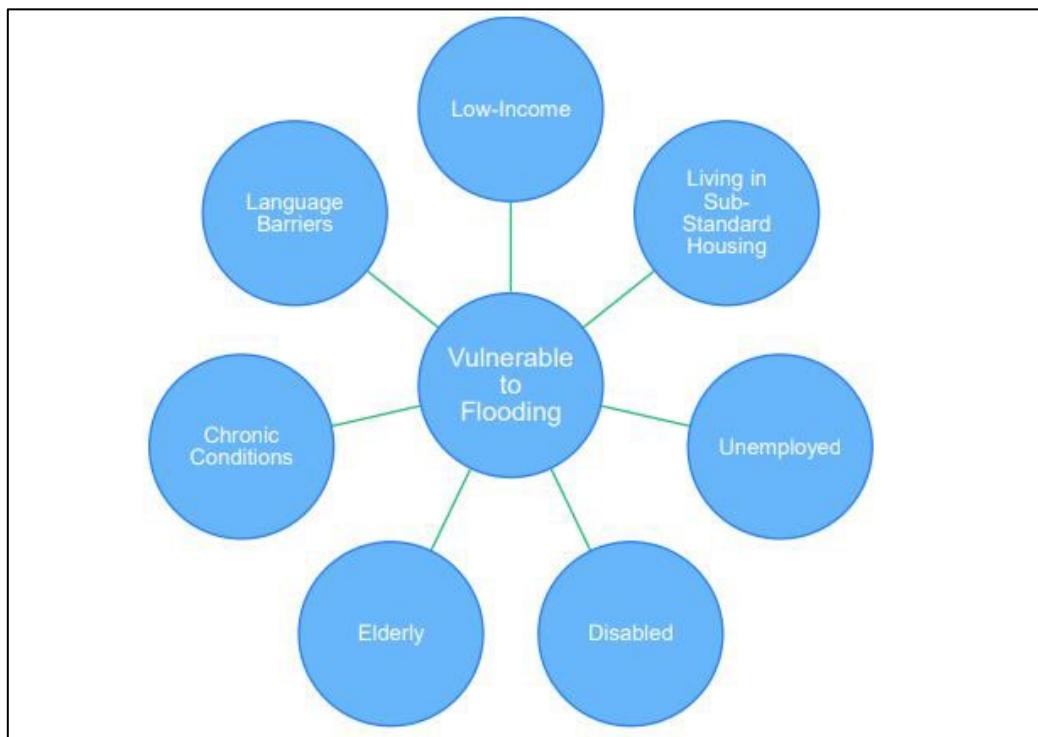


Figure 4. Communities Most Vulnerable to Flood Risk (Source: Energy and Climate Change Action Plan, 2023)

c) What would happen (or not happen) if the applicant does not receive funding.

The City must work on developing a *Flood Resilience Plan* in conjunction with all of the other current and future capital projects and Flood Action Alexandria program efforts. Receiving CFPF funding for this project will enable the City to accelerate the delivery of Plan and integrate the components of Plan more holistically and equitably. Further, because this Plan is a requirement of receiving future CFPF funding, it will enable the City to apply for future rounds of funding for flood mitigation projects.

## 2. Goals and Objectives

Goals and objectives are specific to each Task identified in the Work Plan (see Section 3). The overarching goals and objectives are to better prepare for the future health and resilience of the City, this project will achieve the overarching goal to develop a *Flood Resilience Plan*. This Plan will be informed through community engagement, 2D modeling, vulnerability assessments, and new ways of approaching flood mitigation in the City. This Plan will be developed within an approximate 13-18-month period after the award date.

The City will engage with residents to ‘ground truth’ model results; hearing first-hand from residents on their experiences greatly enhances our assessment of flood risks. The engagement process will take place throughout the course of the planning process culminating with a public comment period on the *Flood Resilience Plan* and continuing after the grant award closes through continued dialogue with the Stormwater Utility and Flood Mitigation Advisory Group.

## 3. Work Plan

### a) Activities and Tasks

#### Task 1. Review of Studies and Reports

The purpose of this Task is to document known historic flood conditions, studies, past/planned projects, data gaps, critical infrastructure, and demographic data. The team will compile and review available past studies and reports, databases and GIS data to inform subsequent Tasks. This work will also be informed in part by information obtained from public outreach (see Task 6). Examples of materials to be reviewed include the following:

- 2016 [City of Alexandria Storm Sewer Capacity Analysis](#) (CASSCA) – provided staff with (1) the identification of problem flooding areas in the separated sewer system using 1D modeling and (2) the development and prioritization of solutions for these areas.
- Flood Action Alexandria projects and modeling results
- FY2021 – FY2031 Capital Improvement Program
- Smaller, neighborhood-scale projects, called [Spot Improvement Projects](#)
- The updated 2022 [NoVA Hazard Mitigation Plan](#)
- As the City is considered a ‘coastal area’, applicable regional studies such as the [Metropolitan Washington District of Columbia Coastal Storm Risk Management Feasibility Study](#) (2022) in conjunction with the City’s [Waterfront Implementation Plan](#).
- Stormwater flooding in the City’s 500-acre CSO area, along with the large-scale CSO capacity projects managed in partnership as [RiverRenew](#).
- Alexandria is participating in a Flood Insurance Study being conducted by the [Federal Emergency Management Agency](#) (FEMA) to update the City’s current floodplain maps.

Floodplain maps inform communities about local flood risk. The maps help set minimum floodplain standards, which helps communities build safely and resiliently, and they also determine the cost of flood insurance, which helps property owners financially protect themselves against flooding.

- Currently existing GIS information such as LiDAR, critical infrastructure, critical facilities, historic districts, natural resource information, data used to inform the City's Racial Equity Toolkit, etc.

## Task 2. 2-D Screening-Level Model

The purpose of this task is to create a model to understand where flooding is occurring in the City in current and future climate conditions. The City will develop a City-wide two-dimensional (2-D) screening-level model using PC-SWMM and the pipe overflow from the 2016 CASSCA model. This model will produce a City-wide flood extent and flood depth map based on best available information for the current 100-year storm and the future 10-year and 100-year storms. City-wide model results will be calibrated against model results from target areas for which more detailed modeling is available from ongoing and past Flood Action projects. City-wide modeling will also be validated and informed by information obtained from the public about their past flooding experiences (see Task 6).

## Task 3. Flood Vulnerability Assessment

The purpose of this task is to overlay flood extents from Task 2 with a repository of City assets and demographics to understand what is at risk and what the ramifications of flooding are in the modeled storm events. The City's consultant will perform a vulnerability assessment to identify flood vulnerability for critical infrastructure, vulnerable populations, and private property across the City using the flow chart presented in Figure 5.

Key assets to be considered include, but are not limited to, the following:

- Key City and Alexandria City Public School facilities (e.g., government buildings, libraries, community centers, schools, and service providers)
- Wastewater collection and treatment system
- Private utilities (i.e., electric and communications systems)
- Transportation/roadway systems
- Hospitals and Emergency Operations
- At-risk populations due to poverty and other metrics
- Private properties (structures)

Exposure will be determined by whether an asset, population, or property is inside or outside of the flood extents obtained from Task 2. Asset sensitivity will be based on flood impacts, include susceptibility of physical damage and/or operational disruption.

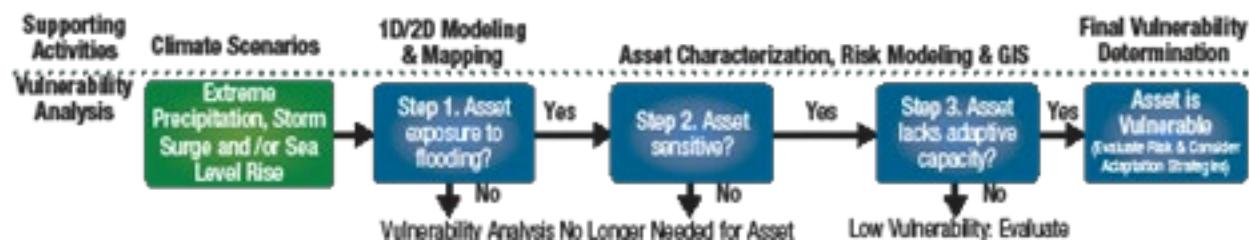


Figure 5. Vulnerability Assessment Steps (Source: Jacobs, 2023)

## **Task 4. Flood Mitigation Strategy and Implementation**

The purpose of this task is to refine additional efforts the City should undertake to enhance flood resilience in the City. These efforts include: (1) Watershed Planning, (2) Capital Improvements, and (3) Policy and Programmatic Updates.

- 1) *Watershed Planning.* Future watershed planning and modeling will provide a more comprehensive and detailed picture of the City's flooding, which is essential for building and maintaining resilience. The City will utilize the modeling, outreach, and vulnerability results to determine areas which are prone to flood risks and have not yet been modeled and explored in a more detailed way through the Flood Action Program. Watershed planning efforts will be prioritized and a cost-loaded schedule for watershed planning will be developed.
- 2) *Capital Improvements.* The City's CIP is set through FY2031, however the projects to be conducted beyond 2031 still need prioritization and definition. The City's consultant will review vulnerabilities and potential projects that are not already captured in the City's existing CIP. Planning-level cost estimates, funding schedules, and project types will be identified and prioritized.
- 3) *Policy and Programmatic Updates.* A resilient Alexandria is one that is proactive and not just reactive. Being proactive requires analyzing what policies are currently in place and how they impact infrastructure as we experience more frequent and severe storm events. More intense rainfall impact plays a role in how the City does business – for example, current infrastructure are designed to a 10-year, 24-hour storm – will this benefit us in the future? It is essential we evaluate how our standards, policies and procedures that we have relied on for operations for decades may not serve us as well into the future. The City's consultant will interview City agencies, stakeholders, and staff to review existing flood-related policies, procedures, and programs, as well as make revision recommendations based on interviews and reviews of City vulnerabilities.

Task 4 may also include a planning-level exercise to understand how the deployment of a flood sensor network might further the resilience of the City as well as a planning-level exercise on establishing a better understanding of how to undertake property buy outs, if needed in the future.

## **Task 5. Flood Resilience Plan Development**

The City will compile the *Flood Resilience Plan*, comprised of the elements discussed in this Work Plan under each Task area. The *Flood Resilience Plan* will be a culmination of the background information, information solicited from residents, modeling, vulnerability assessment, and implementation strategies and recommendations. It will be a roadmap for resilience to flooding which has quickly become a major threat to the City. Staff anticipates vetting the final plan with the community and bringing it to the City Council for adoption.

## **Task 6. Equitable Outreach, Engagement, and Communication**

A key element of developing the *Flood Resilience Plan* will be engaging with the City's residents. To date, resident's communication with elected officials and City staff on the impacts of flooding has mostly driven where flood mitigation efforts are focused. After the large storm events in 2020 and 2021, the City heard feedback via Alex311, emails, social media, and face-to-face neighborhood interactions that severe impacts were felt in low-lying, older neighborhoods. The City investigated all complaints received however, it is understood that not everyone knows about or utilizes Alex311, and it can easily be assumed that not all impacted residents have shared their story, which limits the City's ability to respond equitably.

To help bridge this gap, the City will develop and execute a Community Engagement Plan (CEP) which provides a holistic and equitable approach to engagement during development of the *Flood Resilience Plan*. The approach includes a survey in multiple languages of residents to learn more about flood impacts City-wide. The City intends to hold two larger-scale community engagement meetings which involve a facilitated discussion to let the community know about the *Flood Resilience Plan* initiative, gather flood impact feedback, and gather input on proposed policies and recommendations. The City also plans to attend farmer's markets and community events to meet residents where they live to learn about their unique flooding experiences. Lessons learned and observations from execution of the CEP for development of the *Flood Resilience Plan* will be used to develop a plan for continued outreach and engagement after the Plan is developed. This will be incorporated as a key element of the *Flood Resilience Plan*.

Throughout development of the *Flood Resilience Plan*, the City will engage with both the Office of Climate Action, responsible for leading the City's climate change mitigation efforts, and the Office of Race and Social Equity, leader of the City's ALL Alexandria initiative. Further, the City will continuously engage the Ad Hoc Stormwater Utility and Flood Mitigation Advisory Group, a group of appointed community representatives engaged in stormwater management oversight.

The key elements of this Task include the following:

- ✓ Gather information on flood events that may have been missed → Survey and community engagement events
- ✓ Disseminate information efficiently and equitably → Use networks with the Ad Hoc Stormwater Utility and Flood Mitigation Advisory Group and other local associations
- ✓ Gather input into the Plan → Facilitated workshop discussions and community events

### b) Responsibilities

The City's Engineer of Record Contract for Stormwater will be utilized to procure a consultant to develop the *Flood Resilience Plan*. The Tasks listed above will be performed predominantly by the City's consultant, with input and oversight from City staff. City staff will partake in interviews to collect information about existing flood mitigation and response programs and policies. City staff will also provide additional community engagement above and beyond what is presented in Task 6. City staff plan to attend additional community events and meetings to disseminate information about the *Flood Resilience Plan* and collect local community flood insights and comments about the *Flood Resilience Plan*.

Additional details on the project delivery approach and project teaming will be detailed in a project management plan developed by the City. The City's project management plan is a living document that is continually updated through the life of the project. Input from the City's consultant will be included in the document as the project progresses. At a minimum, the project management plan will clearly identify the projects scope, team member roles and responsibilities, critical stakeholders, project risks and the project procurement plan.

### c) Timeframe

Table 1 provides an overview of the proposed project timeframe. It is anticipated that the plan development will take 13- to 18-months.

Table 1. Project Timeframe

Task	Schedule
Community Stakeholder Engagement	NTP – Month 12
Data Compilation, Review and Gap Analysis	NTP – Month 1.5
Flood Modeling	Month 1.5 – Month 4.5
Flood Vulnerability Assessment	Month 3 – Month 7
Flood Mitigation Strategy and Implementation	Month 5 – Month 9.5
Flood Resilience Plan	Month 8.5 – Month 13-18

#### d) Partners

The City will work with a consultant team to develop the *Flood Resilience Plan* as indicated in the Work Plan. Partners in this effort will be community members (residents and businesses) in the City who have been impacted by flooding or may be impacted in the future. Partners will be identified through the CEP process however, the following Partners will continue to be involved in the City's climate change efforts focused on flood resilience:

- Ad Hoc Stormwater Utility and Flood Mitigation Advisory Group
- City Offices
  - Office of Climate Action
  - Office of Race and Social Equity
  - Office of Emergency Management
  - Department of Planning & Zoning
  - Department of Transportation and Environmental Services
  - Department of Project Implementation
  - General Servicers
  - Fire Marshall's Office
  - Alexandria Fire Department
- Potential Community Groups
  - African Communities Together
  - Tenants and Workers Union
  - UNITE HERE!
  - Casa Chirilagua
- Civic Associations
- Alexandria City Libraries
- Alexandria City Public Schools

#### e) Deliverables

Deliverables associated with the six Tasks included in the Work Plan are detailed in Table 2.

Table 2. Task Deliverables

<b>Task</b>	<b>Deliverable</b>
Task 1. Review of Studies and Reports	<ul style="list-style-type: none"> <li>• Summary technical memorandum</li> </ul>
Task 2. 2-D Screening-Level Model	<ul style="list-style-type: none"> <li>• Summary technical memorandum and model output</li> </ul>
Task 3. City-Wide Flood Vulnerability Assessment	<ul style="list-style-type: none"> <li>• Summary technical memorandum</li> </ul>
Task 4. Flood Mitigation Strategy and Implementation	<ul style="list-style-type: none"> <li>• Summary technical memorandum</li> </ul>
Task 5. Flood Resilience Plan Development	<ul style="list-style-type: none"> <li>• FRP</li> </ul>
Task 6. Equitable Outreach, Engagement, and Communication	<ul style="list-style-type: none"> <li>• Community Engagement Plan (CEP) during development of the FRP</li> <li>• Outreach event materials, including notifications, presentations, boards, and comments</li> <li>• Community survey and results</li> <li>• Plan for continued community engagement, incorporated into the FRP</li> </ul>

### f) Long-Term Maintenance

The *Flood Resilience Plan* does not require physical maintenance. However, measures are in place to ensure the plan is executed. First, the City has an established Flood Action Alexandria program administered jointly by Transportation & Environmental Services and Department of Project Implementation. The program is responsible for executing the approved *Flood Resilience Plan* and is funded by the City's dedicated Stormwater Utility Fee, effective since 2018. Second, the City plans to provide an official public comment period for the *Flood Resilience Plan* and bring the Plan to Council for adoption. With adoption and public input, the City has the authority and obligation to move forward with executing the plan. Finally, T&ES and DPI have forged relationships with other City Departments and staff as well as the community at-large, which is imperative to ensuring programmatic longevity and focus on this effort to help build flood resilience in Alexandria. Other City departments will remain involved in the execution including Office of Emergency Management; Office of Climate Action; and Office of Race and Social Equity.

## 4. Evaluation

This Project will be successful when the City produces a well-informed *Flood Resilience Plan* and identifies future areas of further study and potential flood mitigation projects to carry us into the future. Weather patterns have shifted, and storms have become more severe, flashy, and consequential. The City is doing its best to mitigate the impacts felt by the community through Flood Action Alexandria, launched in 2021. But much more needs to be done – and there needs to be greater community involvement and participation in the process – to understand the true need in order to become more resilient. Efforts to date have helped inform this Work Plan and *Flood Resilience Plan*. Indicators of a successful project will be:

a. Indicators of Success

1. Number of community members providing input and engaging at outreach events
2. Number of areas identified which flood which were previously unknown
3. Number of City agencies and stakeholders who provide input and agree to implementing the FRP
4. Completion of FRP, as well as approval of FRP by Council

b. Data Collected and how the Data will Measure Success

1. Community engagement levels will be tracked using the survey summary tools, as well as counters at public engagement events. Higher rates of participation indicate greater community input and engagement. Demographic information will be voluntarily collected in the survey to understand the range of community participants and where additional outreach may be beneficial.
2. Areas identified which flood which were previously unknown will be counted during the modeling and vulnerability assessment. This metric is a partial indicator of the success of the modeling and vulnerability assessment to identify areas of the City with unknown flooding issues that the City can subsequently work to address.
3. The number of stakeholders which engage with the *Flood Resilience Plan* development and accept the *Flood Resilience Plan* will be counted during Task 4 and 5. This metric provides a gauge for how widely the *Flood Resilience Plan* will be accepted by City stakeholders and how strong the implementation can be.
4. Completion of the *Flood Resilience Plan* and approval by Council will be determined during Task 5 and indicates whether this project successfully resulted in an actionable and acceptable plan for implementation.

c. How was Cost Effectiveness Evaluated and Measured against the Expected Outcomes?

The cost of developing the plan is presented in the Budget Narrative. Damage and risks to the City in past and future storms has not been calculated holistically for the City but will be calculated as part of this *Flood Resilience Plan* initiative to help the City better understand the comparison of risks to the City versus cost of implementation, and how cost-effective solutions can be funded over time.

d. What Products, Services, Meetings, Outreach Efforts etc. will be Conducted and how will Success be Measured?

Please see Task 6 and metric #1 under Indicators of Success.

e. Project Progress Monitoring Plan

The City's consultant is responsible for developing a project management plan (PMP) within a few weeks of project NTP. The PMP outlines communications for the task, roles and responsibilities, a detailed project schedule, a work breakdown structure with associated costs, QA/QC procedures, and a roadmap of interim and final deliverables. The PMP will be used by the City's project manager, the City sponsor the consultant project manager to monitor project progress against. Bi-weekly meetings with the City's consultant will be held to ensure the project stays on target with deliverables, quality, schedule, and budget. These meetings will also be used to discuss project issues or challenges that may cause delays or other course changes. Opportunities to make up schedule and course correct will be discussed and will be dependent on the challenges that arise. Lessons learned during the project will be documented by the City project management team and consultant such that the lessons learned can be applied during execution of the FRP and during subsequent revisions/renewals of the *Flood Resilience Plan*.

# **City of Alexandria Flood Resilience Plan**

## **Appendix B: Budget Narrative**

**Applicant Name: City of Alexandria, VA**  
**Community Flood Preparedness**  
**Fund & Resilient Virginia Revolving**  
**Loan Fund**

## Detailed Budget Narrative

Period of Performance: January 1, 2024 through March 31, 2025  
Submission Date: November 12, 2023

Funding Request Breakdown									
Funding Sources and Allocation									
Funding Type Details									
Grand Total State Funding Request									\$525,000
Grand Total Local Share of Project									\$175,000
Federal Funding (if applicable)									\$
Project Grand Total									\$700,000
Locality Cost Match									25%
Breakout By Cost Type									
Federal Share (if applicable)	Personnel	Fringe	Travel	Equipment	Supplies	Contracts	Indirect Costs	Other Costs	Total
Local Share						\$175,000			\$175,000
State Share						\$525,000			\$525,000
Pre-Award/Startup									
Maintenance									
Total	\$	\$	\$	\$	\$	\$700,000	\$	\$	\$700,000

Personnel – The City will not charge Personnel costs under this grant agreement.

Fringe – The City will not charge Fringe costs under this grant agreement.

Travel – The City will not charge Travel costs under this grant agreement.

Supplies – The City will not charge Supply costs under this grant agreement.

Contracts – As outlined in the Work Plan, the City's Engineer of Record Contract for Stormwater will be utilized to procure a consultant to develop the *Flood Resilience Plan*. The Tasks listed above will be performed predominantly by the City's consultant, with input and oversight from City staff.

The City is requesting 75% of the funds through CFPF (\$525,000) and commits to match the remaining 25% with City funds (\$175,000) for a total project amount of \$700,000.

Indirect Costs – The City will not charge indirect costs under this grant agreement.