



VCU

Research Institute for Social Equity

L. Douglas Wilder School of
Government and Public Affairs

Strengthening Critical Infrastructure for Equity and Resilience: Findings from the Environmental Justice Data Project



September 15, 2025



Cover Photo Credit: from l to r: Photo from Chesapeake Bay Foundation; Photo from Clay Banks on Unsplash; Photo from Unsplash



Table of Contents

Authors & Acknowledgements	1
Executive Summary	3
Project Background and Objectives	6
Environmental hazards and infrastructure challenges in historically marginalized communities	6
Environmental Resilience and Infrastructure Equity	9
Featured Communities: Charles City County, City of Emporia, and City of Richmond	11
Equity and Inclusion-Informed Methods	14
Data Collection and Analysis	14
Quantitative Data Profiles of the Three Localities	14
Document Review of Emergency Plans	15
Insights from Local Governments and Communities	16
FINDINGS & INSIGHTS	19
Quantitative Data Highlights: Infrastructure vulnerabilities, exposure risks, disparities	19
Charles City County	24
Overview	24
Quantitative Data Highlights: Infrastructure vulnerabilities, exposure risks, disparities	24
Review of Emergency Management Documents	26
Insights from Local Communities	29
Summary	31
City of Emporia	32
Overview	32
Quantitative Data Highlights: Infrastructure vulnerabilities, exposure risks, disparities	32
Review of Emergency Management Documents	34
Insights from the Community	36
Focus Groups with community members	38
Pre-Survey	38
Focus Groups	40
Summary	42
City of Richmond, Virginia	44
Overview	44
Quantitative Data Highlights: Infrastructure vulnerabilities, exposure risks, disparities	44

Review of Emergency Management Documents	46
Insights From Local Communities	50
Interviews with Emergency Management Officials	50
Focus Groups with community members	53
Pre-Survey	53
Focus Groups.....	55
Summary	57
Community and Stakeholder Engagement	59
How Stakeholders Shaped Findings	59
Community Advisory Boards (CABs).....	59
Community Navigator	59
Capacity Building Workshops	60
Community Conversations.....	60
Deliverables	61
Summarized Data Packages	61
Equity Analysis of Relevant Documents.....	61
Asset Maps.....	61
StoryMaps	62
Navigating the StoryMaps.....	62
Reflections and Lessons Learned.....	65
Building Trust	65
Adapting to Change.....	65
Community Navigators	65
Equity at the Center.....	65
Building Capacity in Smaller and Underserved Localities	66
Balancing Data and Lived Experience	66
Returning Findings to the Community	66
Impacts	67

Authors & Acknowledgements

This report was prepared by the Research Institute for Social Equity at Virginia Commonwealth University. Research team members include:

- Nakeina E. Douglas-Glenn, PhD, Principal Investigator
- Luisa Nazareno, PhD, Faculty Researcher
- Emily Schreer, Wilder Fellow & Graduate Researcher
- Amidu Kalokoh, Doctoral Researcher
- Curtis Brown, MPA, Emergency Management Expert & Consultant
- Melvin Brown, Graduate Researcher

We are also grateful to the members of the RISE staff and consultants Dr. Yali Pang, Dr. Morgan Woodle, Dr. Charity Scott, Paula Otto, Tivoli Dabney, for their subject matter expertise, and graduate and undergraduate student researchers, J. Herman Tomasi, Jaythan Newby, and Anujin Dorjderem, for their time, skills, and dedication to this project.

Thank you to emergency management personnel and community leaders in Charles City County, City of Emporia, and the City of Richmond for participating in this study, for helping to shepherd this project forward, and for their partnership in the process. We are especially grateful to

- Fire Chief James “Jimmy” Johnson, Charles City County, Fire and Emergency Services;
- William Johnson, City Manager, City of Emporia; and
- Stephen Willoughby, Director for Emergency Communications, Preparedness & Response, City of Richmond.

Special thank you also to our community navigators, Lisa (City of Emporia) and Patrice (City of Richmond), whose knowledge, trust, and deep community connections made this work possible.

We are especially grateful to Resilient Virginia and the Windward Fund for making this work possible through their support of the Environmental Data Grant Project.

Finally, thank you to the many community members of Charles City County, the City of Emporia, and the City of Richmond for sharing your experiences with us. Your voices and perspectives are at the heart of this report.

This research was made possible by a grant from Resilient Virginia with support from the Windward Foundation through the Environmental Justice Data Grant program. The Research Institute for Social Equity at Virginia Commonwealth University served as a sub-awardee. The views, findings, and conclusions expressed in this report are those of the authors and do not necessarily represent the official positions or policies of Resilient Virginia, the Winward Foundation, or any other funding partners.

Recommended Citation:

Research Institute for Social Equity. (2025). *Strengthening Critical Infrastructure for Equity and Resilience: Findings from the Environmental Justice Data Project*. Richmond, VA: L. Douglas Wilder School of Government & Public Affairs. Virginia Commonwealth University.
<https://scholarscompass.vcu.edu/rise/6/>

Executive Summary

In 2023, the Research Institute for Social Equity, an institute of the Virginia Commonwealth University's L. Douglas Wilder School of Government and Public Affairs, partnered with Resilient Virginia to explore the impact of climate change and degradation due to disasters and environmental hazards on the critical infrastructure in and around historically marginalized and underserved communities in the Richmond and Southside Virginia areas. During the study period, 2023-2025, the research team conducted both primary and secondary research in three Virginia localities: Charles City County, the City of Emporia, and a portion of the City of Richmond. Secondary research included a thorough review using an equity analysis framework of the localities' existing planning documents, including emergency management plans and forward-looking strategic plans. Primary research included surveys, interviews, and focus groups with both emergency officials and citizens. Stakeholders were involved not only as participants but also as partners in interpreting findings. More than 100 emergency management officials, Community Advisory Board members, navigators, and community conversation attendees provided input on how results should be framed and shared with residents. Their feedback shaped the design of storymaps, policy briefs, and data products, ensuring that project deliverables reflect community priorities and can be used in future grant applications, planning, and resilience efforts.

At its core, the project sought to connect data-driven insights with lived experiences, ensuring that findings would not only deepen scholarly understanding but also directly inform grant applications, planning, and investment strategies to safeguard the health, safety, and livelihoods of vulnerable populations. This dual emphasis on equity and infrastructure resilience reflects both the urgency of climate adaptation and the enduring legacies of systemic inequities in land use, zoning, and resource distribution.

This report is divided into three sections, outlining findings and recommendations for the three localities. High-level findings of the report include:

- Overall, Charles City County, Emporia, and the four neighborhoods in the City of Richmond show a consistent pattern of socioeconomic vulnerability, notably when compared to statewide and national measures.
- While most of the localities' written plans include some acknowledgement of vulnerable populations, the majority could be strengthened to be more inclusive. Additionally, researchers found the Charles City County Comprehensive Health Improvement Plan (CHIP) and the RVA Green Climate Equity Plan 2030 to be examples of strongly inclusive documents that address marginalized and underserved communities.
- The biggest concerns of both emergency officials and citizens varied in the three localities, but generally included:
 - aging infrastructure;
 - budget constraints;
 - weather emergencies – including hurricanes, flooding, and winter storms;

- a perceived belief/evidence that lower-income areas do not receive the same funding or level of attention in both preparing for and responses to emergencies; and,
- the need to improve emergency communications plans, especially for those citizens who may not have access to the latest technology.

To make the findings accessible and useful to a diverse audience, the project produced a set of complementary deliverables.

- **Data Packages.** Each locality received a tailored data package that integrates demographic data, hazard profiles and infrastructure assessments. These packages provide a foundation for grant writing, planning and resilience building.
- **Equity Document Review.** The team conducted a structured analysis of Emergency Management, hazard mitigation and master plans to evaluate how equity is addressed. This review highlights strengths and gaps opportunities for more inclusive planning.
- **Surveys, Interviews And Focus Groups.** Primary research with residents and Emergency Management personnel ensured that community voices and practitioner perspectives were central to the findings.
- **Interactive Storymaps.** developed for Charles City County, the City of Emporia, and the City of Richmond to make the project's findings accessible in a visually engaging format. Each StoryMap combines narrative text, images, and data to highlight the community context, vulnerabilities, assets, and resources. While each locality has unique content, the StoryMaps share a similar structure to make navigation straightforward. Readers will typically find:
- **Slide Decks, Briefs, and Tables.** Supporting materials, including presentations, summary tables, and briefs, distill key insights into concise, shareable formats for policymakers, funders, and community members.

The data in this report can be used to inform the development and allocation of hazard mitigation funding to prioritize protecting historically marginalized communities near critical infrastructure in Charles City County, the City of Emporia, and the City of Richmond.

The findings raise important questions about whose voices are missing and whose needs are overlooked in policymaking and implementation. Too often, marginalized groups bear the burden of environmental degradation. Addressing this calls for prioritizing equity across four dimensions:

- Making sure everyone has a fair chance to be heard and included in decisions.
- Ensuring that people can access and use the resources they need.
- Providing the services needed, no matter where someone lives.
- Sustaining better results for all communities.

These communities are not only vulnerable to environmental hazards, but they also grapple with low-capacity challenges. Local emergency management staff often juggle multiple roles with



limited support, underscoring the need for additional resources and partnerships to effectively manage multiple responsibilities.

This project emphasizes the importance of sharing research results with the community in accessible and understandable formats as best practice. Deliverables such as data packages, briefs, and storymaps provide clear illustrations of community demographics, cultural assets, infrastructure, and risks, while also equipping local governments and residents with tools for planning and resilience-building.

Unlike most environmental studies, this project enriches and amplifies the voices of frontline communities by focusing on their lived experiences, allowing these marginalized areas to co-produce knowledge essential for future environmental justice efforts. By deploying primary and secondary lenses, the project results from comprehensive data packages suitable for training and mentorship in the target areas to increase awareness, enhance local capacity, and motivate community-led solutions. The project highlights the close connection between environmental degradation, power dynamics, governance, and historical injustices. It offers a model for concerted efforts in shaping public policy and amplifying marginalized voices, providing practical tools for meaningful participation beyond mere consultation in policy creation and implementation.

This report should be viewed as validation for the participating localities. It affirms the challenges these communities already face and the needs they have long recognized. The findings and deliverables are designed to strengthen local capacity to advocate for resources on behalf of citizens. Employees and neighborhoods so that investments flow where they are most urgently needed.

Project Background and Objectives

Environmental hazards and infrastructure challenges in historically marginalized communities

The frequency and severity of environmental disasters have far-reaching consequences for human, built, and natural environments. These events create a domino effect, significantly impacting critical infrastructure, both physical and cyber systems, essential for maintaining community lifelines. These lifelines support life, health, and safety (Figure 1). During times of crisis, having sufficient critical infrastructure is vital for reducing disruptions.

Historically, extreme environmental events in the United States, such as hurricanes, floods, wildfires, winter storms, and heat waves, have caused considerable human and economic losses. These events have hindered the effectiveness of local administration and polluted the environment.¹ As disasters first occur at the local level, communities at risk are often the most impacted. Vulnerable populations, such as the elderly, children, low-income individuals, disabled persons, prisoners, and those struggling with substance abuse, face significant challenges. They experience heightened mental and physical health issues during and after disasters.² Historically marginalized communities are the least prepared, have lower resilience, and are slower to recover³. A review of the history of natural disasters further shows the deep-rooted differences in susceptibility across United States communities, with some being less exposed, better prepared, and quicker to recover than others. Increasing age, physical disability, and lower education and income are each significantly linked to worse disaster preparedness.⁴ Additional variation in vulnerability can arise from various factors, including the natural geographical and demographic characteristics of the localities⁵, as well as political or administrative decision-making. For instance, in Virginia, most jurisdictions with the highest disaster losses are those that received

¹ Kadri, F., Birregah, B., & Châtelet, E. (2014). The impact of natural disasters on critical infrastructures: A domino effect-based study. *Journal of Homeland Security and Emergency Management*, 11(2), 217–241. <https://doi.org/10.1515/jhsem-2012-0077>

² Benevolenza, M. A., & DeRigne, L. (2019). The impact of climate change and natural disasters on vulnerable populations: A systematic review of literature. *Journal of Human Behavior in the Social Environment*, 29(2), 266–281. <https://doi.org/10.1080/10911359.2018.1527739>

³ EPA. (2021). Climate Change and Social Vulnerability in the United States: A Focus on Six Impacts. U.S. Environment Protection Agency, EPA 430-R-21-003. [Climate Change and Social Vulnerability in the United States: A Focus on Six Impacts](#)

⁴ Al-rousan, T. M., Rubenstein, L. M., & Wallace, R. B. (2014). Preparedness for natural disasters among older US adults: A nationwide survey. *American Journal of Public Health* (1971), 104(3), 506–511. <https://doi.org/10.2105/AJPH.2013.301559>

⁵ Borden, K. A., Schmidtlein, M. C., Emrich, C. T., Piegorsch, W. W., & Cutter, S. L. (2007). Vulnerability of U.S. cities to environmental hazards. *Journal of Homeland Security and Emergency Management*, 4(2), 5. <https://doi.org/10.2202/1547-7355.1279>

the smallest share of the Emergency Management Performance Grant. This grant is the most frequent Federal Emergency Management Agency grant distributed by localities.⁶

Rather than being naturally vulnerable, neighborhoods exist within built environments that are often isolated, neglected, and underserved. This is due to social processes and broader planning and development practices driven by power and privilege, which create areas of prosperity and deprivation. Unequal outcomes are primarily caused by early racial zoning, legalized redlining, and ultimately racial segregation. This has led to a decline in tax bases and worsening built environments. Therefore, the strength and resilience of infrastructure in these localities are directly shaped by human choices and social ideologies depicting environmental racism and classism.⁷ The disproportionate impacts of disasters on vulnerable populations, along with their significant human, economic, and environmental consequences, raise concerns about environmental justice—a central issue in environmental politics. Environmental justice recognizes the disproportionate impacts of environmental hazards on communities of color.⁸ It promotes equitable public participation by amplifying the voices of poor, racialized, and indigenous communities in environmental decision-making. It also enhances public health and economic growth, while equitably allocating ecological benefits and burdens.⁹

Many trace the origin of environmental justice to the 1982 protests in Warren County, North Carolina. The predominantly African-American community was activated to push back against the disposal of polychlorinated biphenyls (PCBs). The PCBs polluted the soil at the landfill in the county. This resistance marked the first significant action of solidarity between civil rights activists, leaders, and the majority White environmental activists since the 1960s.¹⁰ Environmental justice has since evolved. The 1990s highlighted a broader range of issues within the movement than is often acknowledged. Its diversity was inspired by Dana Alston's well-known phrase "where we live, work, and play" in her speech at the first People of Color Environmental Leadership Summit in 1991.¹¹ Defining ecological and environmental issues, Alston stated that environmental issues do not exist in isolation. They are broad and interconnected, and our understanding of the

⁶ Louis-Charles, H., Derakhshan, S., Kalokoh, A., Brown, C., & Starke, A. (2024). Unequally prepared: A distributive equity study of local emergency management funding in Virginia, USA. *Disaster Prevention and Management*. <https://doi.org/10.1108/DPM-06-2024-0140>

⁷ Hendricks, M. D., & Van Zandt, S. (2021). Unequal protection revisited: Planning for environmental justice, hazard vulnerability, and critical infrastructure in communities of color. *Environmental Justice*, 14(2), 87–97. <https://doi.org/10.1089/env.2020.0054>

⁸ Krieg, E. J., & Faber, D. R. (2004). Not so Black and White: Environmental justice and cumulative impact assessments. *Environmental Impact Assessment Review*, 24(7), 667–694. <https://doi.org/10.1016/j.eiar.2004.06.008>

⁹ Scott, D. N. (2014). *What is environmental justice?* Osgoode Legal Studies Research Paper Series. 4. <http://digitalcommons.osgoode.yorku.ca/olsrps/4>

¹⁰ Schlosberg, D., & Collins, L. B. (2014). From environmental to climate justice: climate change and the discourse of environmental justice. *Wiley Interdisciplinary Reviews. Climate Change*, 5(3), 359–374. <https://doi.org/10.1002/wcc.275>

¹¹ Agyeman, J., Schlosberg, D., Craven, L., & Matthews, C. (2016). Trends and directions in environmental justice: From inequity to everyday life, community, and just sustainabilities. *Annual Review of Environment and Resources*, 41(1), 321–340. <https://doi.org/10.1146/annurev-environ-110615-090052>

environment is part of a larger framework of social, racial, and economic justice.¹² Environmental justice movements that are led by people of color center self-determination in how they relate to the land, demands for autonomy, and civil and human rights.¹³

Environmental justice criticizes mainstream environmental law and advocacy institutions for paying less attention to the distributive effects of environmental policy. They claim these organizations prioritize elite and professional advocacy over affected communities' participation in decision making. These organizations then ignore the community's emphasis regarding the importance of neighborhoods, workplaces, and cities in environmental justice.¹⁴ However, critics argued that the environmental justice movement is primarily reactive, focusing on threats to communities like toxins and poor transit, rather than promoting proactive policies such as sustainable communities with adequate green and play spaces.¹⁵ Today, the scope of the environmental justice movement and discourse has expanded to include climate justice, indigenous justice, and energy justice, all situated under social justice. It draws from a diverse range of justice ideas within the environmental justice framework.¹⁶ In pursuit of environmental justice, having a better understanding of the various impacts of environmental hazards across different vulnerable communities is essential for emergency preparedness and for enhancing critical infrastructure and community resilience.

This Environmental Justice Data Grant Project (EJDP) evaluates critical infrastructure and community resilience from an environmental justice perspective. Critical infrastructure, according to FEMA, refers to essential systems, networks, functions, and assets, whether physical or virtual, whose disruption or destruction would severely compromise national security, economic stability, and/or public health or safety.¹⁷ The U.S. Department of Homeland Security defines 16 sectors of infrastructure that are important to the nation's security and functioning.¹⁸ Emergency infrastructure, some of which is owned and operated by local governments, plays a critical role for communities (see Figure 1 below).

¹² Gottlieb, R. (2005). *Forcing the spring: The transformation of the American environmental movement* (Revised and updated edition.). Island Press.

¹³ Taylor, D. E. (2000). The Rise of the environmental justice paradigm: Injustice framing and the social construction of environmental discourses. *The American Behavioral Scientist* (Beverly Hills), 43(4), 508–580. <https://doi.org/10.1177/0002764200043004003>

¹⁴ Purdy, J. (2018). The long environmental justice movement. *Ecology Law Quarterly*, 44(4), 809–864. <https://doi.org/10.15779/Z382F7JR1V>

¹⁵ Agyeman, J. (2005). *Sustainable communities and the challenge of environmental justice* (1st ed.). New York University Press. <https://doi.org/10.18574/9780814707746>

¹⁶ Agyeman, J., Schlosberg, D., Craven, L., & Matthews, C. (2016). Trends and directions in environmental justice: From inequity to everyday life, community, and just sustainabilities. *Annual Review of Environment and Resources*, 41(1), 321–340. <https://doi.org/10.1146/annurev-environ-110615-090052>

¹⁷ FEMA. (2008). Critical infrastructure and key resources support annex. <https://www.fema.gov/pdf/emergency/nrf/nrf-support-cikr.pdf>

¹⁸ America's Cyber Defense Agency. (n.d.). Critical infrastructure systems. Retrieved from <https://www.cisa.gov/topics/critical-infrastructure-security-and-resilience/critical-infrastructure-sectors>



Figure 1. Community Lifelines

The three localities studied in this project, Charles City County, City of Emporia, and City of Richmond, face challenges across key public indicators such as life expectancy, employment, and household income. These municipalities are also home to a large share of vulnerable groups, including people of color and those living in poverty. Moreover, residents in these localities are likely to be disproportionately impacted by natural hazards. Thus, understanding the lived experiences of the residents, the impacts of disasters and environmental hazards on their communities, and the critical infrastructure in and surrounding these localities can inform sustainable solutions to address the escalating challenges vulnerable communities face in these localities and beyond.¹⁹

Environmental Resilience and Infrastructure Equity

Environmental resilience is the capacity of individuals and communities to anticipate, prepare for, and recover from hazard events. Doing so in order to maintain essential functions while adapting, learning, and transforming as needed.²⁰ Building resilience requires resources to understand and assess risks, absorb shocks, and recover in ways that reduce future vulnerabilities, guided by data-driven policy, innovation, and technical solutions.²¹

¹⁹ Benevolenza, M. A., & DeRigne, L. (2019). The impact of climate change and natural disasters on vulnerable populations: A systematic review of literature. *Journal of Human Behavior in the Social Environment*, 29(2), 266–281. <https://doi.org/10.1080/10911359.2018.1527739>

²⁰ Intergovernmental Panel on Climate Change (IPCC), 2022: Summary for Policymakers [H.-O. Pörtner, D.C. Roberts, E.S. Poloczanska, K. Mintenbeck, M. Tignor, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem (eds.)]. In: *Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* [H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem, B. Rama (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA, pp. 3–33, doi:10.1017/9781009325844.001.

²¹ Feldman, H., Hinton, D., Kumar, A., Mehta, N., & Modi, K. (2023). Inclusive infrastructure investment: How to empower communities. McKinsey & Company, available at: [Inclusive infrastructure investment: How to empower communities | McKinsey](https://www.mckinsey.com/industries/infrastructure/our-insights/inclusive-infrastructure-investment-how-to-empower-communities)

While national initiatives like the Bipartisan Infrastructure Law (BIL) have advanced resilience efforts, residents' experiences with government services vary significantly within states depending on their identity, location, and access to resources.²² Significant investment gaps persist at the local level, especially in historically marginalized communities, where environmental injustice disproportionately affects racial and ethnic minorities. Race can be a stronger predictor of environmental harm than income²³, partly because these communities are more likely to live in flood zones, near waste sites, or around failing infrastructure.²⁴ According to the 2025 Report Card for America's Infrastructure, aging infrastructure systems are increasingly vulnerable to extreme weather events and natural disasters, creating avoidable risks to public safety²⁵. Community resilience depends on the ability of its critical infrastructure to provide aid effectively without heightening vulnerability among specific social groups to environmental hazards and natural disasters.

This report advances community environmental resilience and infrastructure equity by identifying priority infrastructure improvement needs through a community-driven approach. Using data and information gathered from local authorities and residents, it highlights local vulnerabilities and the often-overlooked connections between environmental hazards, infrastructure, and social justice. The results enable targeted strategies and stronger support for resilience efforts.

The project provides actionable insights on barriers to infrastructure access in the targeted localities, with a focus on marginalized groups, such as low-income residents and individuals with disabilities. By assessing community lifelines, it informs policymakers and practitioners on overcoming infrastructure inequity, fostering cross-sector collaboration, and ensuring that all communities, particularly the most vulnerable, are prepared to withstand and recover from environmental shocks. This approach underscores that environmental resilience and infrastructure equity are inter-connected: improving one requires addressing the other through systemic change and equitable resource distribution.

²² McKinsey & Company. (2022). Governments can deliver exceptional customer experiences—here's why. November 16.

²³ Bullard, R. D. (1994). Overcoming Racism in Environmental Decisionmaking. *Environment: Science and Policy for Sustainable Development*, 36(4), 10–44. <https://doi.org/10.1080/00139157.1994.9929997>; Mital, A. (2023). Change in environmental justice scores in historically redlined communities compared to non-redlined communities: A case study of City of Richmond, Virginia. *Urban Climate*, 49, 101505. <https://doi.org/10.1016/j.uclim.2023.101505>

²⁴ Hendricks, M. D., & Van Zandt, S. (2021). Unequal Protection Revisited: Planning for Environmental Justice, Hazard Vulnerability, and Critical Infrastructure in Communities of Color. *Environmental Justice*, 14(2), 87–97. <https://doi.org/10.1089/env.2020.0054>

²⁵ American Society of Civil Engineers (ASCE). (2025). *2025 Report Card for America's Infrastructure*. Washington, D.C.: ASCE. Available at: <https://infrastructurereportcard.org>

Featured Communities: Charles City County, City of Emporia, and City of Richmond

As disasters become more frequent and severe, the uneven impacts are becoming more obvious, especially in historically marginalized communities. Figure 2 shows the three localities featured in this report. These localities share a combination of sociodemographic characteristics and critical infrastructure conditions that make them disproportionately vulnerable to environmental risks and hazards.

Charles City County was among Virginia's earliest boroughs and is home to historically marginalized and underserved communities such as Weyanoke. Weyanoke was the first African American community established. It was formed by the first enslaved Africans in the tidewater region, and was established in the midst of Weyanoke Indians. Consistent with the reality of environmental racism, this area is just 15 miles from Virginia's first mega-landfill, which now serves as a major waste disposal site accepting debris from across the country. The Charles City County Landfill has been producing pollutants like chloroform, cobalt, arsenic, and cadmium in groundwater since 2021. These pollutants affect areas like Brown Grove, a historically Black community already surrounded by industrial infrastructure.²⁶ Moreover, Charles City County has experienced storms and hurricanes, including Hurricane Isaias, Ernesto, and Hanna, along with multiple flooding and hail events. Nearly 89% of the area is potentially vulnerable to coastal flooding due to its elevation and proximity to water.²⁷ These hazards, in communities already burdened with pollution and high rate of illness, have exposed residents to disproportionate environmental and disaster risks.

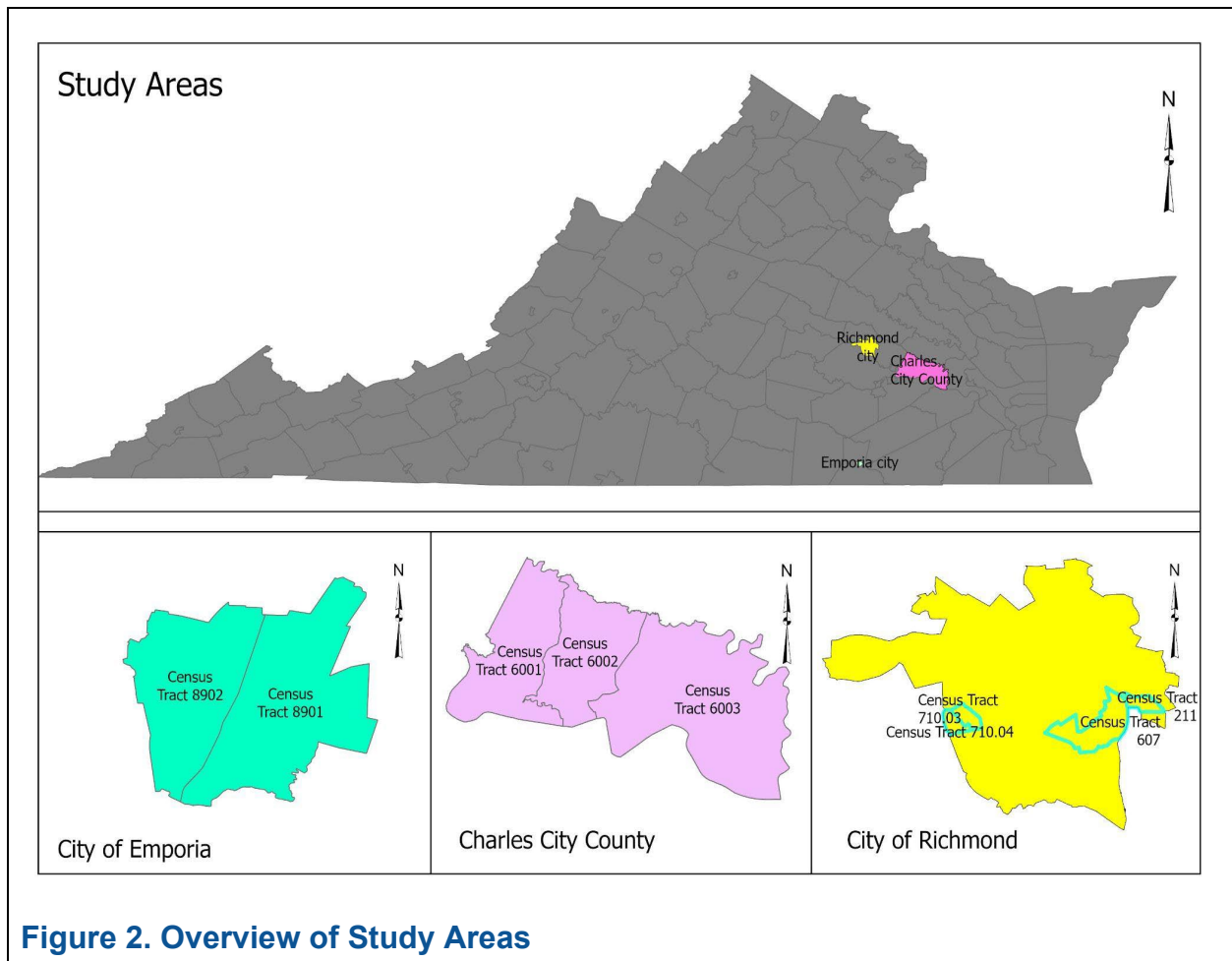
City of Emporia faces similar challenges. Rising temperatures threaten to disrupt local farming, while the city's low-lying geography and proximity to waterways leave it vulnerable to flooding. The increasing severity and frequency of heavy rainstorms and hurricanes amplify this risk. Heat islands and water quality problems pose additional challenges. Moreover, the City of Emporia's aging infrastructure means it struggles to withstand extreme weather, placing additional strain on its resources to respond to damage caused by overwhelmed drainage systems, septic backups, groundwater pollution, and other related disasters. The City of Emporia has a small population and limited economic resources, which hinder both response and recovery capability.

City of Richmond's southside faces significant environmental and disaster-related challenges that directly impact community well-being. Underserved neighborhoods in the southside are captured in the RVAgreen 2050, the City's equity-centered climate action and resilience planning initiative. These neighborhoods are among the most adversely impacted by climate change and

²⁶ Concerned Citizens of Charles City County (C5). (2022, July 20). Environmental Justice in Charles City County – The Story of the First Mega Landfill in Virginia. C5 Group Inform. <https://www.c5groupinform.com/post/environmental-justice-in-charles-city-the-story-of-the-first-mega-landfill-in-virginia>

²⁷ Salter, M., & Dunbar, M. (2022). Reimagining Consumption amidst Toxic Infrastructure: Exploring ties between colonization and the development of landfills in disadvantaged communities, with paths forward. ArcGIS StoryMaps. <https://StoryMaps.arcgis.com/stories/71f62b7fb58841e5ba0326b7a9ced26c>

are most affected by inequities linked to historically racist policies and programs.²⁸ For instance, a winter storm recently caused a major water crisis due to outdated equipment and emergency planning. It is a city with over one century old infrastructure, like the water treatment plant ripe with corroded pumps and outdated emergency protocols. Therefore, mitigating the devastating effects of climate risks and environmental hazards is necessary to protect residents in these historically marginalized and underserved communities by updating the infrastructure located near and around them.



²⁸ City of Richmond Office of Sustainability. (2021). RVAgreen 2050: Climate Equity Action Plan 2030. Richmond, VA, p.3-2, Retrieved from: <https://www.rvagreengreen2050.com>

Methodology

The study aimed to capture the lived experiences in the study areas, revealing vulnerabilities to natural disasters, environmental hazards, and the deterioration of critical infrastructure. The project was designed to understand how disasters and environmental hazards impact critical infrastructure and community resilience in historically marginalized communities. Four interconnected goals guide this effort.

1. Support historically marginalized and underserved local governments and communities in enhancing their capacity, resources, and expertise to conduct threat assessments and identify opportunities to strengthen resilience.
2. Assist limited-resource local governments in developing grant applications to address gaps identified in the assessment and promote resilience-building in marginalized and underserved communities.
3. Listen directly to community members and ensure their voices are included in the determination of grant priorities and investments.
4. Create resilient communities.

To advance these goals, the analysis was guided by two questions:

1. What are common resources available to communities to support their long-term hazard mitigation efforts?
2. How does being affected by disasters and environmental hazards influence residents' quality of life, including their physical health, mental health, education, shelter, and food?

To answer these questions, this project focused on collecting, analyzing, and creating data packages to inform communities about the development and allocation of hazard mitigation funding, with an emphasis on protecting historically marginalized communities near and around critical infrastructure. The study was carried out in three main parts:

- Quantitative Data Profiles of Each Locality
- Review of Emergency Management Documents
- Insights from local Communities

By collecting data from various sources, including community members, the project assessed the impact of environmental hazards and disasters on critical infrastructure and community resilience in and around historically marginalized and underserved communities. The information collected and analyzed will guide investments, planning, mitigation efforts, and public communication strategies, ensuring that critical infrastructure supporting marginalized communities remains resilient and can protect these communities over time. The data will also assist in developing mitigation strategies shared with community members, critical infrastructure owners and operators, state and local governments, funders, and social service providers. This project views

community resilience and local infrastructure through an equity perspective and sources data from multiple avenues, as detailed later under this section.

Equity and Inclusion-Informed Methods

An equity perspective guided every stage of this study. This study placed the community at the forefront as the primary source of information and solutions. It achieved this by actively incorporating their experiences and priorities into the needs assessment and resource identification. The team worked with specific “point of contacts” (POCs) for each locality to share study information, request and receive locality data, and keep communication open throughout the different phases of the study. These POCs were leaders within each locality’s emergency response network. Additionally, the research questions and objectives were framed equitably by recognizing that some communities are disproportionately vulnerable to environmental hazards and less prepared to build resilience. Furthermore, several methodological strategies were used to gather data from communities and other key stakeholders, including interviews, focus groups, and the review of documents and secondary data, as discussed below. This approach not only recognizes communities as active and relevant stakeholders but also helps close the gap between them and their government, fostering community-led environmental resilience. Finally, the insights collected informed the development of strategies to reduce vulnerabilities and enhance resilience.

Data Collection and Analysis

Quantitative Data Profiles of the Three Localities

Secondary data were used to understand both the sociodemographic and environmental hazard vulnerability profiles of the three localities. A sociodemographic profile of each locality was created using data from the 2022 American Community Survey.²⁹ These profiles were compared with state and national figures to help identify absolute and relative vulnerabilities, for example, areas that exhibit a disproportionate concentration of poverty or unemployment. Environmental hazard vulnerability profiles for each area were drawn using data from the Federal Emergency Management Agency (FEMA) National Risk Index (NRI).³⁰ However, because locally available data is often more accurate than the NRI,³¹ the quantitative analysis was complemented by data on perceived hazards and infrastructure assessments gathered from community members and local stakeholders. This approach also recognizes the value of local perceptions as a source of

²⁹ The ACS provides detailed sociodemographic information at various geographic levels, including population characteristics, income, education, and housing.

³⁰ FEMA’s NRI dataset is a tool designed to identify communities at risk for eighteen natural hazards across the US and territories, offering hazard risk assessments as well as historical and projected losses associated with natural disasters.

³¹ FEMA. National Risk Index Technical Documentation. March 2025. Page 3-7. Retrieved from: https://www.fema.gov/sites/default/files/documents/fema_national-risk-index_technical-documentation.pdf

information on emerging trends and risks that may be overlooked in historical or large-scale datasets.

Figure 2 (above) illustrates the areas studied.³² Charles City County is subdivided into three census tracts (600100, 600200, and 600300), and the City of Emporia into two (890100 and 890200). Due to its larger population, the City of Richmond is subdivided into 75 census tracts. The study focused on four tracts in the southside of the City of Richmond (060700, 021100, 071003, and 071004), which were identified as representing particularly vulnerable communities.

Document Review of Emergency Plans

The study reviewed emergency-related plans and documents across the three localities (Table 1) using RISE’s equity analysis Tool.³³ The tool is designed to assess the equity considerations of government policies, rules or actions, organizational policies, plans, programs, or practices. These considerations may include how the reviewed document affects procedures, access, quality and outcomes.

Table 1. Documents Reviewed Through RISE’s Equity Analysis Framework

Charles City County	City of Emporia	City of Richmond
Emergency Operations Plan	Emergency Operations Plan	Emergency Operations Plan
Comprehensive Land Use Plan	Comprehensive Plan	City of Richmond 300 Master Plan
Community Health Improvement Plan (CHIP)	All Hazards Plan	RVA Green Climate Equity Plan 2030
		James River Park Master Plan

This tool assessed how equity considerations were integrated into emergency plans and actions in these localities by examining the three main components below:

- **Keyword analysis:** reviewers identified equity-related terms and references to vulnerable populations, noting both their frequency and the context in which they appear.
- **Plan implementation analysis:** through a pre-determined questionnaire, reviewers examined whether equity was integrated in decision-making, community engagement,

³² The central unit of analysis is the census tract – a small statistical subdivision of a county, often used to represent neighborhoods in urban areas. In addition to being a typical proxy of neighborhoods, we define the census tract as the main unit of analysis as it is available in both datasets: while ACS provides information at more granular levels (e.g., blocks), FEMA’s NRI smallest geographic unit is the census tract.

³³Research Institute for Social Equity. (2025). RISE Social Equity Analysis Tool. Richmond, VA: L. Douglas Wilder School of Government and Public Affairs. Virginia Commonwealth University.

and implementation efforts, especially for historically underserved or at-risk groups. This component also considers the feasibility of proposed equity initiatives, including whether they have sufficient resources or funding support.

- **Structured equity assessment:** reviewers evaluated the strength and accuracy of equity-related statements within the documents, and synthesized findings. A separate section focused on environmental equity, incorporating targeted questions to explore how environmental justice considerations were addressed in the planning documents.

The findings from the document review provide an overview of the policy and actions related to emergency management in these localities.

Insights from Local Governments and Communities

This study conducted interviews and focus groups to gather a wide range of institutional perspectives and lived experiences on environmental hazards, emergency response, and community resilience. These methods together offer insights into both the operational challenges faced by local leaders and the daily realities experienced by community members.

Interviews and focus groups. Interviews were held with local government officials responsible for emergency management operations. Participants were identified through public records and snowball sampling within emergency management networks. Focus group members were recruited through trusted community organizations, such as churches and local groups, as well as through community navigators—trusted members of the participants' own communities.³⁴ The interview and focus group questions were organized around key topics to guide the discussions and ensure consistency across localities (see Box 1).

³⁴ Participants in both interviews and focus groups were offered \$45 Visa gift cards, distributed virtually by Resilient Virginia.

Box 1. Topics Guiding Interview and Focus Group Questions	
Interview Questions	Focus Group
• Quality of infrastructure • Opportunities to enhance infrastructure • Expectations for local government • Educating the public on threats/hazards • Programs for underserved populations • Recurring disasters/environmental hazards • Societal assumptions about threats/hazards • Example of extreme weather event • Assistance received during/after event • Local political considerations • Measuring effectiveness in emergency response • Other experiences related to disasters/emergency response	• Quality of infrastructure • Local resources/assets • Opportunities to enhance infrastructure • How the community prepares for an emergency/weather event • Community assumptions about threats/hazards • Example of an extreme weather event • Preparation, assistance, and recovery related to the event • Expectations for/trust in local government • Other experiences related to disasters/emergency response • Resources needed to feel prepared for threats/hazards

Box 2 provides an overview of the participants themselves, whose perspective shaped the study.

Box 2. Learning from Local Government and Community Members	
Interviews: <i>Insights from Local Emergency Managers</i>	Focus Groups: <i>Insights from the Communities</i>
Participants: Government employees involved in emergency management. Recruitment: Identified and invited based on their roles in local emergency management. Interviews were conducted with local emergency management officials serving historically marginalized and underserved communities: Charles City County: 7 interviews City of Emporia: 7 interviews City of Richmond: 7 interviews Focus: Explore participants' responsibilities, the quality of local infrastructure, opportunities for improvement, expectations of government support, and provisions for underserved populations.	Participants: Residents of historically marginalized and underserved communities. Recruitment: Recruited through flyers, word of mouth, and community navigators. Focus groups were conducted with residents of historically marginalized and underserved communities: City of Emporia: 3 focus groups (28 participants) City of Richmond: 3 focus groups (22 participants) Focus: Explored the lived experiences with disaster, perceptions of infrastructure challenges, expectations of government and resources needed to build resilient.

Across both interviews and focus groups, safeguarding participant identity and shared information was a priority. To ensure confidentiality, all direct quotes from participants in this study are labeled to show the source without revealing names or roles. Each label shows:

- The participant's locality (CCVA, EVA, RVA)

- whether the person was an interview (I) or a focus group (F), and
- a number so you can tell different speakers apart.

For example, (Participant-CCVA-I-1) indicates that the participant is from the Charles City County interview, and (Participant EVA-F-1) signifies that the participant took part in a focus group in Emporia.

Pre-Survey. In addition to these discussions, focus group participants completed a pre-survey adapted from FEMA’s standardized survey tools. The survey assessed participants’ experiences with hazards, preparedness, and resilience, and included demographic questions on race, gender, LGBTQIA status, religious affiliation, and housing type (Table 2).³⁵

Table 2. Overview of Focus Group Demographics

Category	City of Emporia	City of Richmond
Race/ Ethnicity	Black 13, White 2, Hispanic, 3 Multiracial 1	Black 14, White, 2 Multiracial 1
Gender	Female 12, Male 4	Female 11, Male 6, Don’t know 1
Religion	Christianity 12, Other 1	Christianity 9, Islam 1
Housing	Multi-Unit w/o Basement (1) Single-Unit Home w/Basement (1) Single-Unit Home w/o Basement (8) Mobile or Manufactured Home (4) Other (3) Don’t Know (1)	Multi-Unit w Basement (3) Multi-Unit w/o Basement (3) Single-Unit Home w/Basement (3) Single-Unit Home w/o Basement (3) Other (4) Don’t Know (0)

Participant demographics provide important context for acknowledging that different identity groups encounter disasters and infrastructure challenges differently.

This analysis allowed the identification of actionable strategies for mitigating or preventing the negative impacts of environmental hazards on marginalized communities through critical infrastructure improvements. Through outreach to key stakeholders, identification of needs, and development of data packages to support hazard mitigation grant applications, general fund investments, and philanthropy, this study will contribute to closing the identified gaps and creating more resilient communities. Capacity building is crucial, as many marginalized communities lack local governments with the necessary capability and expertise to collect the data required to apply for mitigation and resilience grants.

³⁵ Residents from Charles City County were not yet included in the focus groups due to recruitment challenges. Their inclusion is planned in subsequent phases of engagement.

FINDINGS & INSIGHTS

This section presents findings from both quantitative and qualitative data. We start with a comparative overview of the quantitative data across all three localities, then provide detailed case study narratives for Charles City County, City of Emporia, and City of Richmond.

Quantitative Data Highlights: Infrastructure vulnerabilities, exposure risks, disparities

This section summarizes overall sociodemographic and vulnerability assessments of each locality. Detailed and more granular (census tract) data are available [here](#).

Overall, Charles City County, City of Emporia, and the four neighborhoods in the City of Richmond show a consistent pattern of socioeconomic vulnerability, notably when compared to the State and the nation (Tables 3 and 4). This includes a majority of Black populations, low educational attainment, concentrated poverty and unemployment, high rates of disability, and significant proportions of housing-burdened residents, for instance. In terms of hazards, environmental exposure is marked by risks such as flooding, hurricanes, and heat waves, with additional concerns such as landslides and drought in certain localities. While the specific hazard mix varies across tracts, all areas share a persistent vulnerability to severe weather events, which leads to increased vulnerability when combined with socioeconomic disparities.

Table 3. Demographic, Education, Health, and Housing

	Charles City County	City of Emporia	City of Richmond	Virginia	United States
Sex and Race					
Population (2022)	6,760	5,680	227,171	8,624,511	331,097,593
Men (%)	49.7	44.6	47.6	49.5	49.6
Women (%)	50.3	55.4	52.4	50.5	50.4
White (%)	43.8	23.5	41.8	60.0	58.9
Black (%)	43.7	60.3	43.7	18.6	12.1
Asian (%)	0.2	0.8	2.2	6.9	5.9
Native American (%)	5.6	0.0	0.1	0.1	0.6
Other race (%)	4.6	10.7	4.5	4.4	3.9
Hispanic or Latino (%)	2.2	4.7	7.6	10.0	18.7
Educational Attainment (25 years and over)					
Less than High School (%)	15.1	23.1	11.2	8.9	10.9
High School or Equivalent (%)	68.7	60.4	44.6	50.2	54.8
Bachelors' Degree or More (%)	16.2	16.5	44.1	41	34.3
Health					
Population with No Health Insurance Coverage (%)	6.3	4.7	9.6	7.4	8.7
Population with a disability (%)	19.2	23.1	14.3	12.1	12.9
With a hearing difficulty	5.3	6.2	2.6	3.4	3.6
With a vision difficulty	3.4	5.0	2.8	2.2	2.4
With a cognitive difficulty	6.2	11.0	6.5	4.5	5.0
With an ambulatory difficulty	12.1	9.9	6.9	5.9	6.3
With a self-care difficulty	5.1	2.3	2.5	2.3	2.4
With an independent living difficulty	7.8	5.9	4.8	4.2	4.5
Housing					
Total Housing Units	3,252	2,810	111,524	3,625,285	140,943,613
Occupied Housing Units (%)	89.3	79.9	90.7	90.7	89.2
Owner-occupied (%)	75.6	32.0	39.2	60.7	57.8
Renter-occupied (%)	13.7	47.9	51.5	30.1	31.4
Vacant Housing Units	10.7	20.1	9.3	9.3	10.8
Mobile homes (% of occupied housing units)	10.8	2.4	0.7	3.9	5.2
Median Year Structure Was Built	1,987	1,963	1,958	1,983	1,979
Housing Prices					
Median Gross Rent (for renter-occupied)	927	960	1,227	1,440	1,268
Median House Value (for owner-occupied)	198,800	129,400	308,300	339,800	281,900
House-Burdened Households					
Burdened (%)	21.3	37.1	40.1	28.2	30.5
Severely Burdened (%)	11.5	18.7	19.9	12.4	14.1

Source: US Census Bureau, American Community Survey 5-year estimates 2022. Retrieved from Social Explorer.

Table 4. Employment and Income

	Charles City County	City of Emporia	City of Richmond	Virginia	United States
Employment Status (pop 16 years and over)					
Employed (%)	55.5	49.5	63.5	61.0	59.6
Unemployed (%)	2.4	3.7	4.1	2.8	3.4
Non-Hispanic White Unemployed (%)	2.6	0.0	3.0	3.5	4.3
Black Unemployed (%)	5.4	9.6	10.3	7.1	8.9
Latino Unemployed (%)	11.8	0.0	4.1	4.7	6.2
Income and Poverty					
Median Household Income (\$)	65,573	41,442	59,606	87,249	75,149
Per Capita Income (\$)	38,351	24,915	42,132	47,210	41,261
Population Living In Poverty (%)	12.5	17.8	19.5	12.8	16.7
Below 18 years living in poverty (%)	17.0	18.8	30.1	9.5	11.7
Ages 18 to 64 living in poverty (%)	10.9	11.2	17.9	8.0	10.0
64 and over living in poverty (%)	13.5	17.3	14.2	10.0	12.5
Population Living In Poverty by Race / Ethnicity (%)					
White population living in poverty (%)	12.5	5.2	10.6	7.8	9.2
Black population living in poverty (%)	14.5	22.0	27.0	16.5	21.5
Native American population living in poverty (%)	3.4	0.0	2701.0	11.7	22.6
Asian population living in poverty (%)	23.1	34.1	31.3	7.0	10.3
Hispanic or Latino population living in poverty (%)	6.8	0.0	22.5	13.2	17.2
Other race/ethnicity population living in poverty (%)	6.3	16.2	20.3	12.5	16.3
Household Income Sources					
Wage or Salary Income (%)	69.9	67.6	76.3	77.3	74.9
Self-Employment Income (%)	7.6	4.8	9.3	10.3	11
Interest, Dividends, or Net Rental Income (%)	12.1	7.3	18	22.3	19.8
Social Security Income (%)	44.4	36.3	25.9	29.8	31.2
Supplemental Social Security (%)	7.2	11.8	5.3	4.2	5.1
Public Assistance Income (%)	2.1	13.6	2.5	2.2	2.7
Retirement Income (%)	32.1	19.6	18.7	26	23.1
Other Types of Income (%)	9.2	11.1	8.9	11.7	10.9
Households with No Earnings (%)	27.9	31	21.0	20.6	22.4

Source: US Census Bureau, American Community Survey 5-year estimates 2022. Retrieved from Social Explorer.

The population pyramids in Figure 3 highlight the age and gender distributions across Charles City County, the City of Emporia, and Selected Tracts in the City of Richmond. Each locality presents a distinct demographic profile that shapes its vulnerabilities. Charles City County has an aging population, with relatively larger shares in older age groups and fewer children and young adults. The City of Emporia has a more even distribution across age groups, but with significant portions of both elderly residents and children, highlighting intergenerational needs. In contrast, the City of Richmond has a younger overall profile, mostly comprising working-age residents with fewer elderly individuals compared to Charles City County and The City of Emporia. These demographic patterns shape the social vulnerabilities in each study area. Charles City County's aging population increases health and mobility risks; the City of Emporia's high concentration of children and single-parent households adds socioeconomic stress; and the City of Richmond's younger residents face persistent challenges related to income, housing, and employment instability.

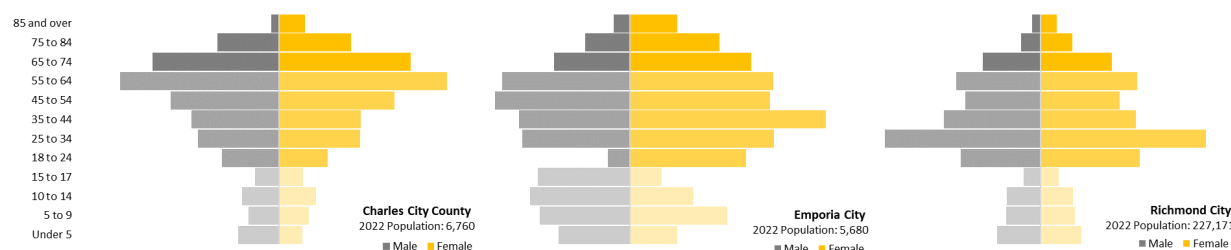


Figure 3. Population Pyramids (2022)

Source: US Census Bureau, American Community Survey 5-year estimates 2022. Retrieved from Social Explorer.

FEMA National Risk Index provides two key indicators: social vulnerability and community resilience indexes. The former captures the extent to which social and economic conditions (such as poverty, age, and housing instability) may amplify the impacts of disasters, while the latter reflects a community's capacity to absorb, adapt to, and recover from hazard events based on its underlying strengths and infrastructure. As shown in Table 5, the City of Richmond and City of Emporia are rated as "Very High" in social vulnerability, indicating substantial underlying social risks. However, both cities are rated as "Relatively Moderate" to "Relatively High" in community resilience, suggesting they may have systems in place to support disaster response and recovery or have gained experience from long-term exposure to hazards that supports that adaptability. In contrast, Charles City County is rated as having "Relatively Moderate" to "Relatively Low" social vulnerability, but consistently receives "Relatively Low" ratings in community resilience across its tracts. These differences underscore the diverse risk profiles across localities: some may face higher social vulnerability but retain moderate institutional capacity, whereas others may appear less socially vulnerable yet remain at risk due to weaker resilience infrastructure.

Table 5. Social Vulnerability and Community Resilience Indexes

	Social Vulnerability (Rating)	Community Resilience (Rating)
City of Richmond	Very High	Relatively Moderate
21100	Relatively Moderate	Relatively Moderate
60700	Very High	Relatively Moderate
71003	Relatively High	Relatively Moderate
71004	Very High	Relatively Moderate
Charles City County	Relatively Low	Relatively Moderate
600100	Relatively Moderate	Relatively Low
600200	Relatively Moderate	Relatively Low
600300	Relatively Moderate	Relatively Low
City of Emporia	Very High	Relatively High
890100	Very High	Relatively Moderate
890200	Very High	Relatively Moderate

Source: FEMA's National Risk Index All Tracts and Counties files.

Charles City County

Overview

Charles City County, situated southeast of the City of Richmond, is one of Virginia's oldest counties, established around 1600. With just under 7000 residents, it is mainly a rural area where vast pine and hardwood forests, farmland, and open spaces characterize both the scenery and community life. Lacking incorporated towns and having limited commercial growth, the county retains a peaceful atmosphere grounded in agriculture and the natural environment.

The county offers many assets, including natural resources, local initiatives, and conservation lands, such as its 11 conservation areas like Harrison Lake, Chickahominy, Kittewan, and TNC Landholdings. These lands maintain their ecological, cultural, and scientific importance to sustainably benefit current and future generations. It also has some of the best rivers, such as the Chickahominy River, which stretches 129.76 miles, and Turkey Island Creek, which is just over two miles long.³⁶

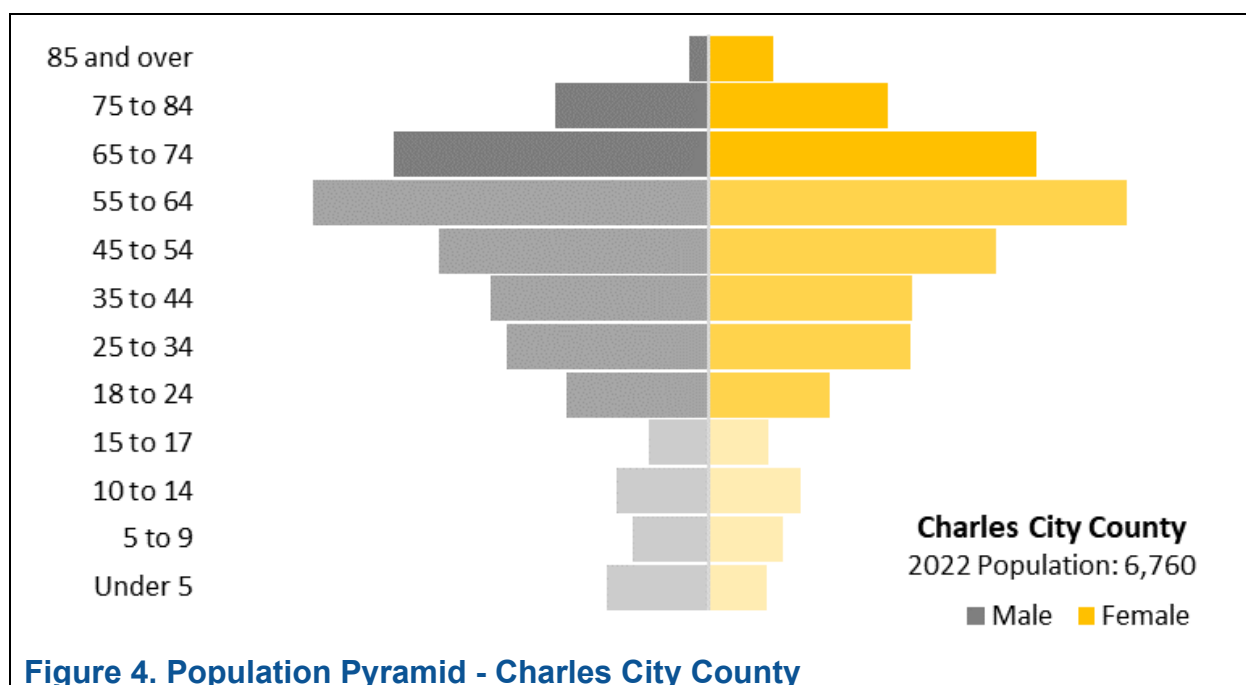
Recreational and cultural amenities enhance the county's socioeconomic and cultural growth. Parks, such as Chickahominy Park, Lawrence Lewis Jr. Park, and Harrison Lake National Fish Hatchery, along with skeet and trap fields, rifle and pistol ranges, archery, scenic trails, picnic areas, and prime fishing spots, draw visitors and tourists. Historic sites showcase a rich African American heritage, including the famous Lott Cary Birth Site, celebrated as the birthplace of Lott Cary, an African-American missionary to Africa and one of the founders of Liberia; and the New Hope & Court House, which served as an encampment during the Revolutionary and Civil Wars.

The county is proactive in safeguarding its residents from severe environmental events. Its coordinated emergency services include the Sheriff's office and fire department, along with volunteers who respond not only to local emergencies but also to large-scale crises.

Quantitative Data Highlights: Infrastructure vulnerabilities, exposure risks, disparities

Charles City County's population was 6.7 thousand in 2022, split across three census tracts (600100, 600200, and 600300). The area exhibits several indicators of structural and intergenerational socioeconomic vulnerability relative to the Commonwealth and national benchmarks. The county is majority-minority, with 44 percent of the population identifying as Black and 5.6 percent as Native American, well above state averages for both groups. The population is aging, with a disproportionate share of elderly (Figure 4).

³⁶ Ibid.



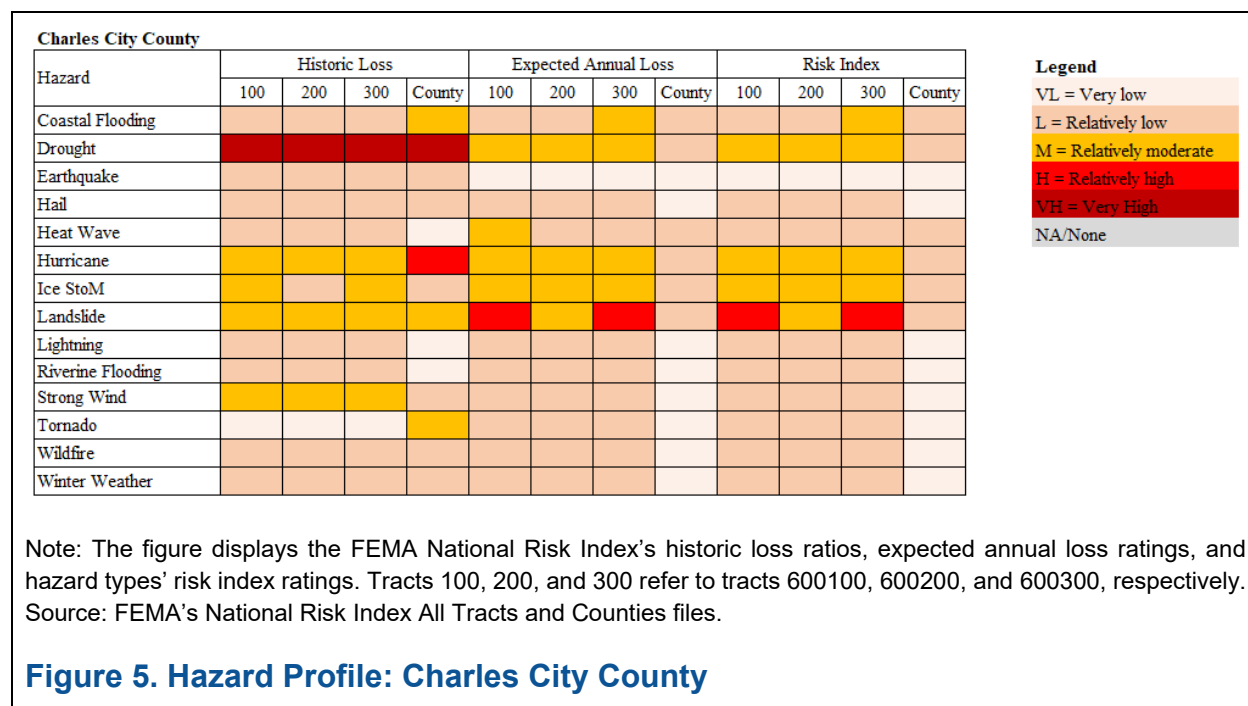
Source: US Census Bureau, American Community Survey 5-year estimates 2022. Retrieved from Social Explorer.

Educational attainment is significantly lower, with roughly 84 percent of the population having a High School degree or less. The population age reflects a relatively smaller labor force (roughly 40 percent of adults are not in the labor force), and a higher reliance on social security income (45 percent) and retirement income (30 percent). Disability prevalence (19 percent) is much higher than in Virginia and the nation, notably in the group with ambulatory difficulties (12 percent) and independent living difficulties (8 percent). Household and per capita income are also lower than the state and nation, and about 17 percent of children (age less than 18) live in poverty at rates much higher than the state (9 percent) and the country (12 percent).

Although housing affordability appears better than in the Commonwealth, the housing stock is older, and there is a higher reliance on mobile homes, which comprise 11 percent of the occupied housing units. Mobile homes face increased risk from weather events, such as flooding, heat and cold, wind, and storms. Additionally, median house values are much lower, suggesting weaker housing markets.

Based on FEMA NRI data (Figure 5), Charles City County faces a moderate but multifaceted hazard risk profile, with several recurring hazards across all three tracts. The most consistently high-rated threat is drought, which registers “very high” historic loss ratios and “relatively moderate” expected annual loss across tracts 600100, 600200, and 600300. This indicates both past damage and persistent vulnerability to prolonged dry periods. Additionally, hurricanes, ice storms, and landslides emerge as systemic threats across the area. All tracts are rated “relatively moderate” or higher for hurricanes and ice storms, suggesting frequent weather-related disruptions. Tracts 600100 and 600300 show elevated landslide risk, with 600300 rated “relatively

high” in both expected loss and hazard index. While most other hazards, such as flooding, wildfire, and earthquake, are rated “relatively low” or “very low,” the convergence of storm and geophysical hazards (particularly landslides and ice events) coupled with climatic stressors like drought positions Charles City County as a locality with notable environmental exposure, particularly under worsening climate variability.



Review of Emergency Management Documents

We reviewed three documents that guide the emergency management operations in Charles City County: the Emergency Operations Plan, the Comprehensive Land Use Plan, and the Comprehensive Health Improvement Plan (CHIP). Each was reviewed for how well equity considerations are integrated into goals, strategies, and implementation. The comparison highlights uneven attention to equity, with CHIP showing the strongest integration across principles, the land use plan demonstrating moderate application, and the Emergency Operations Plan offering only limited equity alignment. Table 6 below summarizes these ratings.

Table 6. Charles City County Plans' Equity Principles Rating

Policy Document	Equity Principles			
	Procedure	Access	Quality	Outcomes
Emergency Operations Plan	Moderate	Moderate	Moderate	Limited
Comprehensive Land Use Plan	Comprehensive	Comprehensive	Moderate	Comprehensive
Comprehensive Health Improvement Plan (CHIP)	Comprehensive	Comprehensive	Comprehensive	Comprehensive

These differences have direct implications for resilience. While the CHIP establishes a strong foundation for addressing health disparities, gaps in the emergency operations plan risk leaving vulnerable residents without adequate support during disasters, and the land use plan misses opportunities to embed equity in long-term development. Together, these findings point to the need for stronger alignment across planning efforts to ensure that resilient strategies benefit all residents equitably.

Emergency operations plan.³⁷ Charles City County's EOP mentions equity-related terms and addresses micro and macro equity issues. The plan acknowledges the county's rural nature and identifies vulnerable groups such as those under 18, seniors, and people with disabilities. These mentions offer a partial demographic overview of the county. The plan also notes existing partnerships with nongovernmental and volunteer organizations, including the Virginia Voluntary Organizations Active in Disaster (VVOAD), Salvation Army, Red Cross, and the private sector. Strong partnerships in emergency management are essential for an effective response, especially when they are established beforehand rather than during a chaotic disaster. While the plan does not specify particular equity goals, it describes the general structure and procedures during a disaster, such as activating a local emergency operations center (EOC), following the Incident Command System, and having the County Administrator serve as the Emergency Management Director. This framework allows each department to develop specific emergency plans, promoting county-wide preparedness. Although the plan does not explicitly address race, ethnicity, gender, victims, or nationality as key factors in environmental impact assessments, its four-year review cycle, involving input from various stakeholders, provides an opportunity to address these gaps.

Effective policy outcomes require the active participation of broad-based stakeholders across the policy cycle, from policy formulation to implementation and evaluation. For Charles City County, this is a crucial aspect identified in the emergency operations plan, with input coming primarily from top officials, including the Director of Emergency Management, the Coordinator of Emergency Management, and the Virginia Department of Emergency Management, and

³⁷ Charles City County (2015). *Emergency operations plan for Charles City County, Virginia*. <https://www.charlescityva.us/DocumentCenter/View/187/Charles-City-County-Emergency-Operations-Plan-PDF>

approved by the Board of Supervisors. The plan overlooked valuable information from communities that were directly and significantly impacted by natural disasters, particularly vulnerable populations. While the plan describes general operational procedures during a disaster, it lacks equity-specific objectives in this process.

Comprehensive Land Use Plan.³⁸ Unlike the process for developing and implementing the emergency operation plan, the comprehensive land-use policy involved broader public input from local, state, and federal agencies. The plan was also presented to the public at three informational meetings. It identifies targeted communities for implementation, such as neighborhood service areas, development centers, and rural areas, each with specific goals related to economic, infrastructure, and environmental development. The plan creation process was inclusive, involving a diverse group of people. The County sought wider input from various federal, state, and local organizations on changes to the plan's basic data, which includes population characteristics, natural resource features, historic resources, and community facilities. These organizations include the U.S. Census, the Virginia Department of Historic Resources, the Virginia Department of Conservation and Recreation (DCR), the Virginia Economic Development Partnership, the Charles City County Department of Social Services, DCR's Division of Chesapeake Bay Local Assistance, the Department of Environmental Quality, and the City of Richmond Regional Metropolitan Planning Organization. Throughout the planning process, the Planning Commission and staff presented a draft to the public and held three informational meetings to gather citizen input and comments. Its clear and transparent procedures for implementing its goals ensure that it achieves its purposes, such as eliminating barriers for marginalized groups and ensuring that they have access to resources and services. The plan was officially adopted during a joint public hearing with the Planning Commission.

Community Health Improvement Plan (CHIP).³⁹ The county prioritizes numerous vulnerable groups in this CHIP policy, including children, rural residents, low-income individuals, and the elderly, which aligns with the county's demographic priorities. The development process of the Plan was inclusive and diverse. It gathered input and feedback from various groups through multiple meetings, including its steering committee and community stakeholders, who reviewed the draft goals and strategies and filled out evaluation forms. In terms of empowerment, there was evidence of consultation and involvement. Throughout the process, Chickahominy Health District's (CHD) Community Health Team sought participation from vulnerable and marginalized communities. Participation was accessible both in-person and virtually. In-person participants used monopoly money and paper bags to vote on health priorities. Virtual participants were provided an interactive online board to participate remotely. Meetings were held in Charles City County and organized to be locally relevant and geographically accessible to residents. Community input was sought, gathered, and reflected in decision-making. Stakeholders helped

³⁸ Charles City County (2014). *Comprehensive Land Use Plan*. <https://capitalregionland.org/wp-content/uploads/2021/11/Charles-City-County-Comprehensive-Land-Use-Pla-20140.pdf>

³⁹ Virginia Department of Health and Chickahominy Health District (2024). *Charles City County 2024-2028 Community Health Improvement Plan*. https://www.vdh.virginia.gov/content/uploads/sites/84/2024/07/2024-2028-Charles-City-County-CHIP_7.9.2024.pdf

select priorities, develop goals, and review strategies. There was also evidence of partnership through the formation of work groups with community members co-developing a strategy and participating in SWOT analysis. Most recently, the health team met with a representative from Young at Heart to gain the perspective of the Older Adult Community.

Generally, Charles City County emergency management-related policies prioritize vulnerable groups differently, with the CHIP being the most inclusive. These policies can be more inclusive, especially the emergency operations plan, by centering the environmental justice needs of all vulnerable groups in the county.

Insights from Local Communities

Interviews with local officials:

Local emergency management officials who participated in interviews consistently emphasized ongoing efforts and persistent challenges in Charles City County. Due to the county's size and resource limitations, officials work under significant constraints to meet increasing needs. Water and sewer systems, for example, are not available throughout the county, with only some areas having access to municipal services and many residents relying on private wells and septic systems. Expanding these systems and improving fire hydrant access were identified as essential steps to strengthen emergency response.

Box 3. Prioritized Needs Identified by Emergency Management Officials in Charles City County

1. Mitigate road flooding and enhance local flood preparedness
2. Enhance service for vulnerable populations: ensure older adults, individuals with mobility challenges, and medically vulnerable residents have access to shelters, transportation, and other support during emergencies
3. Infrastructure improvements: expand water and sewer infrastructure, and improve fire hydrant access
4. Increase capacity for emergency response: address staff shortages, modernize equipment, improve service delivery, reduce reliance on neighboring counties.

Interviewees identified the value of recent investments, such as the county's new fire station and an emergency operations center. However, fire services remain constrained by staffing shortages, outdated equipment, and limited funding. Transportation infrastructure is another major concern. Without a dedicated public transit system, many residents, notably the elderly and individuals with limited mobility, face challenges during emergencies or evacuations. Although internet connectivity has improved in some areas, many parts of the county remain digitally underserved, limiting access to emergency alerts, telehealth, and remote services. Power outages during storms and hurricanes were also common concerns, particularly for vulnerable residents.

Local officials pointed out the broader structural problem of underfunding and the challenge in getting help from state and federal agencies. Disaster aid often needs formal declarations, which restricts the county's ability to respond quickly to smaller events. As a result, Charles City County frequently depends on nearby counties for support during severe weather. These issues emphasize the need for better systems to help smaller jurisdictions build resilience.

Flooding was the most frequently mentioned hazard in Charles City County, with participants describing nuisance road flooding during heavy rains, and some flooding every time it rains. Heat waves are also an emerging concern, especially for residents without air conditioning, posing health risks for medically vulnerable individuals. Power outages caused by storms, hurricanes, or ice events can last for days or even weeks, with serious implications for those who rely on electricity for medical equipment. Participants recalled significant past events, such as ice storms in the 1990s and 2000s that left much of the county without power for up to a month. While large-scale disasters requiring FEMA aid have been rare, interviewees reported a noticeable increase in the frequency and severity of smaller-scale weather events.

"So this past summer it was extremely hot here. It didn't create a huge problem, but for some people that may not have air conditioning in homes, it would – might lead them to some sort of medical event, such as maybe difficulty breathing, or an increased reaction to annual allergies. Rain, we've had a lot of rain, and that's an ongoing thing, and every time it rains, like I said we have certain roads that flood every single time it rains." (Participant CCVA-I-2)

The county's aging population adds an additional layer of complexity. Older adults often need additional services and are more vulnerable to disruptions in electricity and transportation. Interviewees suggested that improving shelter access for mobility-impaired residents and addressing flood-related road closures could greatly improve daily well-being and emergency preparedness. Targeted investments and external support could help Charles City County strengthen its infrastructure and better protect its residents against changing risks.

"We can't seem to get assistance from, and primarily Virginia Department of Transportation, because when the roads flood, you know, that's the main problem, you know, traffic, buses can't get through, Fire, EMS apparatuses can't get through. And what we're being told by VDOT on numerous occasions, which is so frustrating, is that it's a lack of funding. So one road in particular floods, like today it's rained really good. The road is just flooded, and so it needs to be – it's about an eight-mile stretch, it's gonna cost well over \$12 million, and VDOT says they just don't have the money to do it, but it needs to, you know, be reconstructed from expanding, you know, ditches and raising the road up. And here's the thing, in rural areas in Virginia that's difficult because you don't have the high traffic count to constitute, you know, investing \$12 million, you know, and unfortunately, they don't even examine the roads until there is, you know, over five fatalities. So five people have to die for VDOT to take it seriously, and that's so unfortunate." (Participant CCVA-I-1)

Summary

In Charles City County, hurricanes and ice storms are identified as major hazards through both quantitative and qualitative analyses. Interviewees recalled frequent power outages caused by these events, including some long-lasting outages in the past. While the quantitative profile suggests that flooding risks are relatively low, it was the most frequently mentioned hazard during interviews, with routine road flooding noted as a concern even during moderate rain. One reason for this is that most flood models are based on historical data and do not consider recent climate shifts. The interviews also highlighted significant infrastructure limitations, such as the lack of a comprehensive water and sewer system and a limited number of fire hydrants. Disaster response capacity, which partly depends on neighboring counties, could be improved by addressing staff shortages, underfunding, and making access to aid easier.

Population aging presents an increasing challenge. Several other indicators of social vulnerabilities identified in the quantitative analysis, including relatively low incomes, high child poverty rates, high disability shares, and an older housing stock with significant reliance on mobile homes, did not directly appear in the interviews. However, interviewees expressed concerns about service provision to vulnerable groups, as well as infrastructure gaps and housing vulnerability during emergencies.

City of Emporia

Overview

The City of Emporia is known as the “Gateway” to Southern Virginia. Since its incorporation in 1887, the city has grown as a transportation and agricultural hub. Its geographic position, lying along the major corridors of Interstate 95 and US Route 58, makes it a notable stop for East Coast travelers.

The city is rich in history and culture, with unique festivities, and provides a perfect blend of heritage and outdoor adventure. Notable historic sites include the Greensville County Courthouse Square, built in 1781 and serving as the county’s seat of government since 1787, and the Petersburg Railroad, which was built in the 1830s.⁴⁰ The City of Emporia’s assets include its natural resources, community initiatives, and local policies supporting entrepreneurial stewardship. The Meherrin River, which flows through the city, provides outdoor recreation opportunities and natural beauty, while supplying the City’s 220-acre reservoir, serving as its primary water source. City ordinances promote environmental security by addressing soil erosion, managing drought conditions, reducing fire risks, and regulating land development.⁴¹

Its proximity to the Meherrin River makes it prone to flooding, while heavy rains and thunderstorms can disrupt roads and farms. The City of Emporia is also at risk of hazardous materials from accidents as it is intersected by major U.S. roads. One of the national routes that carries hazardous materials passes through the City of Emporia along Southampton Parkway. Additionally, it experiences changing weather patterns with rising temperatures causing heat waves, droughts, and severe storms. Overall, the county is more vulnerable to environmental shocks than its neighboring areas.⁴²

Quantitative Data Highlights: Infrastructure vulnerabilities, exposure risks, disparities

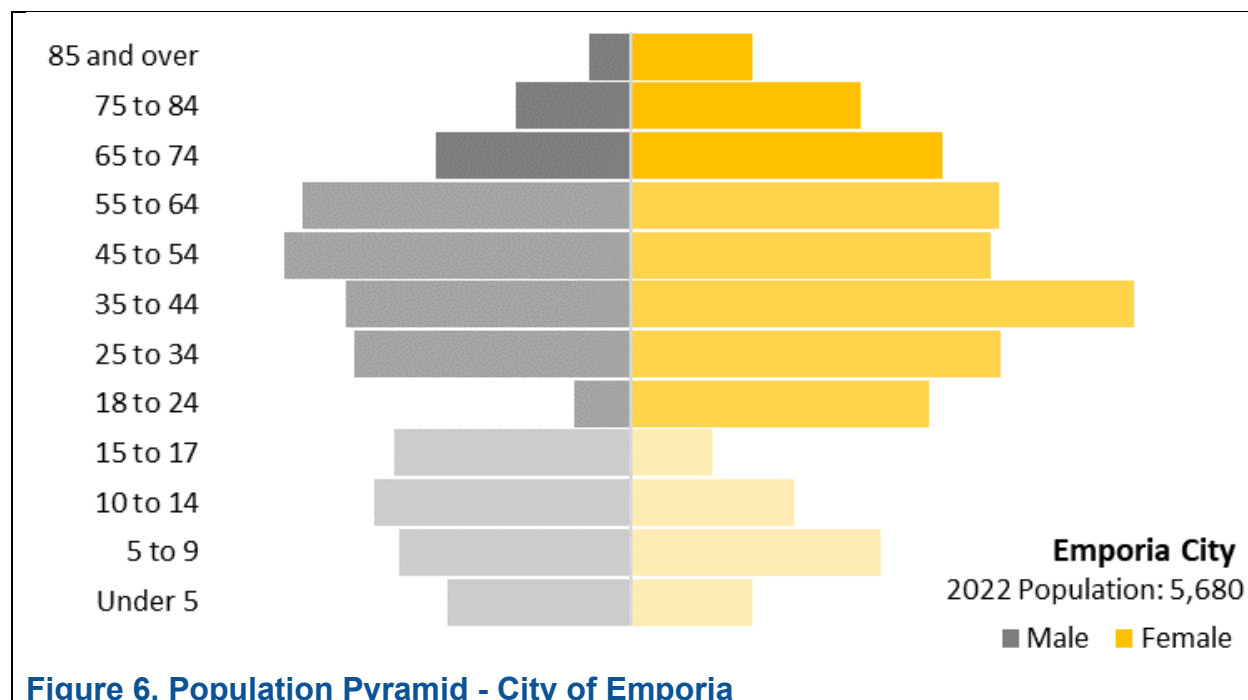
The City of Emporia’s population in 2022 was 5,700, split across two census tracts (890100 and 890200). The city exhibits several overlapping indicators of socioeconomic vulnerability, especially along lines of income, housing burden, educational attainment, and racial disparities. The City of Emporia’s population is predominantly Black (60.3 percent), in contrast with Virginia and the nation, both with a 60 percent White racial makeup. Women represent the majority of the

⁴⁰ Research Institute for Social Equity. (2025). *Improving Resilience in Richmond*. Wilder School of Government and Public Affairs. Virginia Commonwealth University. <https://arcg.is/1bCvCj1>

⁴¹ Ibid

⁴² Ibid.

adult population, but the City of Emporia is also marked by large proportions of children and the elderly (Figure 6).



Source: US Census Bureau, American Community Survey 5-year estimates 2022. Retrieved from Social Explorer.

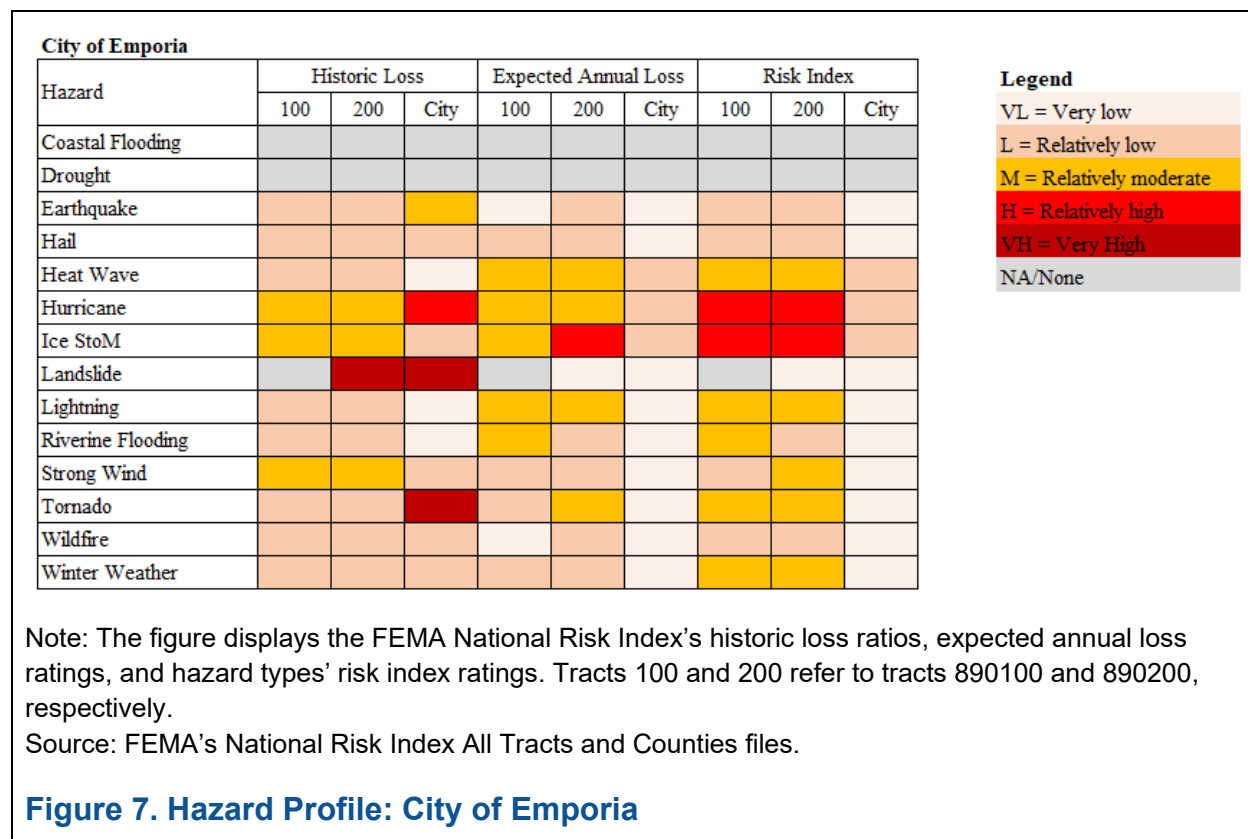
Emporia has a particularly high share of children living in single-parent households (67.0 percent), more than double the state average. Educational attainment is low: over 83 percent of adults have only a high school diploma or less, and just 16.5 percent have a bachelor's degree, well below Virginia's 41 percent. Disability rates are also elevated, affecting nearly one in four residents, with cognitive and ambulatory difficulties being particularly high.

Labor force participation is also limited, particularly in tract 890200, where more than half of working-age adults are not in the labor force. Median household income (\$41,442) is less than half of Virginia's, and nearly one in five residents lives in poverty. Public assistance reliance is high, with 13.6 percent of households receiving public assistance (in contrast with 2-3 percent in the state and nation), and over 30 percent reporting no earnings.

Housing cost burdens are also high: 37 percent of households spend more than 30 percent of their income on housing, and 18.7 percent spend more than 50 percent. Still, about 20 percent of the City of Emporia's housing stock is vacant. Within occupied units, nearly half are occupied by renters.

Based on FEMA's NRI data (Figure 7), the City of Emporia has been historically susceptible to tornadoes, hurricanes, landslides (notably in tract 890200), strong winds, and ice storms. Hurricanes and ice storms are rated with an index of "relatively high" in both tracts. Heat waves and lightning present a growing concern, with "relatively moderate" ratings in both expected loss

and hazard risk, posing health and energy challenges for residents with limited adaptive capacity. In tract 890100, riverine flooding stands out with elevated risk levels, whereas tract 890200 specific risk relates to ice storms. As this recurring set of hazards intensifies with climate trends, the City of Emporia becomes increasingly vulnerable.



Review of Emergency Management Documents

Emporia's planning framework includes the Comprehensive Plan and All Hazards Plan, both of which were reviewed for equity integration. The Comprehensive Plan acknowledges vulnerable groups, particularly children, seniors, and lower-income households, and outlines goals for affordable housing, access to schools, and neighborhood revitalization. However, it lacks targeted strategies to engage marginalized communities and does not fully embed equity into its implementation measures. The All Hazard Plan provides the city's operational framework for disaster preparedness and response, but it is almost entirely silent on equity. It does not identify vulnerable populations, prioritize their needs, or establish mechanisms to monitor equitable outcomes. As shown in Table 7 below, the Comprehensive Plan demonstrates moderate attention to equity across all principles, reflecting some consideration of vulnerable populations, but without strong environmental justice integration. In contrast, the All Hazards plan shows weaker alignment with only moderate attention to procedures and limited treatment to access quality and outcomes.

Table 7. City of Emporia Plans' Equity Principles Rating

Policy	Procedure	Equity Principles		Outcomes
		Access	Quality	
Comprehensive Plan	Moderate	Moderate	Moderate	Moderate
All Hazards Plan	Moderate	Limited	Limited	Limited

Together, these findings show that while the comprehensive plan offers some foundation of equitable development, Emporia's Emergency Management planning remains underdeveloped in addressing equity, leaving residents most at risk without sufficient consideration in times of crisis.

The All-Hazards Plan.⁴³ The All-Hazard Plan lacks a strong focus on equity. While it includes some terms related to equity, these are sometimes not discussed within that context. The plan gives only limited attention to environmental justice, mentioning vulnerable populations briefly and without explaining how their needs would be addressed. It does not consider micro-level equity factors like age, race/ethnicity, language, employment, or cultural ties. Instead, it emphasizes cultural and archaeological sites, historic properties, and the telephone system, all of which are vulnerable during disasters, and includes these in its recovery strategies. The plan also lacks details on specific geographic areas or communities most at risk or vulnerable groups. Its equity considerations are narrow, mainly focusing on education, military veterans, and victims at the micro level, and on environmental issues, public safety, and economic growth at the macro level. Although reviewed every four years, it does not provide demographic data on who participates in the process. This makes it hard to tell if the voices of the most vulnerable are included in the policymaking. Without this input, equity concerns might be overlooked, leading to unfair impacts on underserved communities and slower recovery disasters.

Comprehensive Plan (2015-2035).⁴⁴ The comprehensive plan takes a different approach, as it incorporates the input of citizens. Residents provided specific concerns and desires at public meetings on the various thematic areas of the plan, including land use and environment, community facilities, transportation, housing and neighborhoods, and economic development. The Planning Commission reviews the plan once every five years. The plan prioritizes children and seniors, which is appropriate given the projected numerical increase in these populations, as well as the socioeconomic conditions of residents, and aims to provide housing that meets the needs of all socioeconomic groups. While the plan addresses equity issues at both micro and macro levels, it fails to adequately incorporate environmental justice principles, as it does not discuss vulnerable groups within the context of environmental protection.

Overall, the City of Emporia's plans show commitment to meeting development and preparedness objectives. However, their limited focus on equity leaves significant gaps. Neither plan specifies

⁴³ City of Emporia (2022). *City of Emporia All Hazards Plan 2022*. [unpublished document received through personal communication, December 2023]

⁴⁴ City of Emporia (n.d). *City of Emporia, VA Comprehensive plan*.

<https://www.ci.emporia.va.us/DocumentCenter/View/139/2015-2035-Comprehensive-Plan-PDF>

resources dedicated to outreach for marginalized populations nor includes timelines for achieving equity goals. Instead, the all-hazards plan emphasizes the general identification and allocation of resources under Emergency Support Function No. 7—Resource Support, to respond to and recover from disasters, without earmarked funding for vulnerable groups.

Insights from the Community

Interviews with local officials

Emergency management officials highlighted recent progress in improving infrastructure. The city has made significant improvements in stormwater management by replacing outdated pipes in some high-risk flood areas. Officials also noted the successful completion of sidewalk upgrades and the beginning of long-term planning efforts. At the same time, the City of Emporia's infrastructure faces serious challenges, especially with aging water and sewer systems and deteriorating roads. The city's location at the junction of I-95 and Route 58, along with the Meherrin River, contributes to road wear and stress on utilities. Nevertheless, projects often get delayed despite being part of long-term plans. Additionally, limited staffing and financial constraints continue to slow broader infrastructure upgrades, leaving key projects on hold or underfunded.

"I would say our infrastructure in Emporia is – it's fair, but it needs a lot of improvements. We've got a lot of water lines, sewer lines in Emporia that need to be replaced, and we're under financial strain right now to get these upgrades to our infrastructure." (Participant EVA-I-4)

Flooding was identified as the most persistent environmental threat to the City of Emporia, particularly during periods of heavy rain when the Meherrin River overflows. Officials also expressed concern over older stormwater infrastructure and the city's inability to effectively mitigate rising water in vulnerable neighborhoods. A common concern was the City of Emporia's Dam, a 100-year-old structure that, while not designed for flood management, has been strained by its age and recent weather events. Although hurricanes and severe weather events are less frequent, they have caused significant damage when they occur. The City also faces risk from hazardous material spills due to its proximity to major highways, where tractor-trailer accidents can release dangerous substances. Despite these risks, many areas remain unprotected or only partially addressed due to resource constraints.

"Environmental, probably the biggest issue we have is flooding, because when we have a lot of rain upstream, the Meherrin River does get pretty bad sometimes. It affects us here at the water plant, and if it gets really bad downtown, you have a couple places starting to flood also." (Participant EVA-I-7)

In response to these repeated events, city officials described the residents of Emporia as resilient, but sometimes to their own disadvantage. According to the interviews, many community members are hesitant to ask for help, even during emergencies, which hinders the city's efforts to identify

and address local needs. Interviewees suggest that residents have become used to regular disruptions like flooding, making them less likely to report damage or seek assistance. Some officials express doubt, sometimes based on firsthand experience, that the residents of Emporia will take advantage of services offered, such as emergency shelters or warming and cooling centers. The quote below illustrates how residents rely on their own resources to handle disaster challenges instead of seeking help from local governments:

“I’ll tell you, the heat wave, you know, this past summer we had some hot days, and we didn’t have any -- [we] opened a cooling shelter two different times... The people here are going to ride it out, you know. [We] could walk up to them in the street with a megaphone and beg them to leave their homes and come two blocks to a cooling shelter, and they’re not gonna do it. They’re resilient people, they’re strong people, and they’re just typically - and I say that as a good thing, that’s not a bad thing, that’s a good thing.” (Participant EVA-I-2)

Local emergency management officials emphasized that while they are committed to serving the community, limited staff and constrained budgets hamper their ability to respond effectively to long-standing issues. Departments often rely on grants to fund infrastructure and emergency preparedness, but these can be difficult to obtain and manage with existing staff. While there is strong collaboration across departments and with outside partners, officials expressed frustration with the pace of support from state and federal agencies.

“We need grant dollars. Citizens need to be patient while the streets are tore up doing those repairs, until we can repave them. But really it’s a funding issue for those, you know, we ask citizens, and me... I don’t want to have to keep asking City Council to raise the water rates, but in order to do what we need to do, those rates need to be raised at a minimum of 5% for the next 5 to 10 years.” (Participant EVA-I-3)

Despite these challenges, employees rate their effectiveness during emergency situations highly.

Communication with the public remains a challenge for the local government in the City of Emporia. While the city uses tools like Everbridge,⁴⁵ local radio, and social media to share updates, officials noted that residents do not always engage or take the initiative to inform themselves. Despite efforts to hold public meetings and distribute information, turnout tends to be low and follow-through is inconsistent. Officials felt that many residents expect information to be delivered directly, rather than actively seeking it out. Below are selected quotes that indicate the low participation of the local community:

“But I do want to add to that one of the big problems we have is we have the information available, but it’s difficult to get citizens to sign up to be a part of the mass notification. You know, that system is wonderful, but it doesn’t allow me or anyone for that matter, to go in and just add a citizen. You know, it requires a citizen to log into a website, create a password, and for some of our aging citizens, that’s just a task that’s too tall for them to do, and I have done workshops at the local library, where we invite citizens to come in and we help them do that. But once again, participation is low.” (Participant EVA-I-2)

⁴⁵ A critical event management platform used by many localities to send mass notifications and coordinate emergency response efforts.

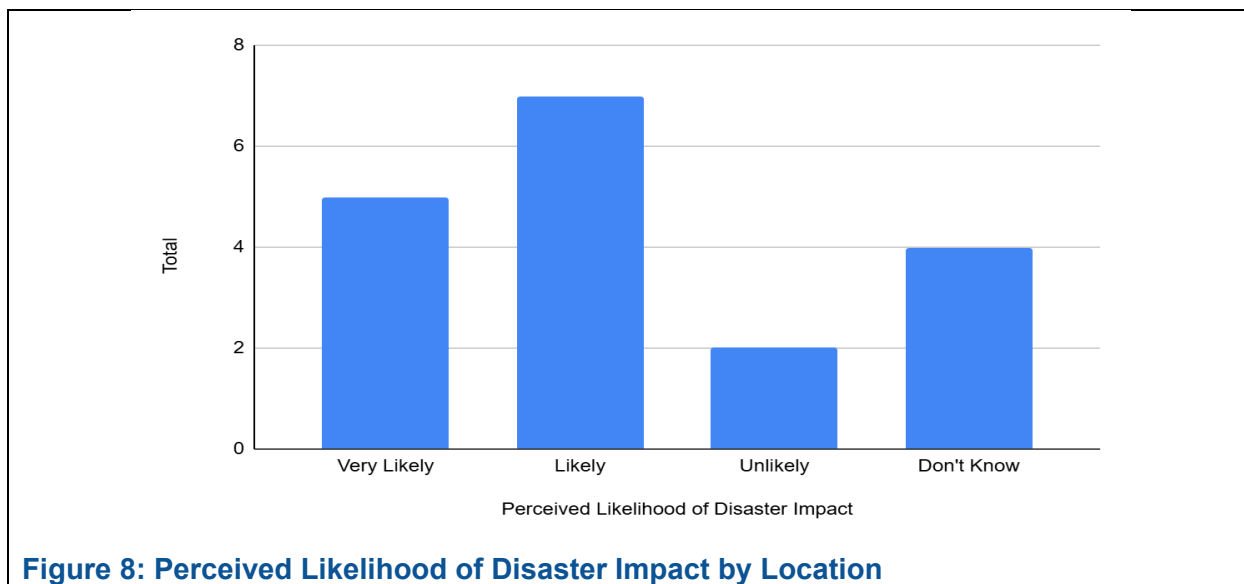
Focus Groups with community members

Pre-Survey

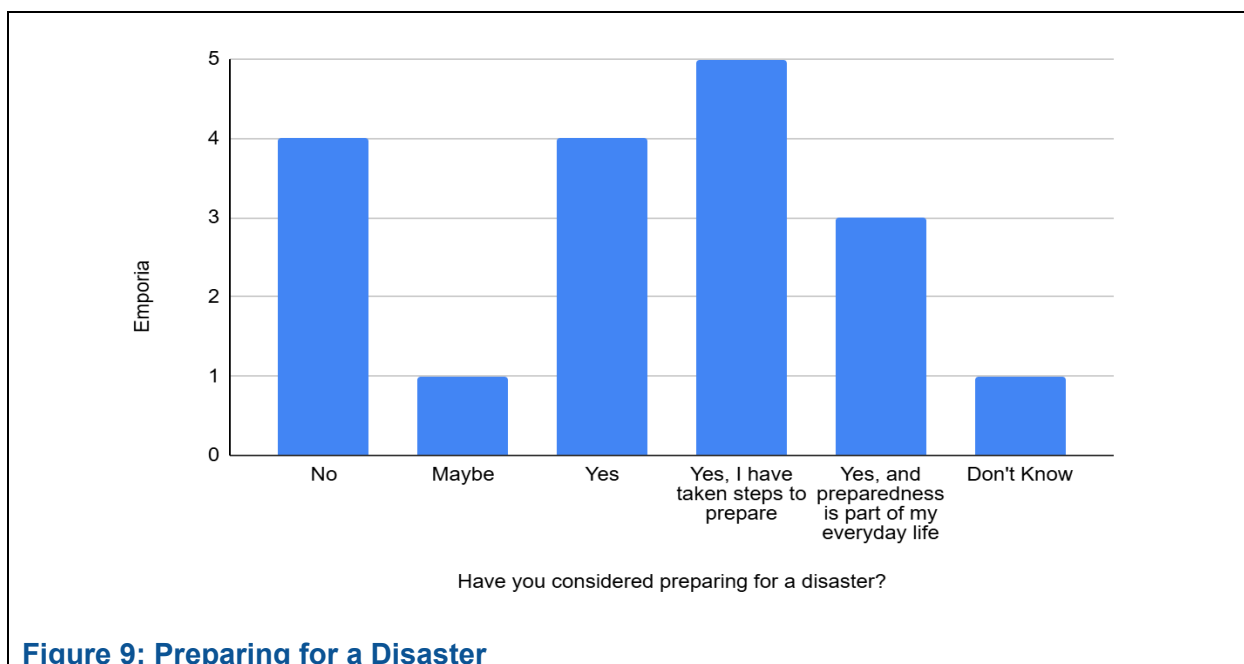
City of Emporia pre-focus group survey reflects the combined results of three separate focus groups held at different times. After accounting for partial responses and survey drop-off, a total of 19 individuals completed the full survey.

Overview. In the City of Emporia, 12 of the 19 participants had considered preparing for a disaster, with many taking concrete steps or integrating preparedness into their daily routines. However, a smaller group of four participants had not taken any action, highlighting uneven awareness among them. Readiness levels varied: Three City of Emporia participants reported planning to become prepared within the next year, four planned to start within six months, three participants had been prepared for less than a year, and five participants reported maintaining preparedness for more than a year, representing the most advanced stage of readiness. While most (12 participants) reported no barriers to accessing services, racial or ethnic identity had a positive, negative, or uncertain impact on preparedness for some, underscoring the need for culturally responsive strategies. Religious and spiritual identity motivated preparedness and was an important, yet inconsistent, source of information: five participants reported that their religious institution shared guidance regularly, while the remaining participants stated that their religious institutions did so only occasionally or not at all. The findings indicate that, while preparedness awareness is strong, targeted outreach, culturally responsive engagement, and expanded collaboration with faith-based organizations could significantly strengthen disaster readiness in the City of Emporia.

Preparedness. Perceptions of disaster risk strongly influence how people think about preparedness. To explore this survey asked respondents how likely they believe a disaster would affect their community. Most Emporia residents perceived a moderate to high likelihood, with five indicating a disaster was very likely and seven saying it was likely (Figure 8). Only two respondents considered a disaster unlikely, while four were unsure. Overall, the findings suggest that most residents recognize some level of vulnerability, which may help explain their attitudes toward preparedness.

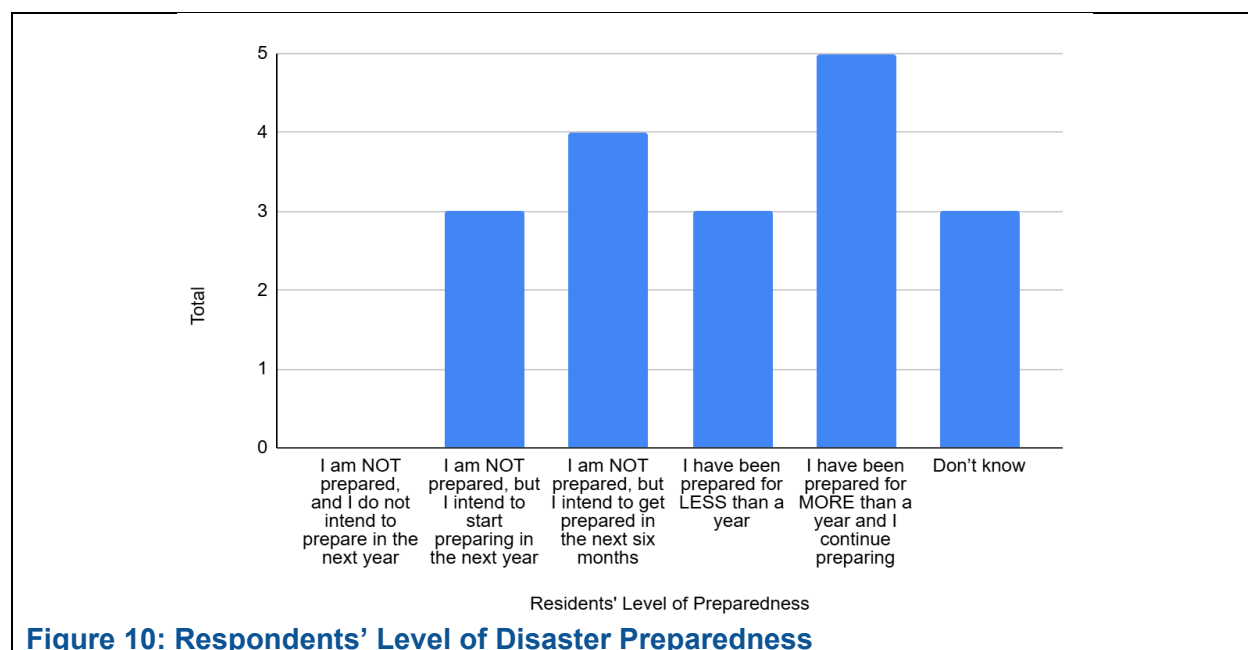


Most City of Emporia residents reported that they had thought about disaster preparedness, with many taking steps to get ready and some even making it a part of their daily routines (Figure 9). Only a few respondents said they had not considered prepping. These results suggest that awareness of the importance of preparedness is common in the community.



To better understand how prepared residents feel, the survey asked participants to place themselves on a 5-point scale, ranging from no plans to prepare to having sustained preparedness for more than a year. This measure captures both those who are not yet engaged and those who consistently practice preparedness. Three City of Emporia residents said they plan to be prepared within the next year, while four planned to start within the next six months (Figure

10). Three reported being prepared for less than a year, and five indicated that they had maintained preparedness for more than a year, representing the most advanced stage of readiness.



Summary. The City of Emporia respondents reflected both awareness and action around disaster preparedness. Though engagement was uneven, many had considered preparing, but their levels of action varied. Some were just beginning to plan, while others had maintained preparedness for over a year. Perceptions of disaster risks were relatively high, with most residents believing a disaster was likely or very likely. Taken together, these findings suggest that while awareness is present, preparedness could be strengthened through more substantial preparedness efforts with targeted outreach and support.

Focus Groups

Focus group participants in the City of Emporia highlighted the declining condition of the city's physical infrastructure, including roads, water systems, and downtown buildings. Many voiced frustrations over infrequent maintenance, poor stormwater drainage, and visible neglect in certain neighborhoods. The recurring issue of brown, odorous, or sandy tap water was mentioned in every focus group. Participants also expressed frustration about paying higher prices for water and utilities without seeing noticeable improvements. Residents pointed out challenges with wifi and internet services, citing limited options for reliable access. Many felt that when improvements do occur, they are unevenly distributed and slow to materialize.

"The quality of the water, the roads, and even the digital pattern that we have, internet accessibility and options, because everything we do now is high speed. So, to only have one or two options for reliable high speed, you know, everything we do, our telephone, our TV, all our communications now come through a digital means. So, to only have one or two options seems a little bit limited as to what's available to us." (Participant EVA-F-7)

Flooding was described in every focus group as a common and unpredictable hazard, especially near rivers and low-lying roads. Residents reported street flooding, water backing into homes, and damage to local infrastructure, which often remains unaddressed for long periods. Participants mentioned that warning systems are inadequate, and residents often find out about flooding too late, sometimes only when they come across it.

“Sometimes the Meherrin River flooded. Don’t nobody know about it until you get ready to come across a bridge, or you look over there by the post office, and you can see all the water is coming out.” (Participant EVA-F-11)

A common concern among community members is the lack of timely, reliable communication from local government, especially during emergencies. Residents feel there’s no clear system for reporting and tracking issues like flooding, blocked ditches, or road hazards. They stressed the need for accountability, transparency, and a digital or written trail for complaints. Although some had heard about sirens that sound during disaster events, many expressed confusion about how to interpret them. Participants suggested ideas like mass text alerts or social media updates to help close the information gap, emphasizing that, even when physical resources cannot be provided, information is important.

“A lot of people don’t have landlines now, they use their cell phones. So in that case, the texting will benefit people. But then again, seniors that don’t do texting, they need – we need both.” (Participant EVA-F-17)

In trying to communicate with the local government, some focus group members mentioned fear of retaliation, saying residents are reluctant to “rock the boat” by complaining. Others voiced frustration that, to get attention to an issue or accomplish anything, you need to self-advocate.

“So, people in general do not like to go to the county nor the city to complain, because then you got a tag on you, and they’d rather be quiet and go along and take what is given, but you’re paying taxes every year to be serviced. That’s the biggest problem in this area. Nobody likes to rock the boat.” (Participant EVA-F-2)

Participants reported a perception of racial and economic disparities in how city services are allocated. They described neighborhoods they viewed as predominantly Black or lower-income as often being the last to get services like snow removal or street cleaning. Even if these differences are only perceived, participants emphasized that the perception itself erodes trust. It should be addressed. Some community members directly associated these patterns with race or socioeconomic status, noting that wealthier areas seem to receive faster and more comprehensive services. Frustration also stemmed from feelings that public complaints were ignored or that city Council representatives engaged unevenly across neighborhoods. Taken together, these perceptions contribute to mistrust of the local government’s willingness and ability to improve infrastructure.

“I’m right in the heart of the city, and they will tell me – our streets don’t get clean. Two of my neighbors and myself keep our area clean from the corner to the other corner, and we shouldn’t have to get out there, paying high taxes and cleaning the streets. And I said to one of the workers one day, I said, “When are you all coming through our way?” Well, the

equipment is broken down. Every time I ask about that, equipment is always broken down in our area. And I'm like, yes, to me, it's a Black and White situation, because I go to the south side and the streets are clean. If they waste garbage on the street, they get it up. And I'm a witness, because I have seen it." (Participant EVA-F-1)

A common theme across the focus groups was a sense of resigned frustration about the lack of economic opportunity—something that participants connect to resilience.

"In this community, in the last 12 months, we've lost over 1,200 jobs that the community has to absorb. It's impossible to do. How do we – what can they do to help with that is, and this may sound – where are the vocational skills in the school that will promote businesses and industry to come to the area? [...] And if you don't have the economics in an area, how do you prepare, if you don't have it – if you've lost the GP and you've lost hundreds of thousands of dollars in water, then how do you have the funds available to prepare for a disaster when you're trying to recover from such a big loss?" (Participant EVA-F-7)

Summary

In the City of Emporia, flooding emerges as a clear priority, with elevated river flood risk shown in the data and many reports from residents and officials about frequent and disruptive floods. Interviewees point to river overflow, aging stormwater systems, and a century-old dam not built for flood control as causes. Residents mention street flooding, water backflow into homes, and lack of timely warnings. The hazard profile also identifies hurricanes and ice storms as significant risks, aligning with interview reports of severe weather damage and long power outages, as well as focus group memories of storms like Hurricane Isabel. Both interviews and focus groups highlight infrastructure issues, including aging water and sewer systems, worsening roads, and limited staff and funding for upgrades. Additionally, participants see communication gaps between local government and residents as a major obstacle to preparedness and recovery.

The City of Emporia concentrates multiple socio-demographic vulnerabilities, including a predominantly Black population (60%), a high share of children in single-parent households (67%), low education attainment levels, elevated disability rates, low incomes, high poverty, and significant reliance on public assistance. While these characteristics were not explicitly mentioned in the interviews, challenges in serving vulnerable populations are implied throughout. Meanwhile, focus groups emphasized racial and class disparities in the provision of services and expressed frustration with uneven service distribution, notably in Black or low-income neighborhoods.

These insights highlight a consistent set of priorities shared across officials and residents, summarized below (Box 4).

Box 4. Prioritized Needs in the City of Emporia	
Emergency Management Officials	Community Members
1. Address the aging infrastructure (water, sewer, roads) 2. Improve funding access: Limited funding and limited staff make it challenge to seek more funding 3. Address frequent riverine flooding 4. Improve communication with citizens	1. Address the aging and neglected infrastructure (water, roads, stormwater) 2. Address frequent flooding by improving drainage systems 3. Improve internet and digital access 4. Improve transparent communication systems

City of Richmond, Virginia

Overview

Centrally located along I-95, the City of Richmond serves as a hub between the Mid-Atlantic and the South. This lively city offers a mix of historic charm, cultural richness, and outdoor activities that attract not only locals but also visitors and tourists. Its diverse population and eclectic neighborhoods include university-centered districts and long-established neighborhoods of various racial and ethnic backgrounds. While the City of Richmond's historic brick buildings, cobblestone streets, churches, and charming museums depict a city that has demonstrated resilience through struggles for liberty, the city is actively committed to addressing the legacy of past policies that shaped inequities in housing, infrastructure, and access to resources.

Today, the City of Richmond is widely known for a thriving arts community, anchored by institutions like the Virginia Museum of Fine Arts, a wide range of local galleries, and colorful public art installations. Moreover, its historic James River and cultural diversity offer enormous opportunities, adding to its appeal for residents. In addition, the City's airport, railway services, and highway access connect it to other cities along the east coast, sustaining a thriving business environment.⁴⁶

The City of Richmond is strategically positioned with community assets to enhance environmental resilience. These include natural resources, governmental policies, community initiatives, and local plans that combat environmental degradation and encourage sustainable use of resources. For example, there is a capable emergency management team that concentrates on hazard mitigation, preparedness, and response across the region, with a focus on protecting vulnerable communities, such as those in Fulton and Manchester.⁴⁷

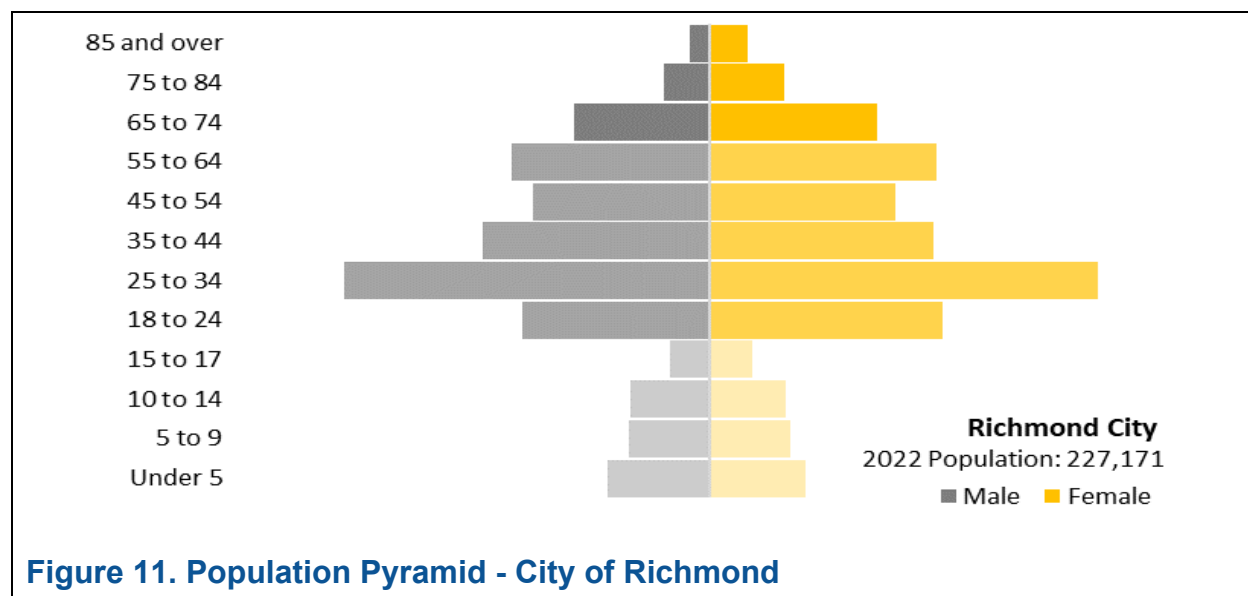
Quantitative Data Highlights: Infrastructure vulnerabilities, exposure risks, disparities

In 2022, the City of Richmond's population totaled 227,000, of which nearly 12,000 lived in one of the four census tracts analyzed (060700, 071003, 071004, and 021100). The City of Richmond exhibits a complex pattern of socioeconomic vulnerability concentrated in historically marginalized neighborhoods. The four census tracts are majority-Black, with an average Black population share exceeding 74 percent, far above the citywide average of 44 percent. These tracts show persistent disadvantages across education, employment, income, and housing.

⁴⁶ Research Institute for Social Equity. (2025). *Improving Resilience in Richmond*. Wilder School of Government and Public Affairs. Virginia Commonwealth University. <https://arcg.is/1DnWKP4>

⁴⁷ Research Institute for Social Equity. (2025). *Improving Resilience in Richmond*. Wilder School of Government and Public Affairs. Virginia Commonwealth University. <https://arcg.is/1DnWKP4>

Unlike Charles City County and City of Emporia, the City of Richmond is marked by a significantly larger working age population, and fewer children and elderly (Figure 11). Educational attainment in the three study tracts is significantly lower than city and state benchmarks, with roughly 80 percent of adults in these tracts holding a high school diploma or less, compared to about 60 percent city-, state- and nationwide.



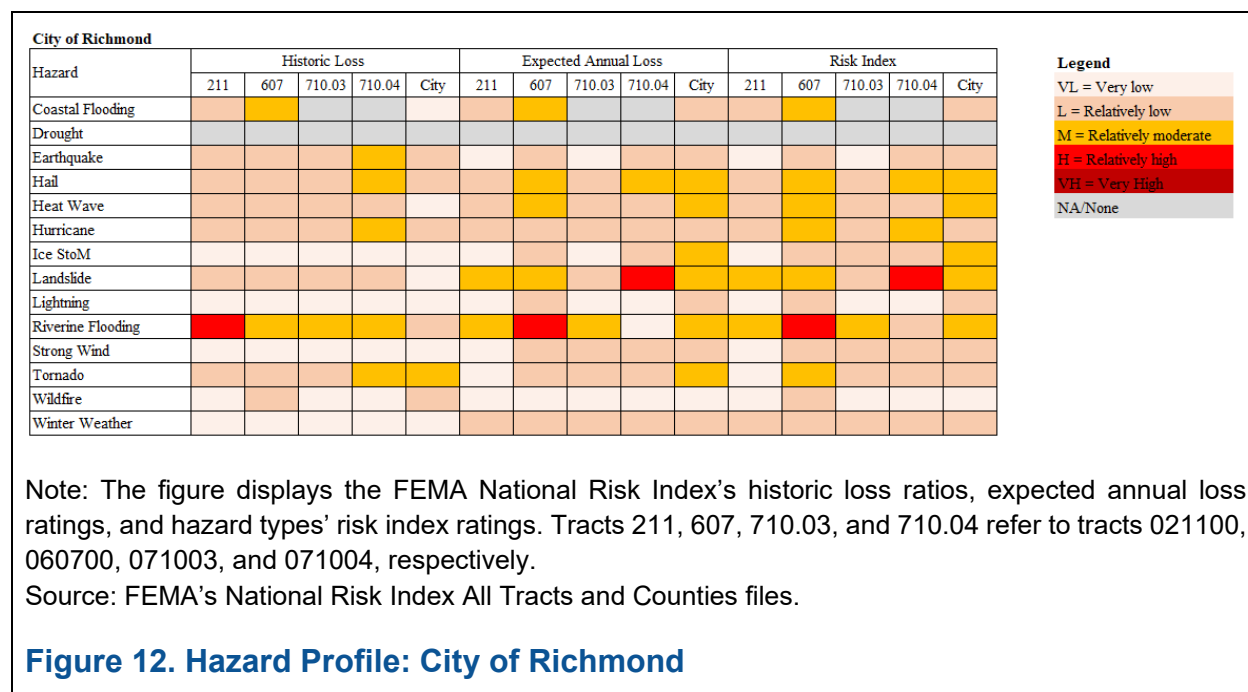
Source: US Census Bureau, American Community Survey 5-year estimates 2022. Retrieved from Social Explorer.

Overall poverty rates in the City of Richmond are at 19 percent, higher than the state and the country (respectively, 13 and 17 percent). However, they are even higher in the studied tracts, notably in tract 060700, where they reach 38 percent. Further, in tracts 060700 and 021100, about half of the children (under 18 years) are living in poverty. Household income is markedly low, with median household incomes ranging from \$32,000 to \$44,000 across tracts, less than half the median for Virginia. Unemployment rates, especially for Black residents, remain well above city and state averages.

Housing instability is another critical concern. Renter-occupancy rates are extremely high (up to 89 percent), and cost burdens are noticeable, with 50-60 percent of residents being cost-burdened,⁴⁸ and 20-40 percent severely cost-burdened across all tracts. Disability prevalence is also elevated, particularly in tracts 060700 and 071004, where over 20 percent of residents report some disability.

⁴⁸ Households that spend more than 30% of their income on housing costs (rent, mortgage, etc.) are considered cost-burdened. Households that spend more than 50% are severely cost-burdened. U.S. Census Bureau. (2024, September 12). Nearly half of renter households are cost-burdened, proportions differ by race [Press release]. <https://www.census.gov/newsroom/press-releases/2024/renter-households-cost-burdened-race.html>

Based on FEMA’s NRI data (Figure 12), the four City of Richmond tracts analyzed face layered hazard risks, particularly from riverine flooding and landslides. Tracts 060700 and 071003 show “relatively high” or “moderate” exposure to riverine flooding across all hazard categories, pointing to persistent vulnerability in low-lying or poorly drained areas. Tract 071004 is especially notable for its “relatively high” landslide risk in both expected losses and hazard risk ratings. Furthermore, hail, heat waves, and ice storms register as “relatively moderate” in both expected loss and risk index, underscoring storm and temperature extremes as recurring threats.



Review of Emergency Management Documents

The census tracts in the City of Richmond do not have independent emergency management but fall under the jurisdiction of the Richmond city government. This analysis relies on publicly available documents from the city, including the Emergency Operations Plan (EOP), the City of Richmond 300 Master Plan, RVA Green Climate Equity Plan 2030, and the James River Park Master Plan. These documents show uneven incorporation of equity principles. The EOP demonstrates only limited alignment with equity, while the Richmond 300 offers moderate emphasis through public engagement at the neighborhood level. The Climate Equity Action Plan stands out as comprehensive, integrating equity throughout its objectives, pathways, and accountability measures. The James River Park Master Plan also performs well, especially in procedures and access, supported by extensive public participation, although its approach to quality and outcomes remains moderate. The Table 8 below summarizes the equity ratings across these four plans.

Table 8. City of Richmond Plans' Equity Principles Rating

Policy	Procedure	Equity Principles		Outcomes
		Access	Quality	
Emergency Operation Plan	Moderate	Limited	Limited	Weak
City of Richmond 300: A Guide for Growth	Moderate	Moderate	Moderate	Moderate
RVA Green Climate Equity Plan 2030	Comprehensive	Comprehensive	Comprehensive	Comprehensive
James River Park Master Plan	Comprehensive	Comprehensive	Moderate	Moderate

Together, these findings show that while Richmond has made significant progress in embedding equity into its climate and park planning, its Emergency Operations Plan and Richmond 300 provide limited to moderate integration. This imbalance leaves critical governance documents underdeveloped in addressing equity, which risks uneven protection and support for the city's most vulnerable residents.

Emergency Operations Plan.⁴⁹ The City of Richmond's Emergency Operations Plan provides a detailed overview of the City's hazard landscape, including natural, technological, and human-made threats. It identifies hazards based on historical currents and likelihood of impact, and it highlights priority populations such as people with disabilities, individuals with other access and functional needs, and residents facing language barriers. The plan emphasizes ensuring that these groups can evacuate and access emergency transportation. And use shelters and participate in emergency programs with service animals. These provisions reflect an important recognition of vulnerability and a commitment to procedural equity, supported by annual reviews and opportunities for planned adjustments based on feedback.

Despite these strengths, the plan has some equity gaps. At the micro level, it omits categories such as cultural heritage, nationality, religion, and employment status. And at the micro level, it gives little attention to unemployment, broadband access, and community health. While it incorporates inclusive language, the plan does not specify resources, establish timelines, or implement monitoring mechanisms to reduce inequities. Access to services for marginalized groups is weakly addressed, and commitments to the quality of outcomes are unclear.

Overall, the Emergency Operations Plan makes progress by identifying vulnerable populations and recognizing the importance of equity. Building on this progress requires moving from broad

⁴⁹ City of Richmond (2022). *Emergency Operations Plan - Basic Plan 2022*.
<https://www.rva.gov/sites/default/files/2022-09/EOP%20Complete.pdf>

acknowledgment to specific actions. The Plan should include measurable strategies, allocate resources, and establish accountability systems to ensure that marginalized residents are not burdened with the disproportionate impacts of environmental and disaster events.

[The City of Richmond 300.](#)⁵⁰ A Guide for Growth plan, broadly incorporates equity language and addresses both micro- and macro-level equity issues. However, omissions at the micro level include the individual's ability status, nationality, and language, and at the macro level, employment. The plan emphasizes support for low-income individuals, particularly in housing, but overlooks several other vulnerable groups with unique needs, such as victims, immigrants, limited English speakers, and the correctional population.

Public participation was a key part of the planning process. Although the plan does not specify the demographic makeup of the participants, it commits to engaging with individual communities through meetings, focus groups, surveys, and public comments. It also highlights important geographical areas of focus⁵¹ and outlines steps to realize its vision for these areas. The plan is structured around six “Big Moves,” comprehensive initiatives planned for the next five years, and establishes a measurement system to track progress with annual reporting toward a 2027 vision.

Despite these strengths, the plan demonstrates only a moderate commitment to equity principles. While it created an inclusive public process, it does not show intentionality in reaching marginalized groups such as people with disabilities and immigrants. Mechanisms for ongoing community feedback and adjustments based on input are unclear, and the plan does not specify steps or timelines for achieving equity-related goals. Access is weakly addressed in terms of removing barriers to services, and monitoring systems for evaluating equity outcomes are limited. Overall, Richmond 300 provides an important framework for inclusive growth, but its limited focus on certain vulnerable groups and lack of measurable equity strategies may hinder progress toward fully equitable development.

[The RVA Green 2050: Climate Equity Action Plan 2030.](#)⁵² RVA Green features extensive equity language, including keywords, micro-level, and macro-level references. Vulnerable populations and broader systemic issues are identified and defined not only at the outset of the plan but are also contextualized through both historical and current perspectives, with ongoing reference throughout the objectives and strategies. Public participation occurred through roundtables and working groups providing stipends, though participation challenges arose due to COVID-19.

⁵⁰ Department of Planning and Development Review (2023). *The City of Richmond 300: A guide for growth*. The City of Richmond. https://rva.gov/sites/default/files/2025-03/R300_Amended_RRHA_lowres_20250321.pdf

⁵¹ Jackson Ward, Shockoe, Manchester, the Downtown Core, Monroe Ward, Route 1, the Southside Plaza Area, and Stony Point Fashion Park, as well as Gilpin, Creighton, Fairfield, Mosby, Whitcomb, Hillside, Blackwell, and Highland Grove

⁵² Office of Sustainability (2023). *City of Richmond RVA Green 2050: Climate Equity Action Plan 2030*. <https://www.rva.gov/sites/default/files/2023-01/FullDocumentRVAgreenClimateEquityActionPlan2030.pdf>

The plan prioritizes BIPOC communities, low-income households, renters, and individuals with health vulnerabilities, guided by the Climate Equity Index to identify underserved areas and populations. The plan fosters partnerships with local nonprofits, grassroots organizations, racial equity groups, and community-led agencies, emphasizing stakeholder-led implementation and cross-sector collaboration.

The plan details 134 actions across five pathways, each with designated partners and phased timelines extending to 2030. It highlights sustained funding for outreach, navigators, and flexible community-directed grants, while building partnerships with nonprofits, grassroots organizations, and equity focus groups. Accountability is ensured through annual monitoring linked to equity metrics. The plan demonstrates comprehensive strength in procedures, access, and outcomes, with transparent implementation processes and clear commitments to equity-focused strategies. Its quality aspect is rated as moderate, as accessibility for persons with disabilities, non-English speakers, and those without Internet access needs improvement. More detailed ongoing monitoring of gaps in under-resourced communities will be crucial.

Overall, RVA Green 2050 sets a national example for equity-centered climate planning. Its strengths lie in stakeholder engagement, procedural transparency, and measurable outcomes. Continued progress will depend on addressing accessibility gaps and ensuring equitable funding allocations to prevent exclusion or displacement, especially in frontline communities.

James River Park Master Plan. The plan prioritizes equitable access as its main goal, aiming to make it easier for diverse visitors to reach and navigate the Park and the James River, and to establish connections between noncontiguous Park properties and regional greenways.⁵³ It includes equity considerations at both small and large scales, covering age, accessibility, environment, public safety, community health, economic development, and transportation. However, it overlooks important marginalized groups, such as immigrants and veterans. The overall goal is to enhance access and amenities for users, such as adding water fountains, parking spaces, and restrooms, while also promoting environmental stewardship through new greenways and conservation efforts.

This plan integrated public participation and relies on it for practical evaluation. It utilized public participation in the policy-making process through an inclusive approach, engaging a diverse range of stakeholders, especially from marginalized communities, in a fair and equitable decision-making process. It had input from stakeholders, including the Friends of the James River Park System, Vanasse Hangen Brustlin, Inc. (VHB), and Hargreaves Associates, the consultant team, a Steering Committee (comprised of representatives from diverse stakeholder groups), a Technical Committee (comprised of City staff from various departments), and the public through

⁵³ Vanasse Hangen Brustlin, Inc. and Hargreaves Associates (2019). *James River Park System Master Plan*. <https://capitalregionland.org/wp-content/uploads/2021/11/James-River-Park-Master-Plan-Oct-16-2019.pdf>

participation in council meetings, in-person and online questionnaires. The planning process also included a survey of 2,353 participants across the city and adjacent counties.

The James River Park System Master Plan differs from its predecessors, the Downtown Plan 2009 and the City of Richmond Riverfront Plan 2012, by emphasizing the entire James River Park System. In contrast, the earlier plans only focused on the downtown section of the James River. In this important aspect, the Plan acts as an overlay to the previous plans while expanding the planning scope upriver along the James River.

Insights From Local Communities

Interviews with Emergency Management Officials

The City of Richmond's officials expressed both confidence in key parts of the city's critical infrastructure and awareness of the urgent challenges caused by aging systems. Several highlighted Richmond's partnerships with local municipalities, state and federal agencies, and organizational collaborators as playing a major role in their hopeful outlook on Richmond's critical infrastructure.

"Richmond actually does a fairly good job on infrastructure. They've -- especially with -- in partnership with some of the Federal agencies, you know, specifically the Corps of Engineers, they've been able to harden the area for many different types of disasters coming out there." (Participant RVA-I-2)

"I think overall, I think our infrastructure is in relatively good shape for like a city in the United States. I think roads and bridges, we are on track to maintain some of our aging bridges and roads. We have a well-functioning Transportation Department. Our Public Transportation system has some level of extreme weather preparedness baked into it. We have snow routes for our buses, so routes that during a blizzard would always be cleared so there's continued bus service[...] And then public health infrastructure, we have large hospital systems, and I think a pretty well-functioning Public Health Department" (Participant RVA-I-1)

"I think we're doing, as a city, a pretty good job of maintaining an increased security around the city. You know, we've got an essential partnership with VCU, for instance, and the MCV campus, in regards to their policing, we're integrated with Capital Police Network. So I think as a city we are leveraging our local and regional and State partners, to support the need for a safer environment, safer community, etcetera" (Participant- RVA-I-4).

While the city benefits from a strong hospital network and ongoing infrastructure planning, many of its water, sewer, gas, and transportation systems are aging: some date back over a hundred years or are made of materials no longer in use (e.g., clay, wood, lead pipes). Additionally, the city's combined sewer system, which backs up and overflows during storms, needs to be

upgraded according to a federal mandate. While this will mark progress, it will require significant financial resources.

“On a scale of 1 to 10, with 10 being the highest, I would say that City of Richmond’s infrastructure, overall quality, for underground infrastructure from my experience would be a 4. The reason for the low score not being at the halfway point is we are a very – this is a very old city. City of Richmond is – and Virginia itself is, you know, the first part of the building of this country, so we have infrastructure that is 100 plus years old, 150 years old. We also have a combined sewer system, which is – it’s unique now because we’re not creating combined sewer systems anymore. And with that being said, we have the material that the infrastructure was built in, it’s inferior to what we’re using now, the clay pipes, the wood pipes for water, you know, all of those things have not been maintained or couldn’t be maintained over the years. We do have some aging infrastructure that’s aboveground as well, as far as our bridges, that’s a concern. We are in the process of replacing one bridge right now, so that speaks to the fact of a lower score. We’re doing some things with the infrastructure, but there’s a lot more that needs to be done. In regards to the roadways, you know, that is a constant thing that’s being taken care of. Sidewalks, roadside ditches, some of the infrastructure in the south side of City of Richmond, south of the river, is very old, which was once a Chesterfield County annexed area of the city. So you don’t even have underground infrastructure to control stormwater on the south of the river. You still got roadside ditches, you still got galvanized pipes, concrete pipes, which right now if you were building a new subdivision or what have you, you wouldn’t be putting in roadside ditches, or you shouldn’t be putting in roadside ditches. It’s a very cheap and somewhat effective way to manage stormwater, but it doesn’t manage it over the long term with varied infrastructure with like pipes, valley gutter, you know, curbing gutter and things of that nature. So when I speak to that, we also still have the lead services. There’s a program where we need to remove the lead services from out of our system that’s mandated with the Federal government. So that speaks again to the old infrastructure, all of our infrastructure that historically is in the City of Richmond.” (Participant RVA-I-6)

There is widespread agreement that major upgrades are necessary, but local budgets are limited and overburdening taxpayers is undesirable. Important priorities include improving the combined sewer system, underground water and gas lines, and stormwater drainage. Concerns also exist about the absence of contingency plans for failures at critical facilities like water and wastewater treatment plants. Respondents also emphasized the need for better transit access in underserved neighborhoods and the expansion of cooling centers and energy-assistance programs to help vulnerable residents during extreme heat. Equitable funding from state and federal sources is seen as vital, given the city’s fiscal limitations. Finally, several participants recommended more proactive pipe inspections, enhanced litter control to prevent storm drain blockages, and increased investment in green infrastructure, such as parks and shade trees, to combat heat-related issues.

“It’s been a lot of improvements at our wastewater plant, there’s been a lot of improvements to separate these systems. But again, one-third of the City is composed of this infrastructure. Now, there has been a Consent Order and a Senate bill passed recently, within the last five years, that mandates the City of Richmond to stop what we would say are combined sewer system overflows, to cease them 100% by the year 2035. That project is in excess of almost \$1 billion.” (Participant RVA-I-5)

Flooding and extreme heat were consistently cited as the City of Richmond’s most pressing and frequent environmental hazards. A rise in heat wave days, earlier seasonal peaks, and heat-related illnesses, combined with limited access to cooling resources, is especially concerning for low-income and unhoused populations.

“Even just this summer we had a number of heat waves that, you know, we were frantically putting out warnings to people that were unhoused, to people that were living inside, or people that didn’t have air conditioning, because, you know, you realize the bigger events are the ones that get a lot of attention, you know, the Milton going through Florida right now, but the biggest killer, you know, environmental killer for any of those disasters is heat. People getting stuck inside their apartments and can’t get out, or, you know, don’t have the right cooling, thousands of people die every year in the United States from heat-related illnesses, and it’s something that we could fix fairly easily with the right support, and the right integration within communities that are vulnerable.” (Participant RVA-I-2)

Pluvial and riverine flooding were described as recurring and worsening, especially in the southside. This issue is worsened by combined sewer overflows during storms. One respondent noted that flood-prone areas outside FEMA floodplains are not addressed promptly, highlighting the difference between historically-based maps and current perceived challenges.

“Well, so if you look at the – like the flood maps, like, say, the, you know, 100- and 500-year floodplains, those things will grow. But that’s not the only – like, there are areas that flood and will flood more that are not in a floodplain, and those are the areas that I think public works is attempting to address, but I think they have to hear a complaint from a person that says, “This corner is always flooded when it rains. What are you going to do?” So, it’s sort of a 311 situation where as long as somebody submits a complaint, they know it exists and they can address it, if they can address it.” (Participant RVA-I-7)

Other hazards mentioned by interviewees include high wind events, remnants of hurricanes, tornadoes, and wildfires with smoke during the summer months. The City of Richmond also faces some man-made hazards, such as potential hazard material spills from old railroads and pipelines that run through densely populated and low-income neighborhoods, along with sewer discharges into the James River.

Focus Groups with community members

Pre-Survey

Following the removal of incomplete responses, a total of 16 individuals completed the pre-focus group survey in Richmond, which was conducted after a single in-person session in the area.

Overview. In Richmond, most respondents reported experiencing barriers to preparedness services tied to their racial or ethnic identity, and many said that identity directly influences how they prepare for disasters. A majority described this influence as substantial or moderate, underscoring the importance of culturally responsive outreach. Religious and spiritual identity also played a meaningful role, with many participants citing faith as a motivator in their preparedness efforts. Faith-based organizations were identified as important but inconsistent sources of information, while some regularly shared preparedness guidance, others did so only occasionally or not at all. These findings highlight the need for preparedness strategies in Richmond that prioritize equity and strengthen partnerships with trusted community institutions.

Preparedness. Perceptions of disaster likelihood can play a critical role in shaping individuals' willingness to engage in preparedness activities. Richmond survey respondents were asked how likely they believe it is that a disaster would impact their community. As shown in Figure 13, the majority of Richmond participants expressed a moderate to high perception of risk. One respondent indicated that a disaster is *very likely*, while ten selected *likely*. Only two respondents believed a disaster was *unlikely* to occur in their community. These findings suggest that most Richmond residents recognize a degree of vulnerability to disaster events, which may positively influence their motivation to prepare.

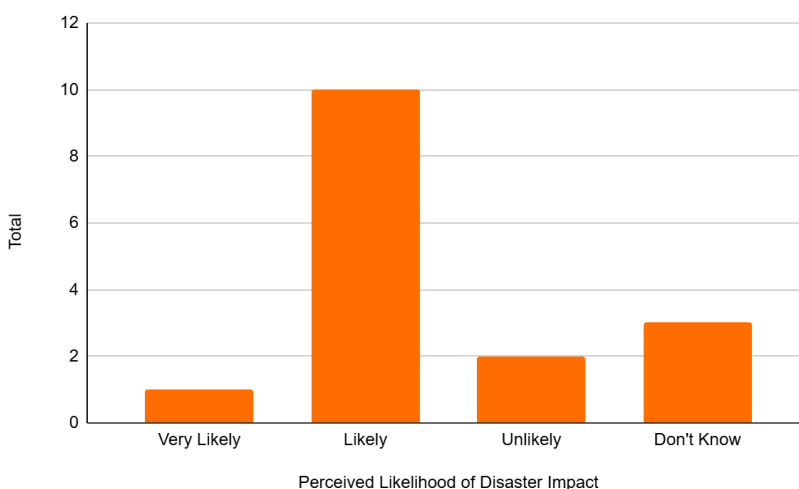
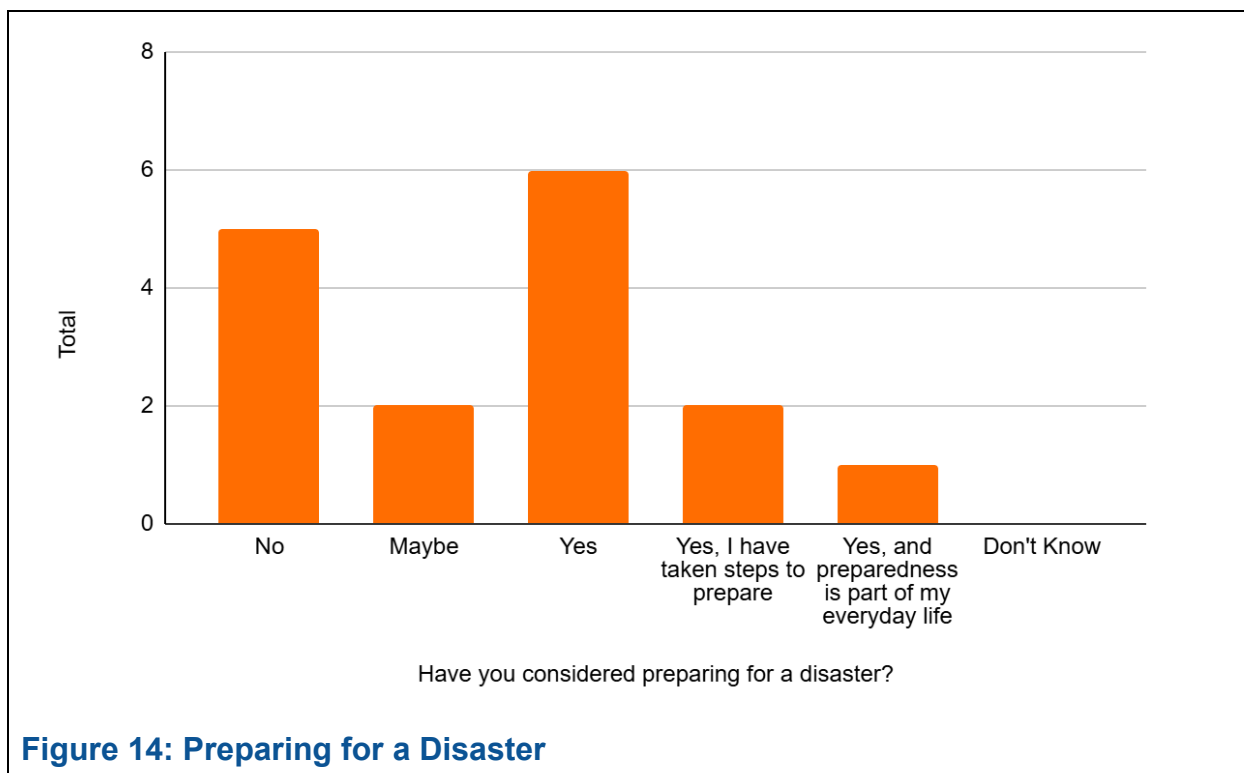
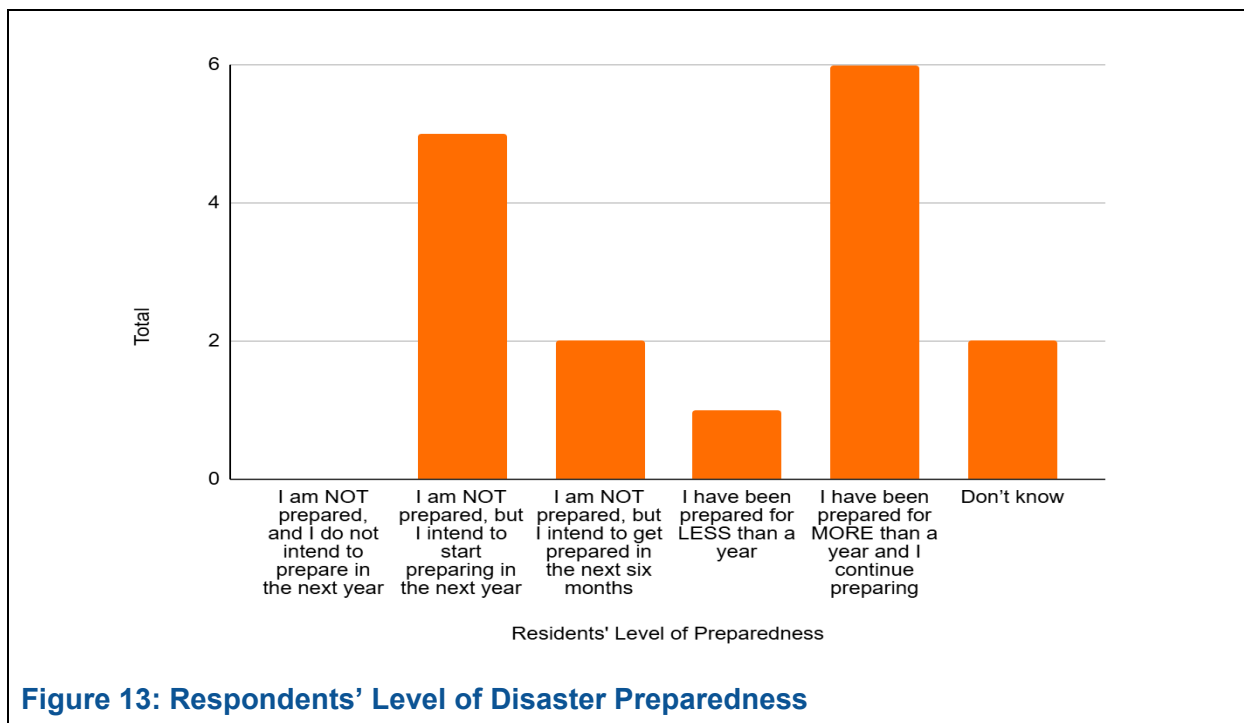


Figure 13: Perceived Likelihood of Disaster Impact

Figure 14 helps understand the general views on disaster readiness. The City of Richmond participants were asked if they had ever thought about preparing for a disaster. While most respondents indicated some level of engagement with preparedness, five reported that they had never considered it, and few selected maybe. Among those who had thought about or acted on preparedness, responses reflected varying levels of involvement. Some had taken concrete steps, while others viewed preparedness as a routine part of their daily lives. In total, nine City of Richmond respondents selected one of the affirmative options, reflecting general awareness of the importance of being ready for potential disaster events.



To go beyond general awareness and assess actual preparedness behaviors, the survey used a five-point scale to measure both current actions and future plans related to disaster readiness. The scale ranged from having no preparedness plans at all to maintaining readiness for over a year, offering a detailed view of individual engagement levels. As shown in Figure 15, respondents from the City of Richmond were spread across various points on the preparedness spectrum. Five individuals indicated that they are not yet prepared but plan to start within the next year, while two intend to begin within the next six months. One respondent reported being recently prepared, having taken action within the past year. Notably, six respondents indicated that they had maintained a state of preparedness for more than a year, representing the most sustained level of engagement. The findings suggest that while many City of Richmond residents are in the early stages of preparedness, some have already adopted long-term readiness practices.



Summary. Residents of the City of Richmond who participated in the focus groups showed a strong commitment to disaster preparedness. Many had already taken steps toward readiness, with several respondents indicating they had been preparing for over a year. Racial and religious identities were more often cited as influential, especially racial identity, with many reporting it had a substantial or moderate impact on their behavior. Residents were also more likely to report facing barriers to accessing preparedness services linked to their racial or ethnic background, pointing to possible inequities in service delivery. Religious organizations in Richmond were regularly active in sharing emergency preparedness information, highlighting a key partner in outreach efforts. While a few residents had not considered preparing, most had, and several described preparedness as part of their daily routines. Perceptions of disaster risk remained high, emphasizing the need for continued support and resources. Overall, Richmond's community shows both motivation and momentum in disaster preparedness, though disparities in access may need policy intervention.

Focus Groups

Focus group participants in the City of Richmond identified the poor condition of roads as a key infrastructure challenge, citing widespread potholes and frequent flooding that disrupts daily transportation. When asked about their experiences with environmental hazards, residents most often mentioned extreme flooding and severe thunderstorms, recalling specific events like Hurricane Isabel, which left the city without power for days, and the recent water crisis, which left residents without access to water for several days. In contrast, hospitals were highlighted as examples of strong and reliable infrastructure within the city.

“The roads are kind of bad. They bumpy. It got a lot of potholes. The electricity for the stop signs, I guess, the power goes out when we have thunder and lightning, heavy rain, we lose power to the stop signs, and it be forever for them to get somebody out there to put up the manual stop sign. Especially over here, South Side, like, Whitehead Road, it floods a lot. I mean, it’s a real big flooding spot between Warwick and Elkhart. That’s a real bad spot for water. There’s a couple other spots, it’s terrible as afar as traffic. Yeah, it’s very cluttered, no parking. That’s it for the roads.” (Participant RVA-F-9)

Participants generally felt their communities were unprepared for extreme weather events. In response to a question about local readiness for events such as an impending snowstorm, one focus group participant remarked, “Yeah, they don’t. We are ill-prepared” (Participant RVA-F-12). This sentiment was echoed by others, who expressed frustration and skepticism regarding the government’s capacity to respond effectively during emergencies.

Yet these discussions also revealed a strong reliance on community resilience. Participants emphasized the importance of personal networks and community-based organizations, especially churches, in providing vital support during a crisis. They noted how these organizations can work with the city to improve emergency service provision.

“Not everyone expects the government to take care of things for them” (Participant RVA-F-4)

Another participant explained how churches helped mitigate the winter 2025 water crisis:⁵⁴

“No, when we got people to come with water, actual water to give. Some of the areas further out, in Chesterfield and Rockville, they got water sooner, first, and the communities – and that’s when we look at stepping in. That’s when all the other churches need to look at stepping in, when crisis like that happen. Our pastor, we got water that was given, water that we bought and brought here, and took anywhere to anybody. And if everybody, if every church does that throughout the city, that would kind of help the government a little bit, the city. That’s called pulling together.” (Participant RVA-F-9)

In addition to identifying challenges, participants offered several suggestions to enhance local emergency preparedness and response. These included creating disaster relief funds, providing targeted support for individuals and businesses, focusing on vulnerable populations, ensuring access to first aid kits, and offering transportation for those with mobility challenges. A common theme was the need for more effective and proactive communication between the government and residents, not only during emergencies but also as part of ongoing community engagement.

“Okay, I have something to say. Yes, I would say shelter and temporary. Like, housing should be provided for individuals that are being affected during any emergency crisis, to

⁵⁴ In January 2025 the City of Richmond, Virginia experienced a water crises, that left the city without water and parts of neighboring counties with limited water access. Details about the event can be found on the City’s website at: City of Richmond. (2025). Water Crisis and Recovery. RVA.gov- Mayor’s Office. <https://rva.gov/mayors-office/2025-water-crisis>

enable them to have somewhere they could at least raise their head and also being protected from harmful substances.” (Participant RVA-F-1)

“Yeah, what I have to say is on my suggestion. First of all, information will be sent across to citizens to ensure their safety and properties are being kept in good condition and also trying to be indoors to avoid any disaster. [...] Yeah, I have something else to add to the question you’re asking. The government should work hand in hand with the community members and the citizens to be able to achieve a good outcome, yeah, making sure that they try to see how they can work together to provide a remedy to avoid having such disaster in the community.” (Participant RVA-F-1)

Summary

In the City of Richmond, flooding emerges as the most consistent concern. The quantitative analysis highlights high riverine and pluvial flood risk, with some tracts showing elevated exposure. Interviews and focus groups reinforce this finding, with flooding described as a top hazard that disrupts daily life and is worsened by aging infrastructure, combined sewer overflows, and unaddressed flood-prone areas outside FEMA maps. Residents repeatedly recalled major flood events such as Hurricane Isabel, emphasizing both the scale and frequency of impacts. Other hazards, such as hurricanes, ice storms, and severe thunderstorms, were also noticed. Interviewees described high winds, tornado remnants, and wildfire smoke, while focus groups recalled prolonged power outages from past hurricanes. Together, these findings indicate that flooding and storm hazards are central, recurrent threats, closely tied to infrastructure vulnerabilities.

Infrastructure condition is another recurring theme: interviews emphasized century-old water, sewer, and gas systems in need of mandated upgrades, while residents pointed to deteriorating roads and transportation disruption from flooding. Preparedness and communication challenges further compound risks, with interviews noting the absence of contingency plans and frustrations over delayed aid, while focus groups perceived unpreparedness and stressed reliance on community organizations. Across all three analyses, gaps in proactive communication and engagement between government and residents stand out, underscoring the need for stronger trust, transparency, and ongoing dialogue alongside physical infrastructure improvements.

It is worth noting that the tracts studied are also marked by socio-demographic vulnerabilities, including having majority-Black residents, high poverty, low incomes, high renter occupancy, and elevated disability rates, as shown in the quantitative analysis. While not always directly noted in interviews or focus groups, equity concerns emerge in calls for more cooling centers, equitable state and federal funding, and targeted emergency support for vulnerable populations.

Box 5. Prioritized Needs in the City of Richmond

Emergency Management Officials	Community Members
1. Upgrading aging infrastructure (especially the combined sewer system, lead pipes, and bridges) 2. Addressing flooding risks both pluvial and riverine 3. Mitigating extreme heat impacts 4. Securing equitable funding and resilience planning	1. Fixing local infrastructure problems (especially road conditions and drainage issues that lead to flooding) 2. Improving disaster preparedness and response capacity 3. Strengthening communication and trust between government and residents 4. Supporting vulnerable populations through community partnerships

Community and Stakeholder Engagement

This project used a multi-level engagement strategy to promote equity, trust, and meaningful participation. Activities included forming a community advisory board, recruiting and training community navigators, hosting capacity-building workshops, and organizing community conversation events. The approach worked together to amplify community voices, enhance local knowledge, and turn findings into practical solutions. By building this structure of trust and inclusion, the project positioned stakeholders to influence not only the research process but also the interpretation and application of results. Each locality was at a different stage of engagement at the time of this report, reflecting variations in community readiness, capacity, and ongoing partnerships.

How Stakeholders Shaped Findings

Stakeholders were involved as both participants and partners in interpreting findings. CAB members, navigators, and community conversation attendees provide input on how results should be framed and shared with residents. Their feedback shaped the design of story maps, policy briefs, and data products, ensuring that project deliverables reflect community priorities and can be used in future grant applications, planning, and resilience efforts.

Community Advisory Boards (CABs)

Community advisory boards (CABs) were established to assist with the research design and ensure that community perspectives shape the project from the beginning. CABs are typically composed of residents, local advocates, and organizational leaders. The CAB works alongside our research team from the earliest stages of the project, playing a central role in developing research instruments such as interview and focus group questions. They provided insight at early stages to help us ensure that the research design and outreach activities are appropriate.

Community Navigator

As a trusted member of the community, the Community Navigator played a pivotal role in advancing our project's goals by strengthening connections between researchers, residents, and local leaders. Their deep knowledge of community dynamics enabled them to identify and recruit diverse focus group participants whose perspectives reflected the full range of lived experiences in areas impacted by critical infrastructure decisions and environmental justice concerns. Beyond logistics, the navigator served as a cultural bridge, providing essential historical and social context that allowed the research team to interpret community concerns with accuracy and sensitivity.

Community navigators were identified for all three localities. The first community navigator was based in the City of Emporia, VA, and helped boost participation in focus groups and community forums. Additional navigators in the City of Richmond increased engagement among residents. Navigators received training, stipends, and were asked to submit a one-page written reflection on



their experiences. Recognizing the value of their expertise and time, their contributions were fully compensated.

Capacity Building Workshops

Capacity building workshops were designed to provide communities with information, resources, and direct connections to agencies working in resilience and emergency management. The project team hosted a “funding for resilience” workshop that brought together emergency management stakeholders across the three localities. Participants heard presentations from state and federal agencies about funding opportunities and engaged in discussions about how to apply these resources in their communities.

Community Conversations

Following the completion of interviews and focus groups, each locality hosted a community conversation event to further engage residents and stakeholders. These informal gatherings brought together focus group participants, interviewees, local government employees, emergency management staff, and other community members. The events featured a “data walk” that highlighted key insights from the earlier stages of the research, serving as a starting point for solution-focused discussions. Free food and a small stipend were provided and participants had the opportunity to engage directly with researchers and one another in collaborative problem-solving among participants.

As of this report, only the City of Emporia had conducted a community conversation. Findings from that event are summarized below.

Deliverables

This study produced a suite of deliverables designed to make findings accessible and actionable for multiple audiences. These products, ranging from data packages, slide decks to tables and charts, and story maps, present demographic, hazard, and equity information in clear and engaging formats. The deliverables provide a comprehensive picture of community strengths and vulnerabilities, support resilience planning, grant applications, and policy development.

Localities and partners are welcome to use and adapt all of the data and materials as needed to advance their own planning and management efforts. We ask that any use include attribution to the Research Institute for Social Equity and Resilient Virginia Commonwealth University.

Summarized Data Packages

The project produced a set of tables and charts that offer detailed sociodemographic and economic profiles of each locality, census tracts, as well as Virginia and the United States, which serve as comparison benchmarks. The key demographic variables include population size, race, sex, and age. It also covers education, employment, income, poverty, health, housing, commuting, immigration, and mobility. Additionally, hazard vulnerability profiles are developed for each area, capturing hazard risk, historic losses, and projected losses for each area and tract. Hazards include: coastal flooding, drought, earthquake, hail, heat wave, hurricane, ice storm, landslide, lightning, riverine flooding, strong winds, tornado, wildfire, and winter weather. These tables help understand community needs, guide resource allocation, inform policy development and programming, and provide relevant information for targeted equity intervention programs, thereby strengthening community resilience.

Equity Analysis of Relevant Documents

The project conducted a systematic review of Emergency Management Plans, Hazard Mitigation Plans, and Relevant Agency Master Plans that guide emergency management infrastructure. The findings emphasize how well equity is integrated into the documents that shape emergency responses in each locality studied. The reviewed documents and the review results are available in the repository.

Asset Maps

The project produced a series of maps to provide a geographic view of the three participating localities. Developed using Google Maps and ArcGIS Pro, these maps illustrate risk zones, population density, and other contextual details. This visual approach makes the findings accessible, helping policymakers identify areas most in need of targeted resources and community members know where needed resources are located.

StoryMaps

Storymaps are a digital storytelling tool by ESRI that combine text, images, video, and interactive maps. By presenting qualitative and quantitative data in an engaging, easily digestible format, storymaps can facilitate community participation in research and improve access to its deliverables. This study created storymaps as both a visual narrative of the project for each city, as well as a community toolkit to help residents be more informed about emergency response and resources available in their communities. Each storymap begins with a brief history of the locality as a whole to provide important context. Because the study covered only certain census tracts in the City of Richmond, the city's storymap includes brief introductions to each of those tracts/neighborhoods.

The storymaps begin with a positive overview, which is essential for community buy-in. This includes highlighting the locality's unique cultural, social, or architectural assets and strengths. The following sections present quantitative data covering demographics and current/future climate-related risks. Any vulnerabilities, whether referring to populations or environmental hazards, are presented with an asset-based approach, focusing on opportunity. Each storymap then provides an overview of the research conducted in the locality, along with major themes pulled from interviews and focus groups. A final section provides community lifelines, including essential phone numbers, links to sign up for community alerts, and other resources for residents of the locality. Engaging features, including interactive maps, sliding photos, and interesting graphic design, are used throughout the storymaps to be visually appealing to viewers. We hope localities will share these story maps widely. With their residents providing citizens with clear, accessible information. About available resources and opportunities to strengthen resilience.

Navigating the StoryMaps

Interactive storymaps were developed for Charles City County,⁵⁵ City of Emporia,⁵⁶ and City of Richmond⁵⁷ to make the project's findings accessible in a visually engaging format. Each StoryMap combines narrative text, images, and data to highlight the community context, vulnerabilities, assets, and resources. While each locality has unique content, the StoryMaps share a similar structure to make navigation straightforward. Readers will typically find:

- [Community Highlights and Background](#) - an introduction to the locality's history, neighborhoods, and setting
- [Demographics](#) - Key population and socioeconomic characteristics that shape resilience
- [Existing Risks and Future Hazards](#) - Environmental and climate-related challenges facing the community

⁵⁵ Research Institute for Social Equity. (2025). *Improving Resilience in Richmond*. L Douglas Wilder School of Government and Public Affairs. Virginia Commonwealth University. <https://arcg.is/0vj4C50>

⁵⁶ Research Institute for Social Equity. (2025). *Improving Resilience in Richmond*. L Douglas Wilder School of Government and Public Affairs. Virginia Commonwealth University. <https://arcg.is/1bCvCj1>

⁵⁷ Research Institute for Social Equity. (2025). *Improving Resilience in Richmond*. L Douglas Wilder School of Government and Public Affairs. Virginia Commonwealth University. <https://arcg.is/1DnWKP4>

- [Community Assets](#) - local organizations, cultural resources, and infrastructure that support resilience
- [Study Introduction](#) - a description of the project's goals, methods, and partnerships with residents
- [Your Voice matters](#) - emphasis on community perspective shaped the findings
- [Community Lifelines](#) - practice resources, services, and emergency contacts available for residents

By following the sections in order, users can start with local history, then explore risks and resources, and finish with tools and contacts that support resilience planning.

Charles City County



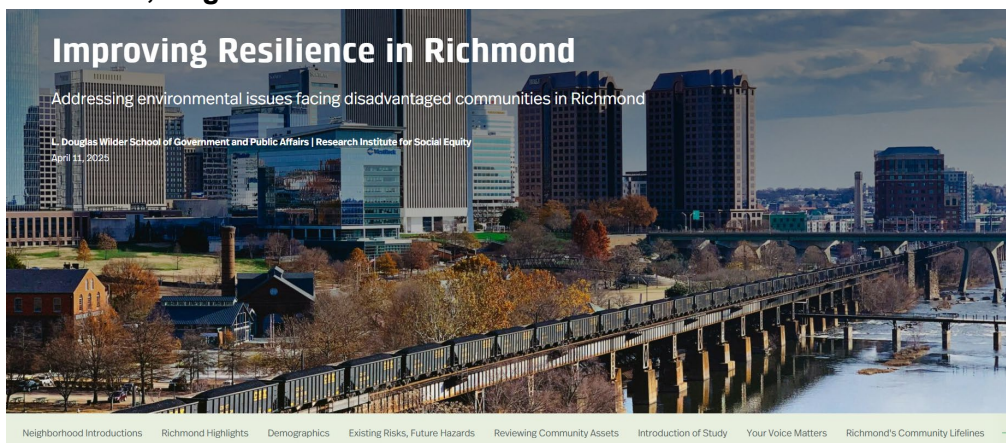
Source: <https://arcq.is/0vj4C50>

City of Emporia, Virginia



Source: <https://arcq.is/1bCvCj1>

City of Richmond, Virginia



Source: <https://arcq.is/1DnWKP4>

Figure 14. Story Maps

Reflections and Lessons Learned

The experiences shared by residents and local partners reveal important lessons about resilience, equity, and preparedness. Communities emphasized the value of trusted relationships, clear communication, and equitable access to resources. These lessons reflect the realities of daily life in Charles City County, the City of Emporia, and the City of Richmond, and can help guide future efforts to strengthen resilience and environmental justice across similar communities.

Building Trust

Trust was essential to the success of this project, especially in Charles City County and the City of Emporia. We partnered with local churches and community groups to increase awareness of the project's goals and to host focus groups in familiar, trusted settings. This localized and relationship-focused approach created entry points for participation and helped community members feel comfortable engaging in the process. Future efforts should focus on building trusted partnerships early and dedicating time for relationship development as a key part of the project design, as these efforts lead to higher participation and more meaningful results.

Adapting to Change

Shifts in federal policy led to the removal of key EPA tools and restrictions on environmental language, requiring us to adapt our approach rather than slow down the work. These changes prompted us to reframe the project with a broader focus on community resilience and preparedness for all types of weather-related emergencies. This flexibility not only kept the project moving forward but also enhanced its relevance for the participating communities. Future efforts should prepare for such disruptions by developing adaptable strategies, diversifying data sources, and framing resilience in ways that stay relevant across different policy environments.

Community Navigators

An important addition that significantly improved community engagement was the recruitment of community navigators. These were respected local residents who played a vital role in identifying safe and trusted spaces, recruiting participants, and supporting the planning of community conversation events. Their involvement proved essential in fostering trust and engagement and stands out as a critical lesson for future research in similar settings. Due to the slow initial uptake in interview and focus group participation, the study timeline was extended to prioritize trust-building before proceeding with data collection. Integrating community navigators from the outset can help accelerate trust-building and create stronger, more inclusive participation.

Equity at the Center

This study revealed opportunities to strengthen equity in each locality's environmental security and emergency management practices. It also highlighted the importance of increasing equity in



their administrative efforts. The research team gained valuable insights into areas that need significant equity investments, including community development planning, active public participation in decision-making, and intentional public policy making and implementation that benefits everyone, especially marginalized groups. The study pointed out whose voices can be more fully included and whose needs can be more intentionally addressed. Elevating these perspectives helps ensure that the voices and needs of marginalized and vulnerable communities are incorporated into policy-making and implementation processes. As a result, these groups continue to shoulder the burden of environmental degradation, despite contributing little to emissions. Leading with equity involves promoting fairness, access, quality of services, and positive outcomes.

Building Capacity in Smaller and Underserved Localities

Many smaller, under-resourced localities demonstrate resilience despite limited staff capacities. Employees often take on multiple roles, reflecting their dedication and adaptability, and they would benefit from additional training, support, and partnerships to maximize their impact. With the right investments, these localities are well-positioned to leverage resources for development, successfully apply for grants, and manage projects that enhance resilience. Funders and policymakers have an opportunity to build on this strong foundation by investing in human capital alongside infrastructure. Infrastructural improvements are most effective when paired with the people and systems needed to sustain them.

Balancing Data and Lived Experience

The research demonstrates the power of combining data with lived experience. A mixed methods approach, integrating demographic and environmental data with community narratives, story maps, focus groups, and interviews, offers a more comprehensive and engaging view of local realities. Community narratives reveal critical insights that numbers alone cannot capture, highlighting the importance of including local voices and resilience planning. This balance between rigorous data and lived experiences showcases the assets communities contribute to resilience efforts. It underscores the importance of resilience planning to incorporate these knowledge sources for sustainable outcomes.

Returning Findings to the Community

This project highlights the importance of sharing results with the community in accessible and understandable formats as best practice. In this way, people recognize that they are valued, respected, and that their voices are heard when addressing the problems that affect them and their communities. The report included several strategies to return ownership of the narrative back to the community.

In conclusion, this project not only highlights the issues, needs, and opportunities of these localities but also importantly provides a blueprint showing that resilience requires more than just



technical fixes. It calls for trust, equity, active community participation, and investment in people, policies, and infrastructure.

Impacts

This project has given localities actionable insights into how environmental harms and benefits are distributed within their communities. It provides evidence that historically marginalized communities face higher exposure to environmental threats and climate risks, giving local leaders a better basis for decision-making. By examining critical infrastructure near or around these marginalized areas, the project uncovered systemic disparities often rooted in legacy discriminatory zoning, industrial policies, and neglect, affecting both historic and annualized loss estimates.

The findings provide localities with practical tools for policy development, community engagement, and grant writing. They link environmental impacts to the integrity of critical infrastructure and historically marginalized neighborhoods, offering a framework for interventions in key areas such as community lifelines, housing, air quality, and green space equity. By including community demographics as social factors, the project gives local governments and organizations a broader, more actionable picture that extends beyond natural hazards to include human-made and structural factors.

This project focused on frontline communities, ensuring their lived experiences enriched and guided the findings. This approach enables localities to co-produce knowledge crucial for resilience planning, resulting in detailed data packages that can be used for training, mentorship, and community-led solutions. Building knowledge and skills within these communities enhances their capacity to reduce hazards and risks, improve emergency response, and foster greater involvement, ownership, and empowerment.

The project also emphasized the close link between environmental degradation, power dynamics, governance, and historical injustices. While translating these issues into locally relevant tools for participation, communities are given a model for shaping public policy and amplifying voices, moving beyond mere consultation to genuine participation, decision-making, and implementation. This is especially important in communities most vulnerable to climate change impacts and often represented in public planning processes, particularly minoritized and lower-income residents.

Through environmental scanning and infrastructure assessments, the project aligns community needs with eligible grant uses, creating a roadmap for targeted investments. These resources are already being used to support local grant applications, enhance planning decisions, and attract resilience funding to improve infrastructure and community well-being in the face of future environmental threats.



Research Institute for Social Equity

**L. Douglas Wilder School of
Government and Public Affairs**

Virginia Commonwealth University
Richmond, VA