

Northern Virginia Hazard Mitigation Plan
Annex 2: City of Alexandria

November 2022



City of Alexandria Overview

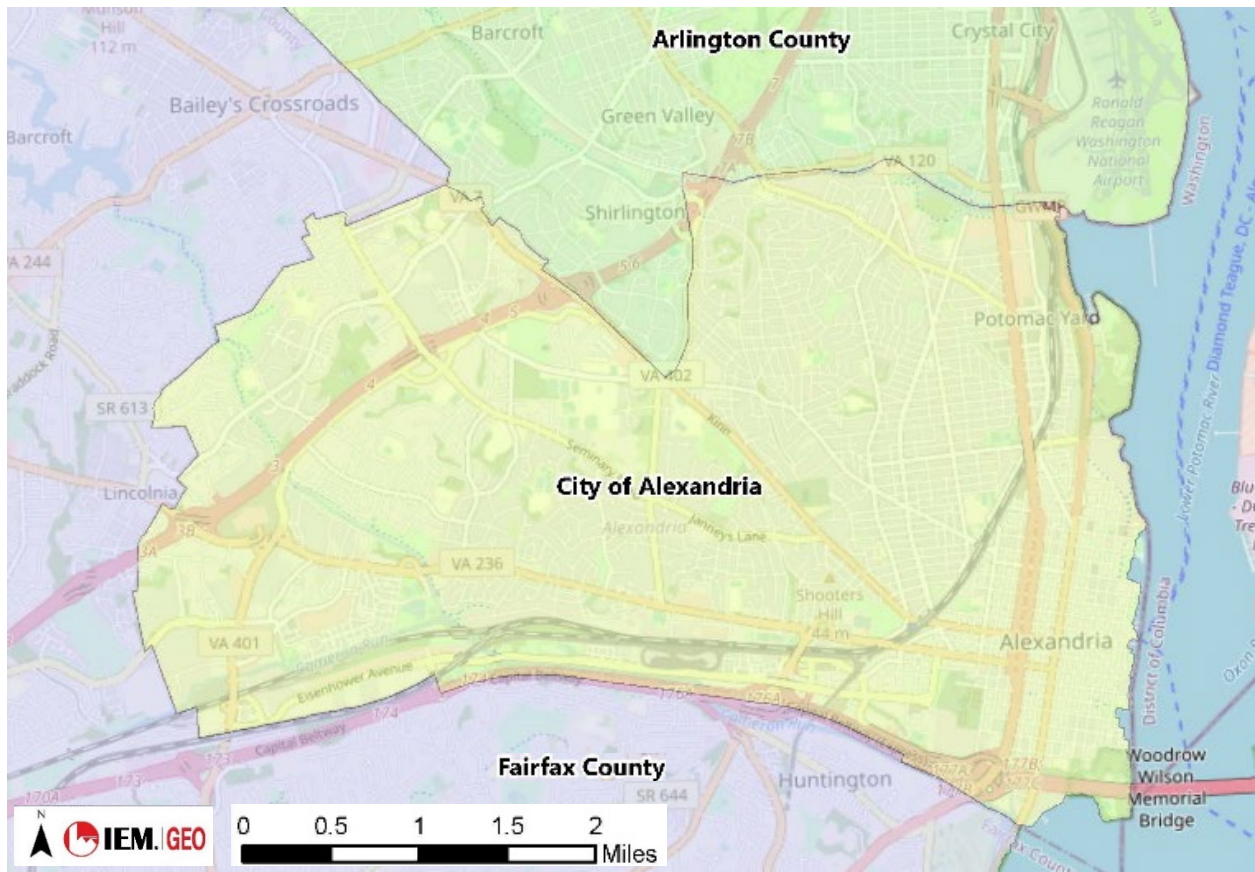








Table 1: Specific Jurisdictional Data

 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

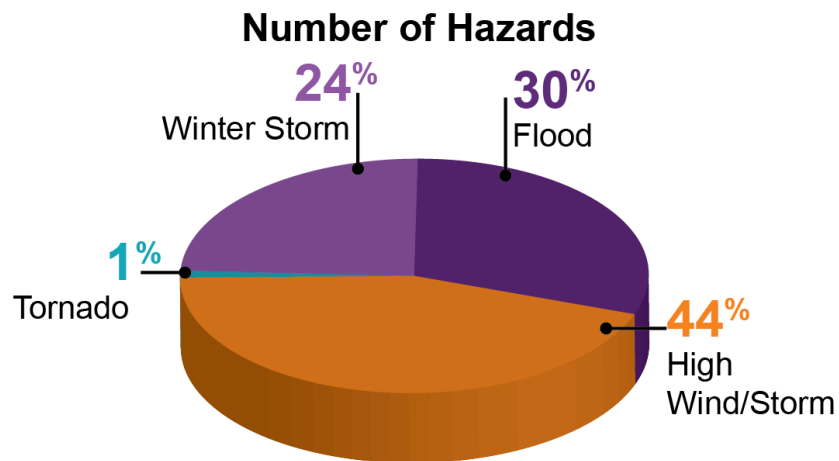


Figure 1: Percentage of Hazards

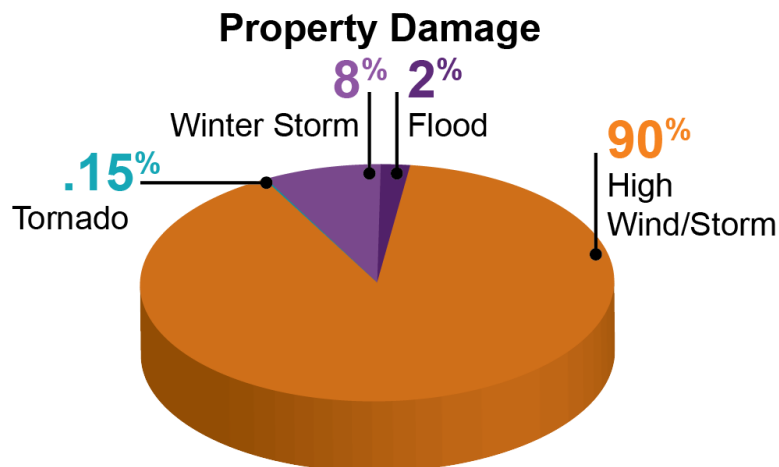


Figure 2: Reported Property Damage Percentages from Natural Hazard Events¹

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%

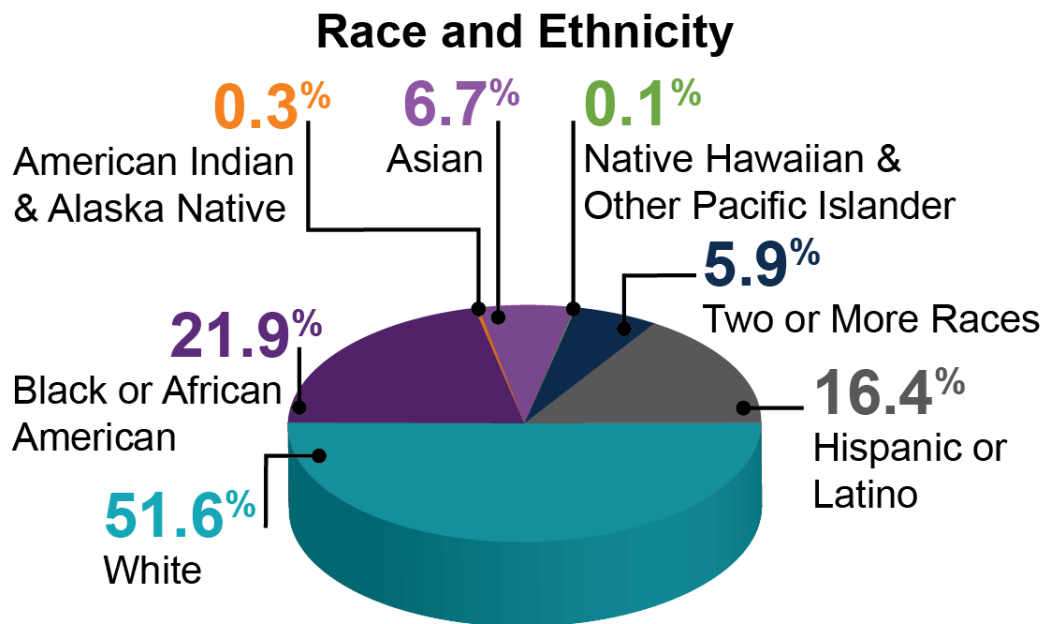


Figure 4: Race and Ethnicity Demographics from 2020 US Census

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 primary 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 FHB 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](#)

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.

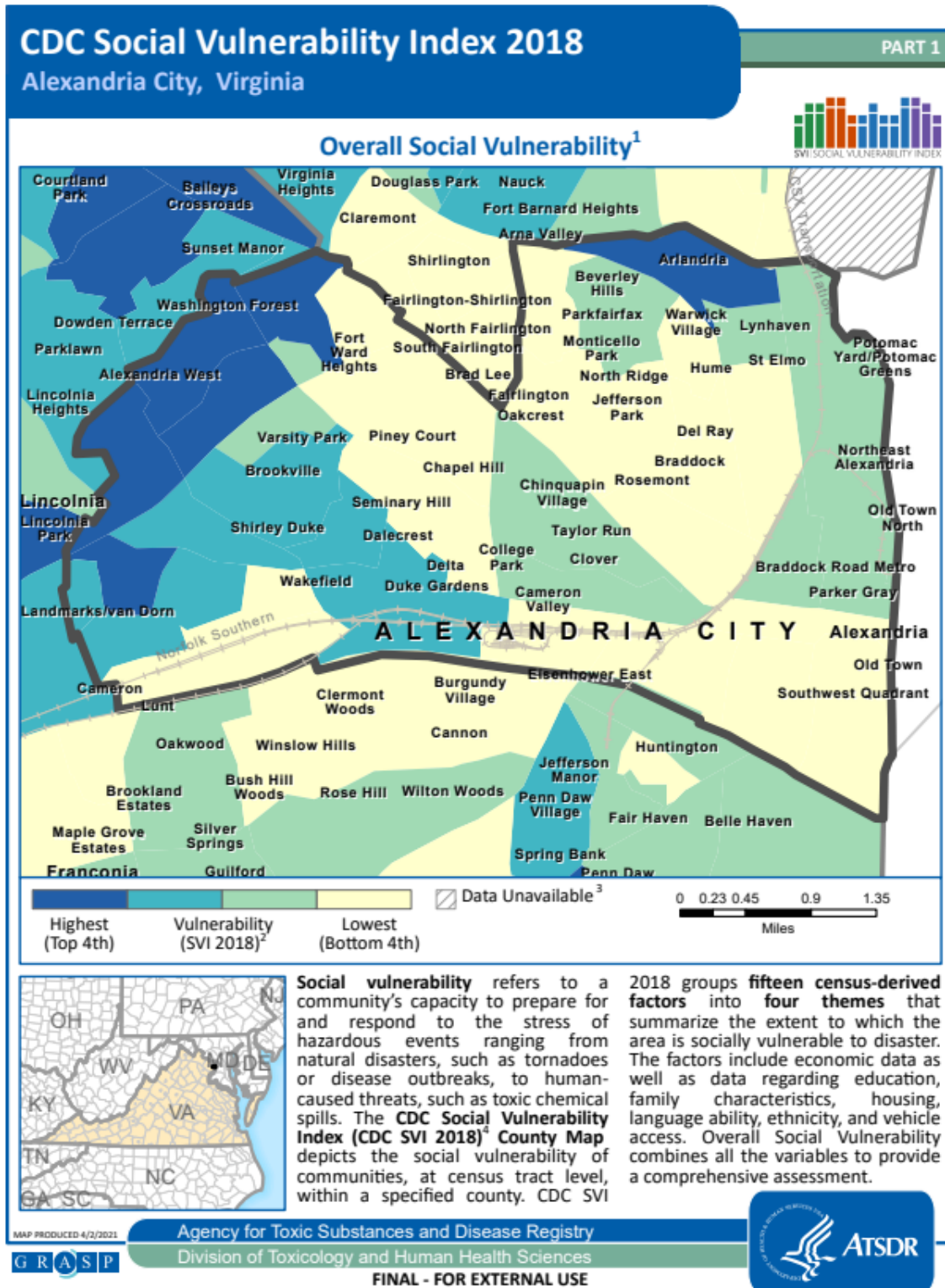
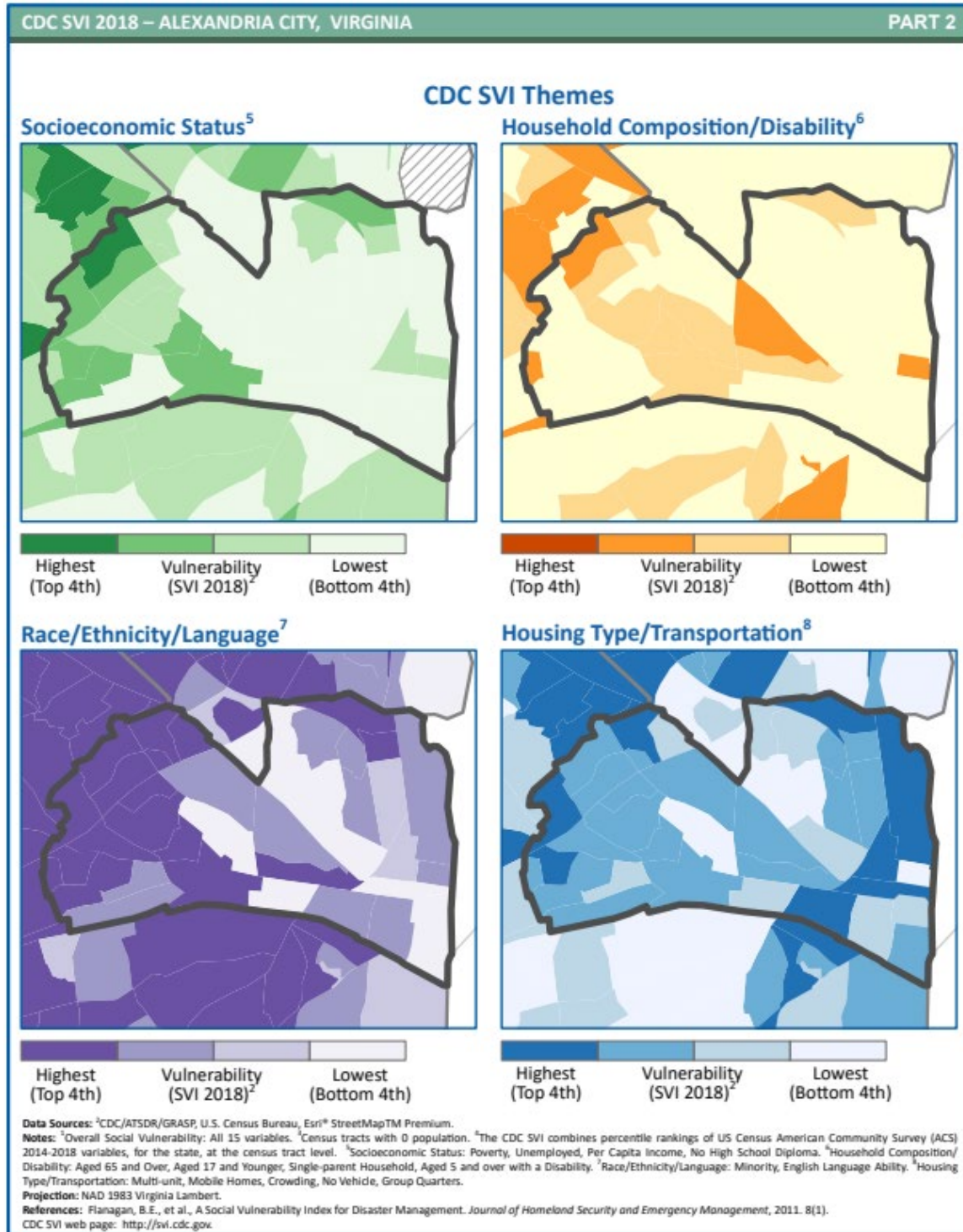


Figure 5: Overall Social Vulnerability (2018), City of Alexandria¹³

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

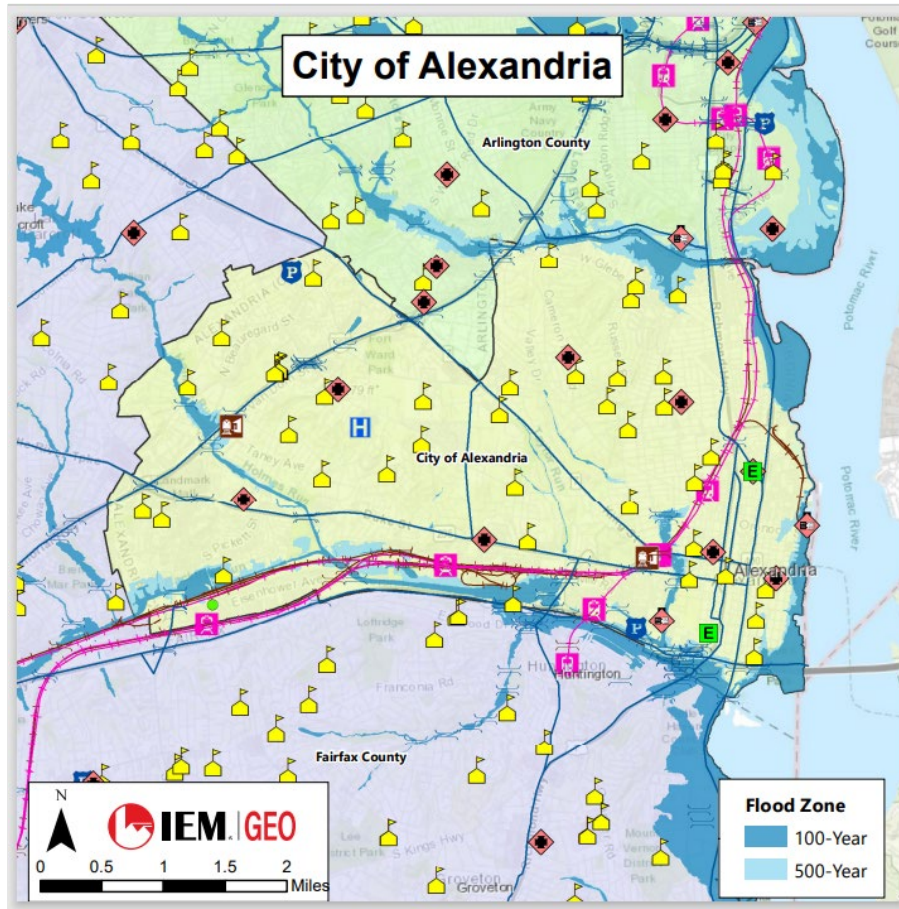


Figure 7: Critical Facilities in Flood Zones, City of Alexandria¹⁵

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.

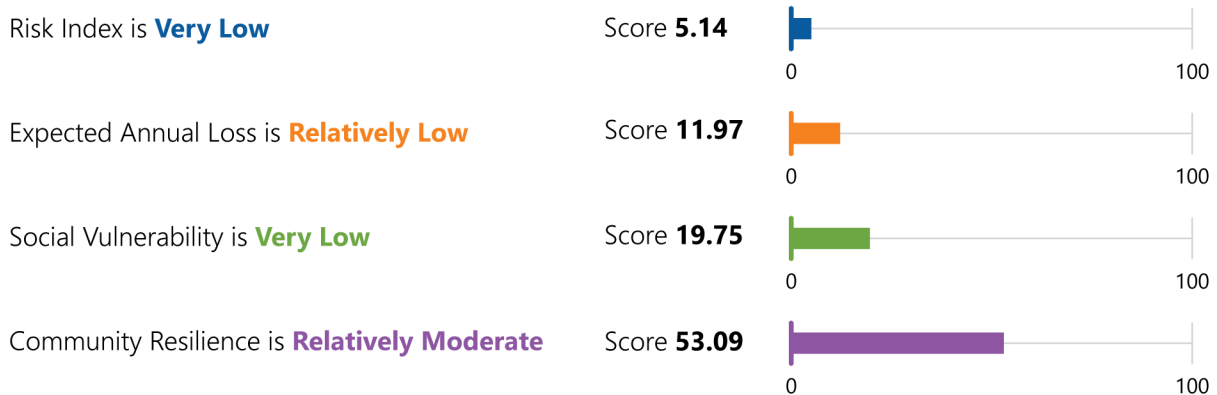
Table 27: Capability Summary – Activities that Reduce Natural Hazard Risk or Impacts

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.”

Hazard Types	Risk Index Rating	Risk Index Score		
Avalanche	Not Applicable	--		
Coastal Flooding	Very Low	3.23	0	100
Cold Wave	No Rating	0.00	0	100
Drought	No Rating	0.00	0	100
Earthquake	Very Low	2.09	0	100
Hail	Very Low	3.65	0	100
Heat Wave	Relatively Low	7.62	0	100
Hurricane	Very Low	3.99	0	100
Ice Storm	Very Low	4.42	0	100
Landslide	Very Low	7.47	0	100
Lightning	Relatively Low	10.37	0	100
Riverine Flooding	Very Low	5.13	0	100
Strong Wind	Relatively Low	9.75	0	100
Tornado	Relatively Low	9.83	0	100
Tsunami	Not Applicable	--		
Volcanic Activity	Not Applicable	--		
Wildfire	No Rating	0.00	0	100
Winter Weather	Very Low	7.44	0	100

Figure 9: Hazard Type Risk Index, National Risk Index²⁰

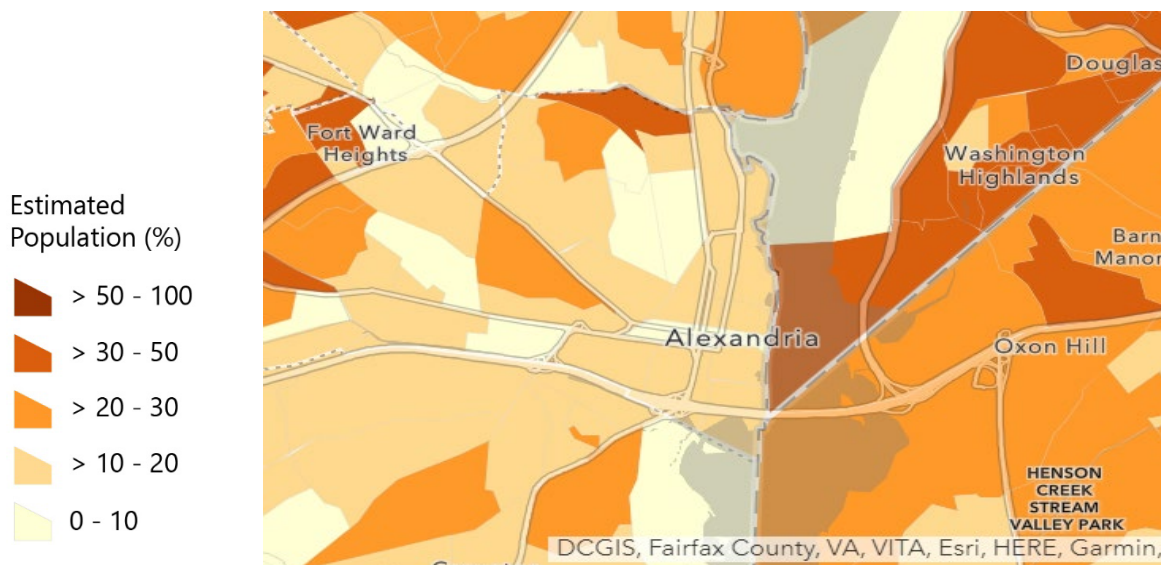
The NRI calculation does not follow the same criteria and formulas used in the hazard risk ranking methodology for this plan but is provided as a comparative measurement tool.

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 \(fema.gov\)](#)

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.



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.

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

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← Office of Emergency Manageme... 🔍

 **Office of Emergency Management, City of Alexandria, VA** 11 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 ...

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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.