Multi-Hazard Mitigation Plan

Washington County, Maryland

Updated 2023

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WASHINGTON COUNTY
HAZARD MITIGATION PLAN

UPDATED 2023

FOR THE COUNTY JURISDICTION OF WASHINGTON COUNTY, MARYLAND AND THE MUNICIPAL JURISDICTIONS THEREIN

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EXECUTIVE SUMMARY

The *Washington County Hazard Mitigation Plan* of 2023 is an update to the 2018 mitigation plan. The Washington County Office of Emergency Management (WCOEM) sponsored this update. This plan considers all the jurisdictions – the county, the City of Hagerstown, and the towns of Boonsboro, Clear Spring, Funkstown, Hancock, Keedysville, Sharpsburg, Smithsburg, and Williamsport – within the geographic boundaries of Washington County, Maryland, and it 'is therefore considered a multi-jurisdictional plan. The plan has been prepared following federal requirements outlined in the Disaster Mitigation Act of 2000 (DMA2K), which requires jurisdictions to formulate a hazard mitigation plan to be eligible for mitigation funds made available by the U.S. Department of Homeland Security (USDHS), Federal Emergency Management Agency (FEMA). Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (PL 100-707) requires that all states and local jurisdictions develop and submit hazard mitigation plans designed to meet the criteria outlined in 44 CFR Parts 201 and 206. This plan has been approved by the municipalities, the county, and the steering committee that participated in its development, the Maryland Department of Emergency Management (MDEM), and the Federal Emergency Management Agency (FEMA).

Procedurally, Washington County convened a steering committee four times and asked participants to complete five activities to generate content for the plan. Meetings also served as opportunities to share information about risks and vulnerabilities. The county's consultant ran the meetings and compiled minutes to document the decisions made. See Section 1.1 for notes about these meetings and activities.

Public participation occurred through an online survey and a town hall meeting. The survey received 126 responses and identified the types of risks to which the public was most concerned, as well as the types of mitigation projects the public might support. The opioid epidemic was the hazard to which the highest number of respondents indicated being "Concerned" or "Very Concerned" (n=73, 57.9% of respondents), followed by major transportation accidents (n=69, 54.8% of respondents). Regarding the types of mitigation actions respondents would support in their communities, three types of projects received the most support:

- Burying power lines to provide uninterrupted power during severe weather (n=94, 78.3% of respondents),

- Planting trees to prevent erosion and promote cooler micro-climates (n=93, 77.5% of respondents), and
- Installing generators in critical facilities such as clinics, police stations, fire stations, etc. (n=31, 75.8% of respondents).

The WCOEM also hosted a town hall meeting, which the county concurrently live-streamed to its Facebook account. The county subsequently posted a video of the live stream to its YouTube channel. Though not heavily attended, residents shared concerns about runoff, fire risks associated with new development, and cybersecurity.

Hazard considerations were essentially the same in 2023 as in 2018. The only change was the addition of "dam failure," which the steering committee considered prudent given the presence of dams in the county, recent incidents, and the availability of funding through the USDHS/FEMA High-Hazard Potential Dams (HHPD) program. The other hazard list changes included separating wildfires from the general “fire” discussion and tornado from the “severe summer weather” discussion. Section 2.4 of the plan summarizes risk and vulnerability. The following table appears in that section. It presents the risk ranking calculations for each of the hazards in the plan.

SUMMARY OF RISK RANKINGS

Hazard	*Risk Ranking*	***Total***	*Frequency*	*Response*	*Onset*	*Magnitude*	*Business*	*Human*	*Property*
Opioid Epidemic	High	**24**	5	5	4	4	1	4	1
Fire (Structural / Industrial)	High	**22**	5	2	4	1	4	2	4
Severe Winter Weather	High	**21**	5	3	2	4	2	3	2
Flooding	Medium	**19**	5	4	3	2	2	2	1
Tornado	Medium	**19**	2	3	4	1	3	3	3
Land Subsidence	Medium	**18**	5	3	5	1	2	1	1
Reportable Disease Epidemic	Medium	**18**	2	5	1	4	1	4	1
Severe Summer Weather	Medium	**18**	5	3	2	4	1	2	1
Wildfire	Medium	**18**	5	3	4	1	2	2	1
Hazardous Materials	Medium	**18**	5	2	4	1	1	2	3
Drought	Medium	**17**	2	4	1	3	2	3	2
Transportation Accident	Medium	**17**	5	2	4	1	1	3	1
Dam Failure	Low	**14**	2	2	3	1	4	1	1
Extreme Temperatures	Low	**12**	5	1	1	1	1	2	1

Washington County's steering committee elected not to add or delete mitigation goals from the 2018 plan. However, the team rewrote the goals and objectives to be more measurable. The 2023 goals and objectives list is as follows.

1. Maximize Washington County's jurisdictions' capabilities to make the county less vulnerable to hazards.
    - Increase data layers within Washington County's GIS system to graphically depict risk and vulnerability.
    - Increase collaboration between responder agencies, other relevant organizations, and jurisdictions with each other and the public.
    - Increase jurisdictional capabilities (e.g., staff, equipment, programs) to support risk reduction.

2. Provide education for local officials and the public as to the benefits of and opportunities for mitigation, both on community and personal levels.
    - Increase awareness and knowledge of hazard mitigation principles and practices among local and municipal public officials.
    - Increase awareness of and access to funding programs that can support mitigation planning and project activities.
    - Increase public awareness of natural hazards, including the indirect or cascading impacts of those hazards.

3. Protect existing and future properties and infrastructure from all hazards that could affect Washington County.
    - Increase transportation and stormwater management infrastructure resilience through upgrades or replacement (through consideration of mitigation elements in design).
    - Decrease the number of road closures and life-threatening road conditions during hazard events.
    - Increase instances of property-owner mitigation measures.
    - Decrease the number of buildings that are at risk of flooding.
    - Sustain regulatory measures to ensure that new development will not increase risks.
    - Increase the resilience of manufactured housing through code enforcement.
    - Increase the resilience of existing residential structures at high risk through retrofitting and floodproofing.

- Increase public investment in risk reduction for public services, critical facilities, and critical infrastructure throughout the county.

4. Promote sustainable development to improve the quality of life by fostering resilient communities.
   - Increase naturalized areas throughout the county to provide for protection from increased precipitation events.
   - Decrease risk for vulnerable populations throughout the county.

The plan includes 47 mitigation actions to work toward these objectives. The strategies cover a range of measures, including planning and regulatory efforts, structure and infrastructure projects, natural systems protection efforts, and education and outreach activities. Washington County also streamlined the plan maintenance process. The county will ensure public engagement via online surveys during National Preparedness Month (i.e., September) during Years 2, 3, and 4 of the planning cycle, with paper copies available at the WCOEM and municipal offices for those without reliable internet access. (See Section 4.0 for additional information.) To ensure ongoing governmental participation:

- **Year 1:** Focus on supporting plan adoption by all participating jurisdictions.
- **Years 2 through 4:** The WCOEM will survey steering committee members (which include all participating municipalities) about hazard experiences and mitigation actions.
  - **Year 3:** During National Preparedness Month, if the committee feels it is warranted, the WCOEM will sponsor an in-person steering committee meeting to discuss plan maintenance survey data in more detail.

- **Year 5:** The final year of the cycle will consist of the next update to the plan.

This plan will serve as a vehicle for ensuring eligibility for hazard mitigation funding for participating jurisdictions throughout the next five years. Moving forward, the participatory processes set as a foundation in 2018 and reinforced in 2023 will enable a similarly-engaged, more mature planning process in 2028 and, through regular plan review, perhaps result in a richer discussion of risk, vulnerability, and mitigation project status.

1.0 INTRODUCTION

This section introduces the hazard mitigation plan and defines its authority, scope, and purpose.

Background

Natural, technological, and human-caused hazards have prompted disasters resulting in injury and death, damaged and destroyed property, and disrupted business and government function across the nation. To lessen the effects of disaster, Washington County and the nine municipalities in the county participated in this planning process to identify hazards and potential actions to mitigate vulnerability to those hazards.

Purpose

Washington County, the municipalities in the county, and other preparedness partners updated this hazard mitigation plan for:

- protecting life, safety, and property by reducing the potential for future damages and economic losses that result from natural, technological, and human-caused hazards;
- aiding in recovery and development following future disaster events;
- demonstrating a firm local commitment to risk reduction principles;
- qualifying for grant funding in both pre- and post-disaster environments; and
- complying with state and federal legislative requirements for local hazard mitigation plans.

Scope

The *Washington County Hazard Mitigation Plan (2023 Update)* complies with the Federal Emergency Management Agency (FEMA) and Maryland Department of Emergency Management (MDEM) guidelines for funding eligibility and technical assistance from state and federal hazard mitigation programs. Thus, it applies to the county and nine municipalities and is their official hazard mitigation plan. It addresses natural, technological, and human-caused hazards significant to the county and its municipalities. The steering committee reviews the plan annually; a complete plan update will occur at least every five years.

Authorities and References

Authority for this plan originates from the following federal government sources.

- Robert T. Stafford Disaster Relief and Emergency Assistance Act, 42 U.S.C., Section 322, as amended
- Code of Federal Regulations (CFR), Title 44, Parts 201 and 206
- Disaster Mitigation Act of 2000, Public Law 106-390, as amended
- National Flood Insurance Act of 1968, as amended, 42 U.S.C. 4001, et seq.

Authority for this plan also originates from the following State of Maryland sources.

- Maryland Natural Resources Code Ann. §3-1015
- Maryland Public Safety Code Ann. §14-101

The following guidelines and reference documents assisted in the preparation of this document.

REFERENCED DOCUMENTS		
Document Type	*Document Citation*	*How Incorporated into Plan*
USDHS/FEMA Resources		
Technical Information	U.S. Department of Homeland Security (USDHS)/Federal Emergency Management Agency (FEMA). (2001). *Understanding your risks: Identifying hazards and estimating losses* (FEMA 386-2). https://mitigation.eeri.org/wp-content/uploads/FEMA_386_2.pdf	Legacy resource used as guidance to support hazard profiling
Technical Information	U.S. Department of Homeland Security (USDHS)/Federal Emergency Management Agency (FEMA). (2002). *Getting started: Building support for mitigation planning* (FEMA 386-1). https://mitigation.eeri.org/files/FEMA356-1.GettingStarted.pdf	Legacy resource used as guidance to support planning committee formation
Technical Information	U.S. Department of Homeland Security (USDHS)/Federal Emergency Management Agency (FEMA). (2003). *Bringing the plan to life* (FEMA 386-4). https://mitigation.eeri.org/wp-content/uploads/FEMA_386_4.pdf	Legacy resource used as guidance to support plan development and maintenance efforts
Technical Information	U.S. Department of Homeland Security (USDHS)/Federal Emergency Management Agency (FEMA). (2003). *Developing the mitigation plan* (FEMA 386-3). https://mitigation.eeri.org/wp-content/uploads/FEMA_386_3.pdf	Legacy resource used as guidance to support mitigation action planning

REFERENCED DOCUMENTS		
Document Type	*Document Citation*	*How Incorporated into Plan*
Technical Information	U.S. Department of Homeland Security (USDHS)/Federal Emergency Management Agency (FEMA). (2005). *Integrating historic property and cultural resource considerations into hazard mitigation planning* (FEMA 386-6). https://mitigation.eeri.org/wp-content/uploads/FEMA_386_6.pdf	Used as general guidance for incorporating historical property and cultural protection
Technical Information	U.S. Department of Homeland Security (USDHS)/Federal Emergency Management Agency (FEMA). (2007). *Using benefit-cost review in mitigation planning* (FEMA 386-5). https://www.hsdl.org/c/abstract/?docid=486846	Legacy resource used as general guidance for the action plan discussion
Technical Information	U.S. Department of Homeland Security (USDHS)/Federal Emergency Management Agency (FEMA). (2008). *Using the hazard mitigation plan to prepare successful mitigation projects* (FEMA 386-9). https://www.hsdl.org/c/abstract/?docid=28466	Used to support the action planning discussion
Technical Information	U.S. Department of Homeland Security (USDHS)/Federal Emergency Management Agency (FEMA). (2013a). *Integrating hazard mitigation into local planning: Case studies and tools for community officials*. https://www.fema.gov/sites/default/files/2020-10/fema_integrating-hazard-mitigation_case-studies_tools-community-officials.pdf	Used as general guidance on existing plan integration for hazard mitigation
Technical Information	U.S. Department of Homeland Security (USDHS)/Federal Emergency Management Agency (FEMA). (2013b). *Local mitigation planning handbook*. https://www.fema.gov/sites/default/files/2020-06/fema-local-mitigation-planning-handbook_03-2013.pdf	Used as general guidance on the mitigation planning process
Technical Information	U.S. Department of Homeland Security (USDHS)/Federal Emergency Management Agency (FEMA). (2013c) *Mitigation ideas: A resource for reducing risk to natural hazards.* https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas_02-13-2013.pdf	Used as general guidance for stakeholders and jurisdictions on mitigation ideas
Technical Information	U.S. Department of Homeland Security (USDHS)/Federal Emergency Management Agency (FEMA). (2015). *National fire incident reporting system 5.0: Complete reference guide*. https://www.usfa.fema.gov/downloads/pdf/nfirs/NFIRS_Complete_Reference_Guide_2015.pdf	Used as a resource to support an understanding of reported NFIRS data
Technical Information	U.S. Department of Homeland Security (USDHS)/Federal Emergency Management Agency (FEMA). (2016). *National mitigation framework*, 2nd ed. https://www.fema.gov/sites/default/files/2020-04/National_Mitigation_Framework2nd_june2016.pdf	Used as general guidance on mitigation planning

REFERENCED DOCUMENTS		
Document Type	*Document Citation*	*How Incorporated into Plan*
Technical Information	U.S. Department of Homeland Security (USDHS)/Federal Emergency Management Agency (FEMA), Mitigation Framework Leadership Group. (2019). *National mitigation investment strategy*. https://www.fema.gov/sites/default/files/2020-10/fema_national-mitigation-investment-strategy.pdf	Used to ensure alignment with national strategies for advancing mitigation investment
Technical Information	U.S. Department of Homeland Security (USDHS)/Federal Emergency Management Agency (FEMA). (2022). *Local mitigation planning policy guide* (FP 206-21-0002). https://www.fema.gov/sites/default/files/documents/fema_local-mitigation-planning-policy-guide_042022.pdf	Updated guidance on refinements to the process, particularly regarding the NFIP, hazard mitigation assistance, HHPD program, and the FEMA building codes strategy
Technical Information	U.S. Department of Homeland Security (USDHS)/Federal Emergency Management Agency (FEMA). (2023c). *Local Mitigation Planning Handbook*, May 2023. https://www.fema.gov/sites/default/files/documents/fema_local-mitigation-planning-handbook_052023.pdf	Used as general guidance on the revised mitigation planning process, particularly upon the receipt of state and federal review comments
MDEM Resources		
Technical Information	Maryland Emergency Management Agency (MEMA). (2015). *State of Maryland local hazard mitigation plan guidance*. https://www.montgomerycountymd.gov/OEMHS/Resources/Files/MEMA-HazardMitigationLocalGuidanceBooklet.pdf	Legacy resource used to ensure consistency with state goals and objectives
Technical Information	Maryland Historical Trust. (2018). *Flood mitigation guide: Maryland's historic buildings*. https://aecomviz.com/MEMA-Maryland-360/Downloads/2018-06-30_MD%20Flood%20Mitigation%20Guide.pdf	Used as a resource regarding risk reduction for historic and cultural resources
Plan	Maryland Department of Emergency Management (MDEM). (2021). *State hazard mitigation plan.* https://aecomviz.com/MEMA-Maryland-360/	Used to ensure consistency, document state hazard rankings, etc.
Miscellaneous Resources		
Technical Information	National Fire Protection Association (NFPA). (2019). *Standard on continuity, emergency, and crisis management* (NFPA 1600). https://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/detail?code=1600	Used as a general guide to ensure a comprehensive planning process
Technical Information	U.S. Environmental Protection Agency (USEPA). (2018). *Storm smart cities: Integrating green infrastructure into local hazard mitigation planning* (EPA 903-K-18-001). https://www.epa.gov/sites/default/files/2018-04/documents/storm_smart_cities_508_final_document_3_26_18.pdf	Outlines ways low-impact development and green infrastructure can support mitigation planning

1.0 INTRODUCTION

1.1 Documentation of the Planning Process

§201.6(c)(1)	Documentation of the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.

The Washington County Office of Emergency Management (WCOEM) coordinated the update to the county's plan in late 2022 and early 2023. The county contracted JH Consulting, LLC, a consultant, to assist in the process. The following planning process was a joint effort between WCOEM, the county's steering committee, and consultant staff.

Planning Committee

The WCOEM utilized a steering committee approach (see the table below for its membership) to accomplish the goals of the mitigation planning process. The committee provided overall strategic direction for jurisdictional and public outreach, listed hazards to include in the plan, generated project prioritization instructions, and outlined plan maintenance. Using the committee for strategic direction rather than to satisfy jurisdictional participation requirements allowed for a more significant consideration of countywide mitigation goals. It also enabled participation from more than just jurisdictional representatives.

As the coordinating agency for the update, the WCOEM and its consultant conducted a kick-off meeting on August 3, 2022. This meeting intended to finalize steering committee membership and to identify an extended range of partners with information to support the update. Notes from this meeting appear in Appendix 1.

WASHINGTON COUNTY MITIGATION PLAN STEERING COMMITTEE		
Agency/Jurisdiction Name	*Representative*	*Participant Type*
Boonsboro, Town of	Reiley Stanley, Town Planner	Participant (Municipal Jurisdiction)
Clear Spring, Town of	Juanita Grimm, Town Clerk	Participant (Municipal Jurisdiction)
Funkstown, Town of	Brenda Haynes, Town Manager	Participant (Municipal Jurisdiction)
Hagerstown, City of	Kathleen Maher, Director of Planning & Code Administration Steve Lohr, Fire Chief	Participant (Municipal Jurisdiction)
Hancock, Town of	Mike Faith, Town Manager	Participant (Municipal Jurisdiction)
Keedysville, Town of	Lisa Riner, Town Administrator	Participant (Municipal Jurisdiction)
Sharpsburg, Town of	Carrie Estell, Town Clerk	Participant (Municipal Jurisdiction)
Smithsburg, Town of	Brian Brandt, Town Manager	Participant (Municipal Jurisdiction)
Williamsport, Town of	Chad Rooney, Town Administrator	Participant (Municipal Jurisdiction)

WASHINGTON COUNTY MITIGATION PLAN STEERING COMMITTEE		
Agency/Jurisdiction Name	*Representative*	*Participant Type*
Washington County Emergency Management	Charles "Tom" Brown, Director Cody Swope, EM Specialist Brian Lowman, EM Specialist	Participant (Plan Developer)
Washington County Emergency Services	Dave Hays, Director	Partner Entity (County Government)
Washington County Engineering	Scott Hobbs, Director	Partner Entity (County Government)
Washington County Environmental Management	Mark Bradshaw, Director	Partner Entity (County Government)
Washington County Permits & Inspections	Rich Eichelberger, Director	Partner Entity (County Government)
Washington County Planning & Zoning	Jill Baker, Director	Partner Entity (County Government)
Washington County Public Works	Andrew Eshleman, Director	Partner Entity (County Government)
Washington County Solid Waste	Dave Mason, Deputy Director	Partner Entity (County Government)

Steering Committee Meetings

The steering committee met four times throughout the update process. See Appendix 1 for meeting minutes. Though most steering committee members attended regularly, some could not attend at the times designated for the meetings. These individuals remained involved through other activities (detailed below), distribution of the meeting minutes, and correspondence with the consultant and WCOEM.

SEPTEMBER 14, 2022

The first steering committee meeting was an opportunity to set the parameters for the 2023 update. As such, committee members reviewed mitigation goals and the hazards list. The previous version of the plan listed four goals. After discussing slight revisions, the committee elected to include four similar goals in this update. The committee also decided to keep the hazard list essentially the same as in the previous version. With a new Federal Emergency Management Agency (FEMA)-driven focus on high-hazard potential dams, the committee added dam failure.

OCTOBER 19, 2022

The second steering committee meeting was a virtual session designed to outline the strategy for ensuring jurisdictional and public participation. To that end, the committee reviewed and approved a jurisdictional capability survey to document local government capabilities that can support hazard mitigation and risk reduction. The committee also reviewed and approved a survey for public distribution. To accompany the public survey, the committee recommended holding a public meeting later in the planning process.

DECEMBER 14, 2022

The December virtual session was the shortest steering committee meeting. Committee members discussed areas targeted for development throughout the county and reviewed the asset inventory from the previous plan.

JANUARY 19, 2023

The final steering committee meeting was an in-person session that preceded the public meeting. There were three primary agenda items for the committee: (a) new project ideas, (b) an activity to determine project prioritization criteria, and (c) outlining the plan maintenance process. The meeting concluded with a roundtable discussion that identified the need to note the emergency response implications of the development of large warehouses along the Interstate 70 and Interstate 81 corridors.

Jurisdictional Participation

Though the steering committee included representation from all of the municipalities in Washington County, jurisdiction-by-jurisdiction participation consisted of more scripted activities. This document serves as the hazard mitigation plan for 10 governmental jurisdictions; the table below summarizes their involvement.

WASHINGTON COUNTY HAZARD MITIGATION PLAN (2023 UPDATE) COMMUNITY PARTICIPATION TABLE											
	Meetings						*Worksheets/Surveys/Forms*				
Municipality	KO Mtg. (08-03-2022)	Mtg. 1 (09-14-2022)	Mtg. 2 (10-19-2022)	Mtg. 3 (12-14-2022)	Mtg. 4 (01-19-223)	Pub. Mtg. (01-19-2023)	"Tell Me a Story"	Capability Survey	Asset Updates	Project Updates	One-on-One w/ Cons.
Washington County	**X**	**X**	**X**	**X**	**X**	**X**	**X**			**X**	**X**
Town of Boonsboro		X	X				X	X	X	X	X
Town of Clear Spring		X	X				X			X	X
Town of Funkstown							X	X	X	X	X
City of Hagerstown		X	X	X	X		X	X	X	X	X
Town of Hancock								X	X	X	X
Town of Keedysville		X	X	X			X	X	X	X	
Town of Sharpsburg		X	X	X	X		X	X	X	X	X
Town of Smithsburg								X	X	X	X
Town of Williamsport							X	X	X	X	X

The right side of the table identifies the scripted activities noted above. The activities correspond with the major elements of the mitigation plan.

- **"Tell Me a Story":** This activity was an opportunity for participating jurisdictions to identify the hazards and associated impacts most relevant to their areas (per requirement 201.6[c][2][ii]; see also Elements B1-f and B2-b of the *Local Mitigation Plan Review Tool* [FEMA, 2022c]).
- **Asset Updates:** This activity included instructions for updating the asset inventory that appeared in the previous plan. Though not explicitly referenced by the *Local Mitigation Plan Review Tool*, it enabled participating jurisdictions to describe risks pertaining to critical and other vital facilities in their communities.
- **Capability Survey:** This online survey provided background information on the existing codes, ordinances, authorities, and resources participating jurisdictions have available to support mitigation activities (see 201.6[c][3]; see also Element C1-a of the *Local Mitigation Plan Review Tool* [FEMA, 2022c]).
- **Project Updates:** Participating jurisdictions had projects in the previous version of the plan, and this activity enabled an updated status statement for each of them. The project updates activity also provided an opportunity for the participating jurisdiction and consultant to discuss new projects for the 2023 version (per requirement 201.6[c][3][iii]; see also Elements C4-a and C4-b of the *Local Mitigation Plan Review Tool* [FEMA, 2022c]).

Of course, planners targeted the completion of all activities for each jurisdiction; though an admirable goal, it was not feasible in all cases. As such, the last activity (i.e., one-on-one discussions with the consultant) confirmed the plan's applicability for each participating jurisdiction. Planners used these interactions for clarification; to ensure, at minimum, a capability assessment and project status response for each jurisdiction; and for jurisdictional review of document drafts. All such, all governmental jurisdictions participated in the 2023 update.

Additional Stakeholders

The WCOEM ensured participation by or the use of information from several other stakeholders. WCOEM contacted the emergency management agencies serving the seven neighboring counties, asking them about any risks they felt might impact Washington County (see Appendix 1). The WCOEM also offered to provide information on risks originating in Washington County that concerned the neighboring counties. Four of the seven neighbors replied. Allegany

County (MD) and Jefferson County (WV) indicated that they are also updating their plans and expressed interest in aligning the updates. Fulton County (PA) noted concern about issues along Interstate 70 that could impact both counties. Morgan County (WV) emphasized the potential for rail accidents near Hancock and runoff from flooding or hazardous material incidents that could pollute the Potomac River. Morgan County also offered to share its latest commodity flow study (dated 2022).

Additionally, the steering committee added dam failure as a hazard to the 2023 version. In so doing, the WCOEM sought feedback from the owners of dams in the county. Despite several dams and access to 13 dam-specific emergency action plans (EAPs), the WCOEM realized that it did not have personal contacts for many of the facilities. As such, the WCOEM added a mitigation project to address this need. Participation from those facilities for which the county had contact information occurred in two ways. First, the director of Washington County Public Works served as a steering committee member and was a point of contact for the Fort Ritchie-Lake Royer Dam (owned by the Washington County Commissioners). Second, the WCOEM distributed an online survey to the available points of contact, asking about inspections, notifications of issues, and hazard mitigation opportunities. The county received one response to that survey.

Planners pulled information from several other local stakeholders. For instance, the Washington County Chamber of Commerce (i.e., Hagerstown.org) and Visit Hagerstown (visithagerstown.com) websites provided background data on the private sector business community and tourist attractions, which contributed to the "analyzing development trends" section. The Washington County Community Action Council (wccac.org), Reach of Washington County (reachofwc.org), and Hagerstown Area Religious Council (harccoalition.org) websites contributed information that supported the social vulnerability discussion. The Hagerstown Community College's website (hagerstowncc.edu) supported the discussion surrounding the community college as an asset. Finally, data from the Washington County Health Department regarding the COVID-19 pandemic contributed to the "reportable disease epidemic" hazard profile.

Outreach to Historically Under-Served Populations

Revised hazard mitigation planning guidance from FEMA (2023b, p. 35) understandably and necessarily advises communities to create an equitable planning process. Washington County and the participating municipalities support boosting participation by historically under-served communities and socially vulnerable populations, and they took several steps in the 2023 update to ensure more equitable participation.

Attempts to identify underserved populations, though necessary and admirable, run the risk of inadvertently excluding various groups as focus narrows on various types of population groupings. Washington County and its partners are sensitive to this reality. This section identifies several populations to which the WCOEM reached out; however, it is likely there are other underserved communities that were missed. As such, the efforts contributing to the 2023 update should be considered initial steps on a pathway for more thorough participation by underserved communities.

The WCOEM focused on engaging several providers whose regular clientele are communities and populations have not regularly participated in emergency preparedness or hazard mitigation planning (an example of "procedural equity" [FEMA, 2023c, p. 235]). Those providers included the following.

- Hagerstown Community College (serving a largely transient population who may be unfamiliar with the area)
- Horizon Goodwill Industries (serving those who may be un- or under-employed)
- Meritus Health (serving numerous individuals with health needs)
- REACH of Washington County (serving those without a home)
- Washington County Health Department (serving various populations, often through partnerships with an array of service providers with varying clientele)
- Washington County Public Schools (serving youth [i.e., aged four to 18 years])

In a broad (but brief) effort to capture insight as to the hazards and impacts most concerning to these clientele, the WCOEM and its consultant organized a survey and sent it to these providers. Provider representatives could respond (which would be welcomed), but the WCOEM encouraged these providers to distribute the survey, either digitally or as a paper copy, to various clients. The response to the survey was minimal (see Appendix 1), though it is easily replicable and will serve as a component of the plan maintenance process (see Section 4.0 for additional information). Based on the response received, the opioid epidemic was the primary hazard of concern (i.e., a hazard whose impacts ultimately create a socially vulnerable population), with commercial/industrial fire, flooding, hazardous materials, reportable disease epidemic, severe winter weather, and transportation accidents also being noted. Many service providers are accustomed to working collaboratively to address these issues, and the response reflected that reality. Consequently, as the custodial agency, the WCOEM should continue to ensure awareness of mitigation by these partners by sharing information (an example of "structural equity" [FEMA, 2023c, p. 35]).

Further, participating jurisdictions recognize that equity in hazard mitigation planning is tied to equity in other preparedness planning initiatives. For instance, during the 2023 updating process (which began in the fall of 2022), Washington County communities experienced bitter cold temperatures on and around the Christmas holiday. This extreme cold event prompted not only response actions, but also plan revisions (and subsequent stakeholder engagement). The WCOEM and the City of Hagerstown coordinated necessary revisions to the county's inclement weather plan with the Washington County Community Action Council and the Washington County Homeless Coalition (see Appendix 1 for a highlighted copy of that revised plan). These plan updates began a dialog with providers that serve those without homes, an underserved and socially-vulnerable population. Coalition representatives interact regularly with the homeless, and were able to share their concerns and information about their general needs with county and city response and preparedness stakeholders. As the mitigation plan neared completion, the WCOEM again engaged the homeless coalition regarding risk reduction for its clientele.

Public Involvement

Washington County used in-person and online options for engaging the public in this process. The following narrative describes the results of a public meeting and an online survey. See Appendix 4 for additional information.

January 19, 2023, Public Meeting

The county sponsored a public meeting at 5:00 p.m. on Thursday, January 19, 2023, at the Washington County Public Safety Training Center. The county also streamed the session live to the Washington County Government Facebook page (https://www.facebook.com/WashingtonCountyMD). Two residents attended the meeting, and though the number of participants via the live stream is unknown, there were comments on the Facebook feed during the session. The meeting was approximately 40 minutes in length. There were three primary topics of public comment.

- Surface water runoff is a challenge and contributes to flooding.
- There is a problem with trash and other debris throughout the county, particularly at commercial and industrial facilities. For example, at locations where large quantities of cardboard are stored, a fire could be difficult to extinguish because of the availability of that cardboard as fuel.
- Will the plan include cyber incidents?

Online Public Survey

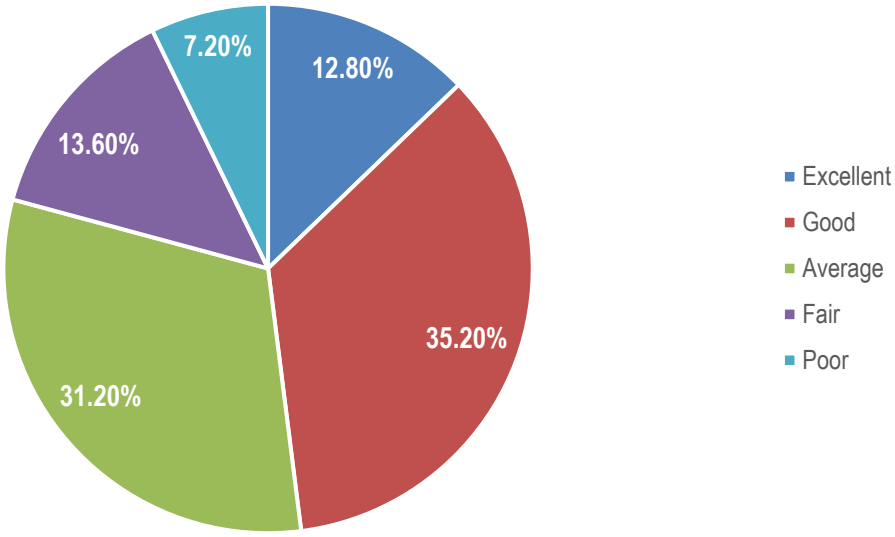
The county and participating municipalities also promoted an online survey. These stakeholders shared a link to the survey on their social media accounts and websites. Some municipalities offered residents the opportunity to stop by the town hall to complete a paper copy of the survey (to enable those without reliable internet access to participate). The survey accepted responses from mid-January through the end of February 2023; 126 individuals responded. Of the 126 respondents, 49.2% of respondents lived in the county for more than 20 years, and 23% lived in the county for 11-20 years. Regarding age, 50.8% of respondents were between 55 and 72 years, and 27% were between 36 and 55. Zip codes 21740 (28.6%, n=36), 21742 (21.4%, n=27), 21782 (14.3%, n=18), and 21795 (11.9%, n=15) had the most respondents. See Appendix 4 for the full results.

The opioid epidemic was the hazard to which the highest number of respondents indicated being “Concerned” or “Very Concerned” (n=73, 57.9% of respondents), followed by major transportation accidents (n=69, 54.8% of respondents). Regarding the types of mitigation actions respondents would support in their communities, three types of projects received the most support:

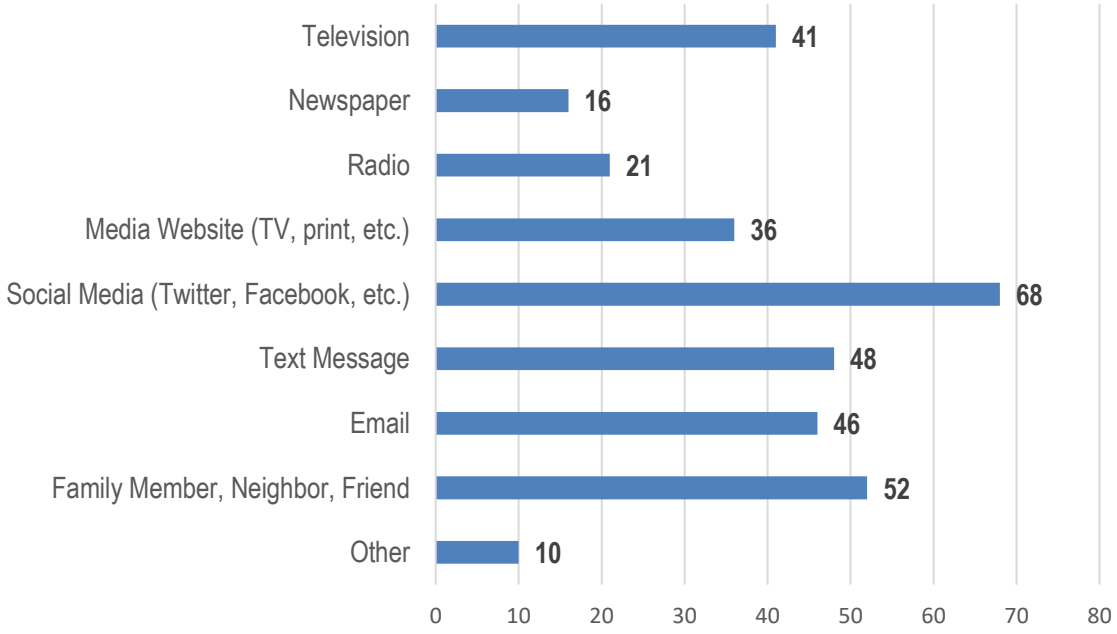
- Burying power lines to provide uninterrupted power during severe weather (n=94, 78.3% of respondents),
- Planting trees to prevent erosion and promote cooler micro-climates (n=93, 77.5% of respondents), and
- Installing generators in critical facilities such as clinics, police stations, fire stations, etc. (n=31, 75.8% of respondents).

References to the survey responses appear in the hazard profiles in Section 2.2 below. These references report the results for the levels of concern for the hazards included in the plan, the memory of past occurrences, and thoughts on increasing/decreasing impacts. Other results are as follows.

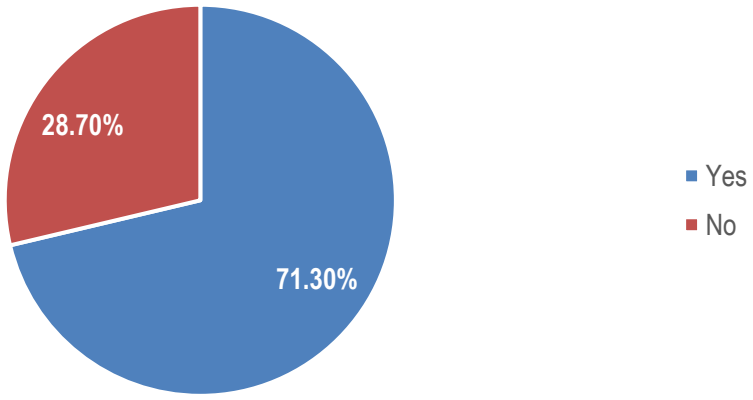
How would you rate your community's ability to respond? (n=125)



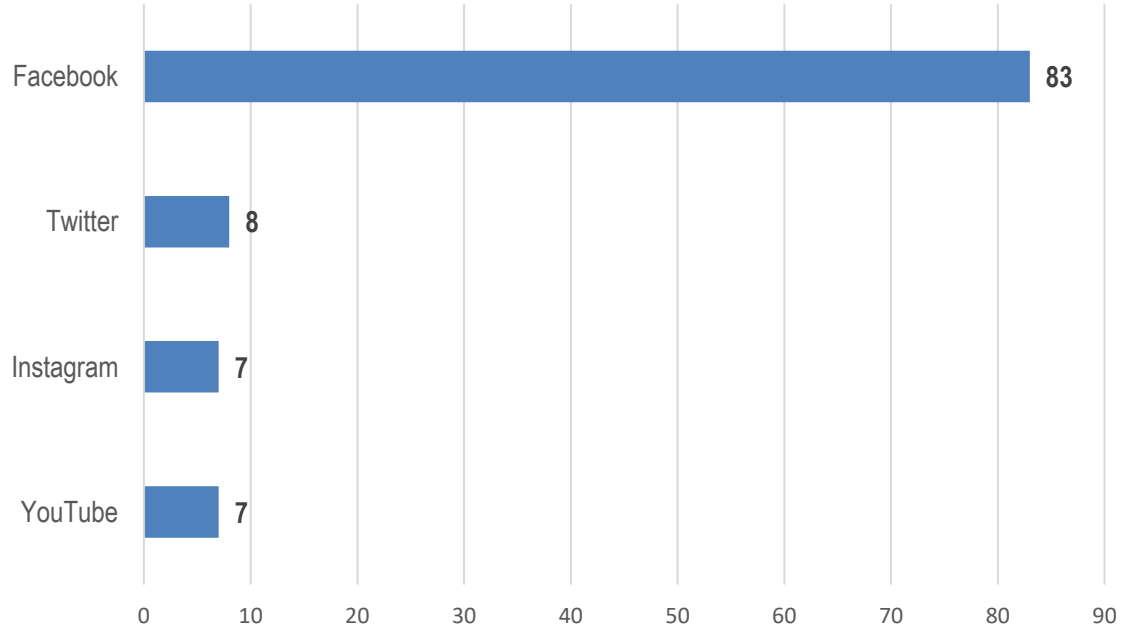
How do you receive notifications about hazards? (n=112)



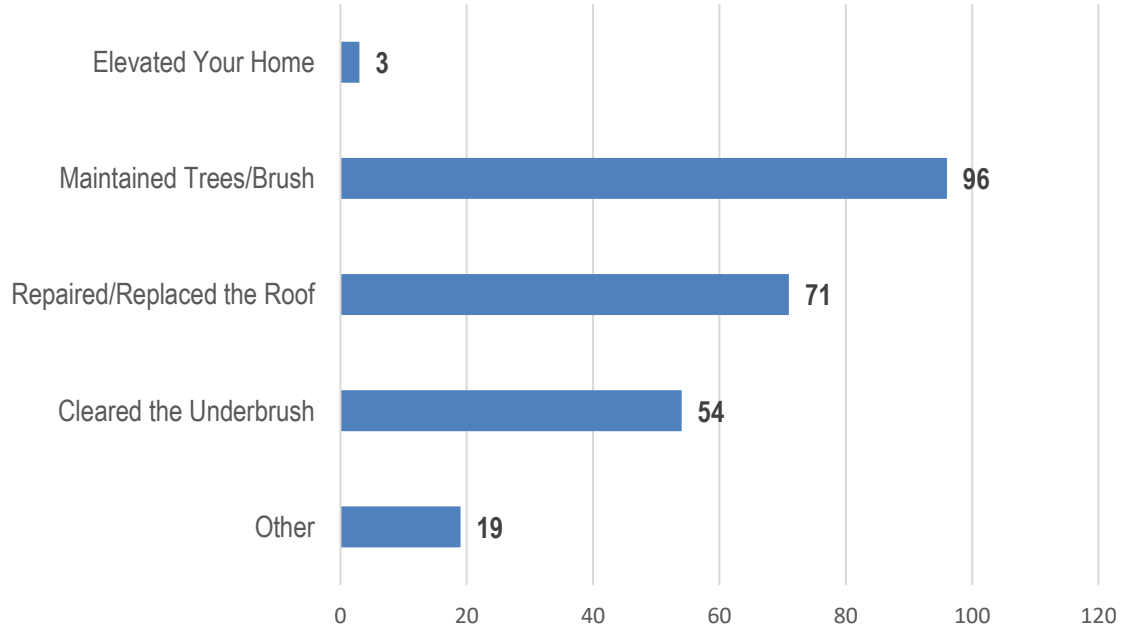
Do you follow Washington County on social media? (n=122)



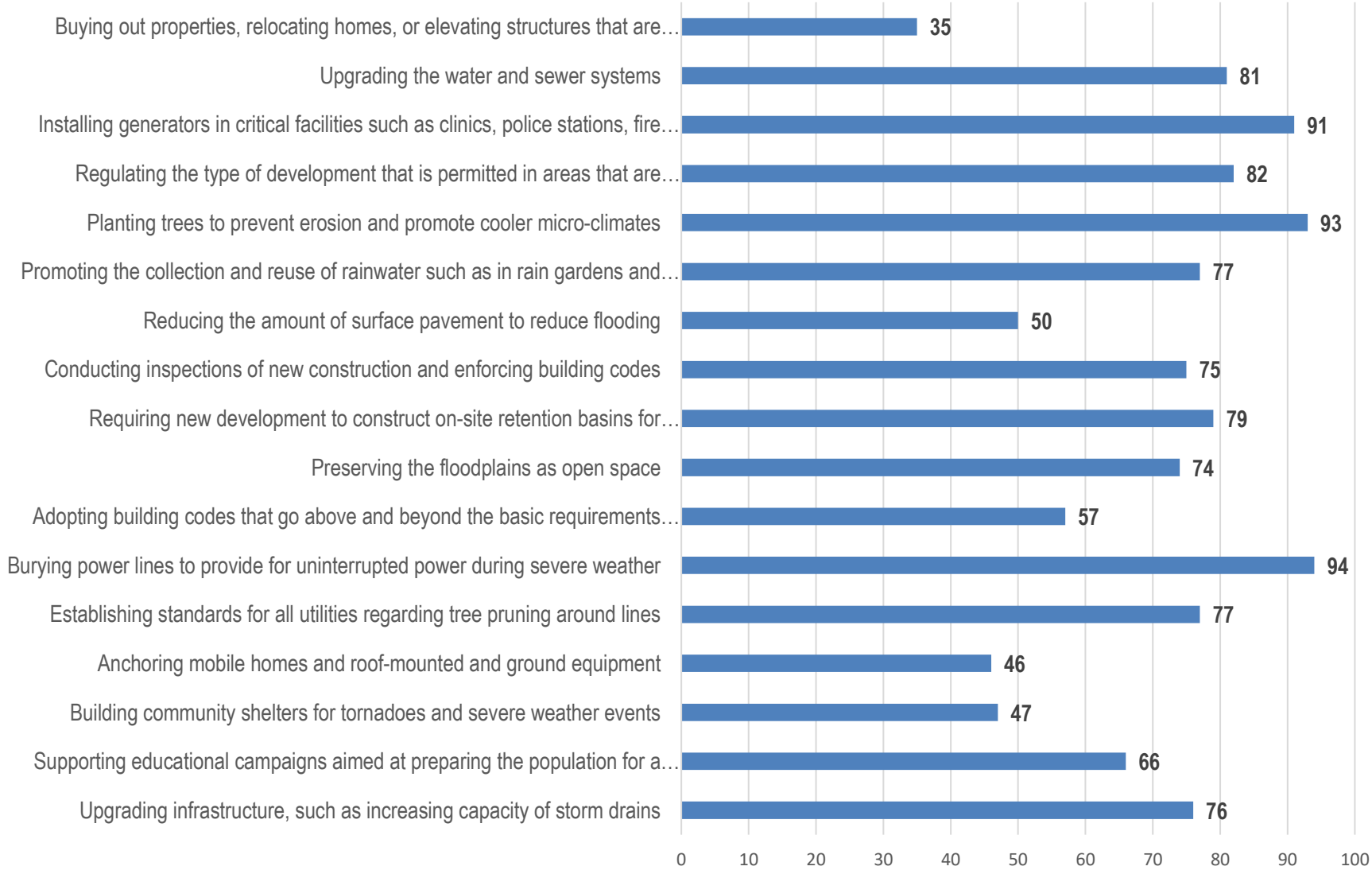
On which social media platform do you follow Washington County? (n=88)



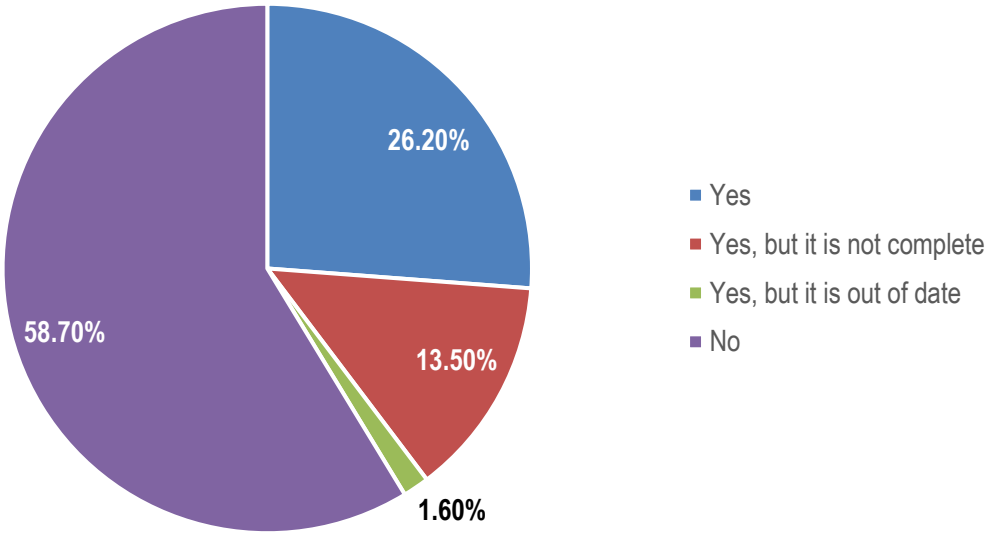
Mitigation is an effort by you, your community, and/or your local officials to reduce the negative impacts of hazards. Have you ever…? (n=109)



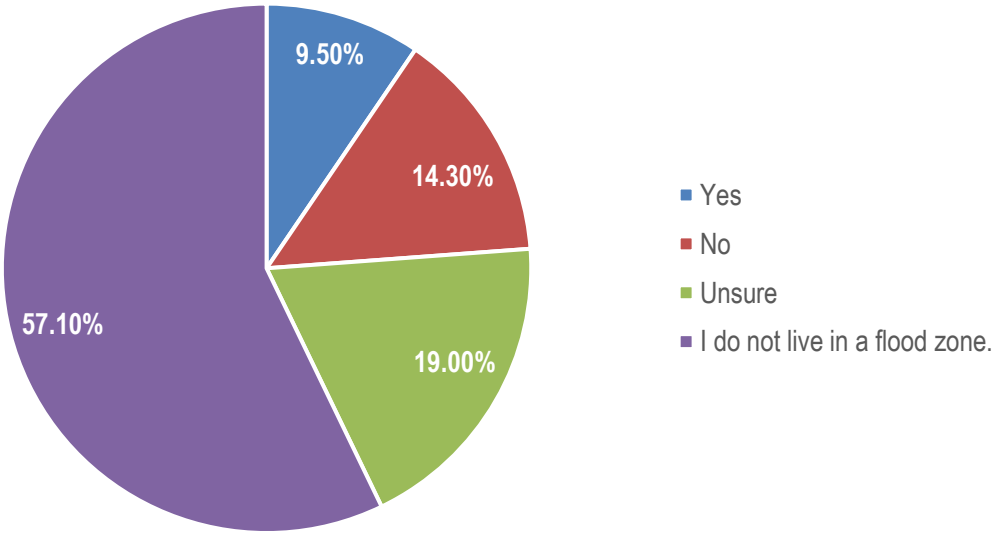
Please indicate the types of actions you would support; these could be something you can do or an initiative by local officials. (n=120)



Do you / does your household have a 72-hour kit? (n=126)



Do you know your flood zone? (n=126)



1.0 INTRODUCTION

1.2 Description of the Planning Area

The description of the planning area contextualizes the remainder of this document. It provides the background information on the areas impacted by various hazards and serves as a foundation for mitigation decisions. Washington County, Maryland is in western Maryland, bordered to the west by Allegany County and to the east by Frederick County. Franklin and Fulton Counties in Pennsylvania border to the north, while Berkeley, Jefferson, and Morgan Counties in West Virginia's Eastern Panhandle border to the south.

PARTICIPATING JURISDICTIONS	
Political Jurisdiction	*Type*
Boonsboro	Town
Clear Spring	Town
Funkstown	Town
Hagerstown	City
Hancock	Town
Keedysville	Town
Sharpsburg	Town
Smithsburg	Town
Williamsport	Town
Washington	**County**

Washington County covers 457.76 square miles (U.S. Census Bureau, 2020). It includes portions of two physiographic provinces: the Ridge and Valley and Blue Ridge. The Ridge and Valley Province covers the majority of the county, running from South Mountain west toward Dans Mountain in Allegany County. It contains strongly folded and faulted sedimentary rocks as well as the Hagerstown Valley, a wide, open valley formed on Cambrian and Ordovician limestone and dolomite. The Blue Ridge province, in the eastern-most portions of Washington County, are Lower Cambrian quartzite, "a rock that is very resistant to the attack of weathering and erosion" (Maryland Geological Survey, 2001, p. 2). The following figure is a relief map of Washington County.

WASHINGTON COUNTY HAZARD MITIGATION PLAN

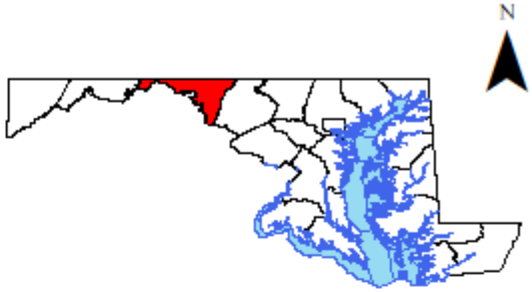
General Topography & Waterbodies

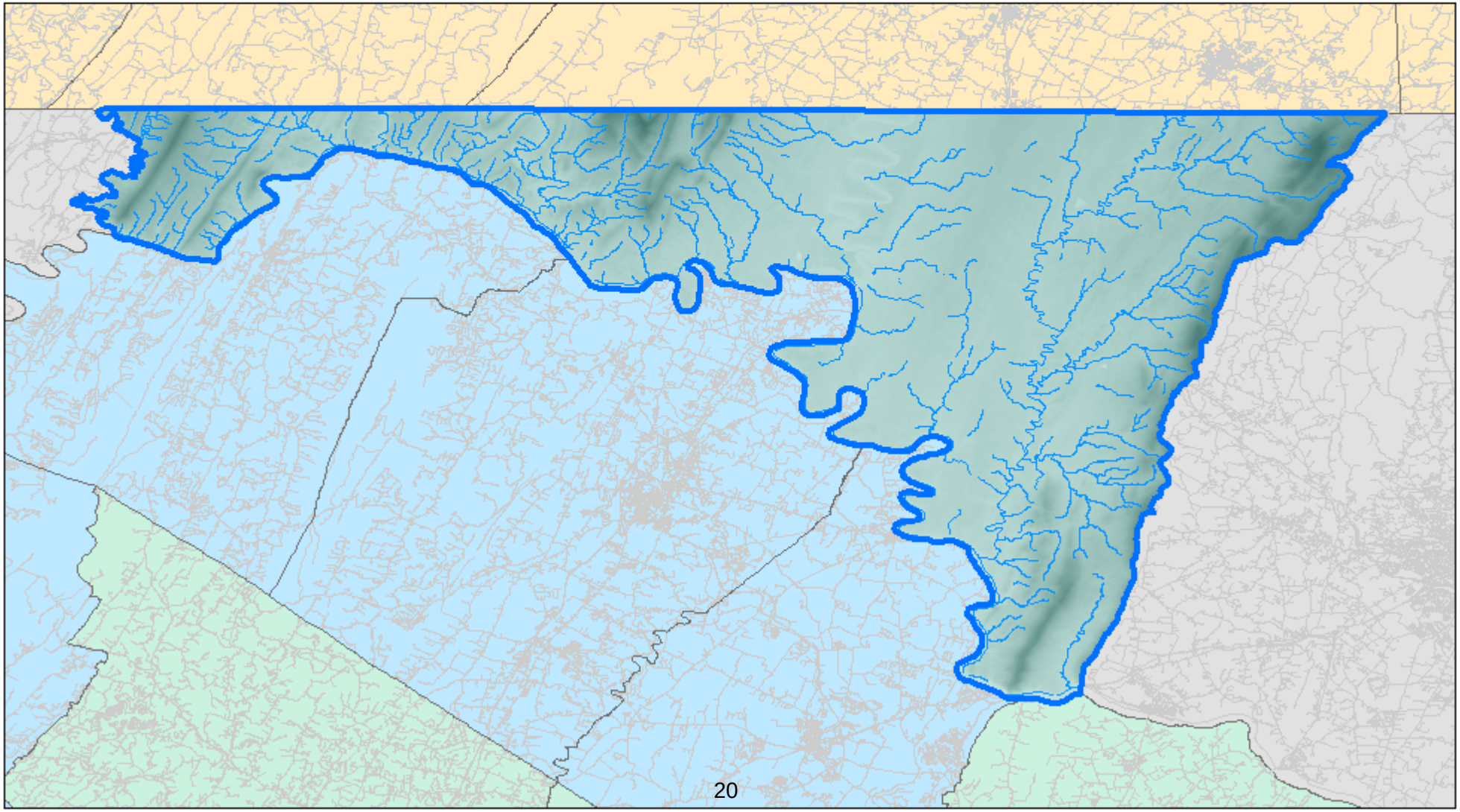
Data Source(s):
Maryland LiDAR Statewide, US Census (Tiger Data)

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

High : 3371.83

Low : -168.551





The Potomac River forms the southern boundary of the county, dividing Washington County from West Virginia. Other principal streams in the county include Antietam Creek, Conococheague Creek, Licking Creek, Little Conococheague Creek, Sideling Hill Creek (which forms the county's western boundary), and Tonoloway Creek. The county is within the Chesapeake Bay Watershed, the largest estuary in the United States. It includes several sub watersheds, as shown in the following figure.

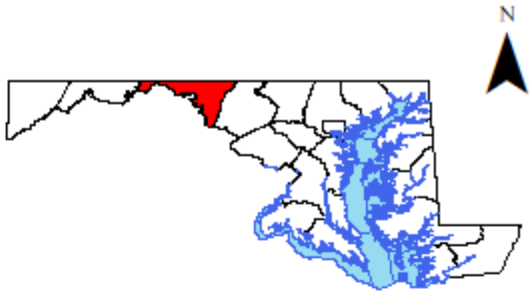
WASHINGTON COUNTY HAZARD MITIGATION PLAN

Watersheds

Data Source(s):
Washington County GIS

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

- Antietam Creek
- Catoctin Creek
- Conococheague Creek
- Licking Creek
- Little Conococheague
- Little Tonoloway Creek
- Marsh Run
- Potomac River AL Cnty
- Potomac River FR Cnty
- Potomac River WA Cnty
- Sideling Hill Creek
- Tonoloway Creek
- Upper Monocacy River



Washington County is home to nine municipalities (one city and eight towns). The Town of Boonsboro sits along ALT US Route 40 (including its intersections with State Route [SR] 34 and 66) at the foot of South Mountain. Founded in 1792, the town's population is 3,757 (U.S. Census Bureau, American Community Survey, 2021). A fire station, emergency medical services (EMS) station, and four schools (two public, one private, and one specialty academy) are within the town's corporate limits. Boonsboro's median household income is $105,196 (U.S. Census Bureau, American Community Survey, 2021).

Downtown Boonsboro
Photo Credit: Acroterion, Wikipedia, 2009

The Town of Clear Spring is in the central portion of the county along US Route 40, just north of Interstate 70. Its population is 443 and its median household income is $54,728 (U.S. Census Bureau, American Community Survey, 2021). The Clear Spring elementary, middle, and high schools are just northwest of the corporate limits, but a fire station and an EMS station are within the town's boundaries.

Cumberland Street, Clear Spring
Photo Credit: Natalie Brown, 2002

Funkstown Historic District
Photo Credit: Acroterion, Wikipedia, 2009

The Town of Funkstown sits to the immediate south of Hagerstown in central Washington County. According to the town's website, early residents called it "Funck's Jerusalem Town" after its founder, Jacob Funck, who developed a plan for a village named Jerusalem in 1767. Today, Funkstown has a population of 889 and a median household income of $38,235 (U.S. Census Bureau, American Community Survey, 2021). ALT US Route 40 goes through the central portion of town, which includes a fire station in its corporate limits.

Founded in 1762, the City of Hagerstown is in central Washington County at

the intersection of US Routes 11 and 40 (as well as Interstates 70 and 81). It is, by far, the largest municipality in the county, with a population of 43,015 (U.S. Census Bureau, American Community Survey, 2021). Hagerstown is the county seat. The city has an extensive railway infrastructure along with its dense highway network, and the Hagerstown Regional Airport (HGR) sits just north of city limits. Hagerstown is nicknamed “Hub City” thanks to the crossings of highways and railways, and in many ways, it is the hub of commerce and recreation for the tri-state area along I-81.

Downtown Hagerstown
Photo Credit: Hagerstown Facebook Page

The Town of Hancock, population 1,622 (U.S. Census Bureau, American Community Survey, 2021), is one of the oldest settlements in western Maryland and sits in western Washington County along the Potomac River. Interstate 70 travels through the center of the corporate limits, as does US 522 (north-south). The interstate splits just northwest of town, with I-70 going north into Pennsylvania and I-68 traveling westward into Allegany County. Two schools, Hancock Elementary and Hancock Middle-Senior High, are in the western portions of town, with the fire station, EMS station, and rescue station in the central portion of downtown. Hancock’s median household income is $43,716 (U.S. Census Bureau, American Community Survey, 2021).

Downtown Hancock
Photo Credit: Flickr

Main Street, Keedysville
Photo Credit: Ian Douglas, 2006

Established in 1768, the Town of Keedysville sits in southeastern Washington County along State Route

(SR) 34 between Boonsboro and Sharpsburg. Its population is 1,126 and its median household income is $124,167 (U.S. Census Bureau, American Community Survey, 2021).

Sharpsburg Center
Photo Credit: sharpsburgmd.com

The Town of Sharpsburg is also in southeastern Washington County along SR 34, just north of the Potomac River and the Town of Shepherdstown, West Virginia. Sharpsburg sits just south of Keedysville. Joseph Chapline laid out Sharpsburg's initial plans in 1763. Its population is 671 (U.S. Census Bureau, American Community Survey, 2021). Sharpsburg is adjacent to the Antietam National Battlefield. The town's corporate limits include a fire, EMS, and rescue station, and Sharpsburg Elementary School is just outside of the corporate limits along SR 34. Sharpsburg's median household income is $63,068 (U.S. Census Bureau, American Community Survey, 2021).

The Town of Smithsburg, platted in 1814, is in the eastern portion of the county, east of Hagerstown and north of Interstate 70. State Routes 64 and 66 traverse the town, and a rail line runs through its eastern corporate limits. Smithsburg Elementary, Smithsburg Middle, and Smithsburg High School are all located within the town's corporate limits, as is a fire station and an EMS station. The town's population is 2,986 and its median household income is $93,295 (U.S. Census Bureau, American Community Survey, 2021).

Smithsburg Snow Storm
Photo Credit: Amanda McCurry

The Town of Williamsport is in central Washington County, southwest of Hagerstown along US Route 11 and the Potomac River. The town's early history aligned with the C&O Canal. The canal remained in use through the 1920s, though flooding throughout the 1800s caused damage to bridges, aqueducts, and the canal itself. Williamsport Elementary School, Springfield Middle School, and Williamsport High School are located in the town's eastern areas, just west of Interstate 81. The town's fire department, EMS and rescue stations are in the central downtown

areas. Williamsport's population is 1,952 and its median household income is $50,509 (U.S. Census Bureau, American Community Survey, 2021).

The following map shows the location of the municipalities in the county.

Conococheague Street, Williamsport
Photo Credit: Tim Kiser, 2007

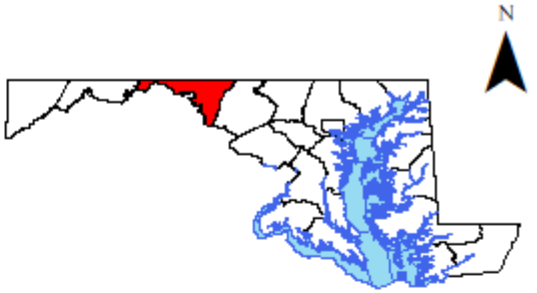
WASHINGTON COUNTY HAZARD MITIGATION PLAN

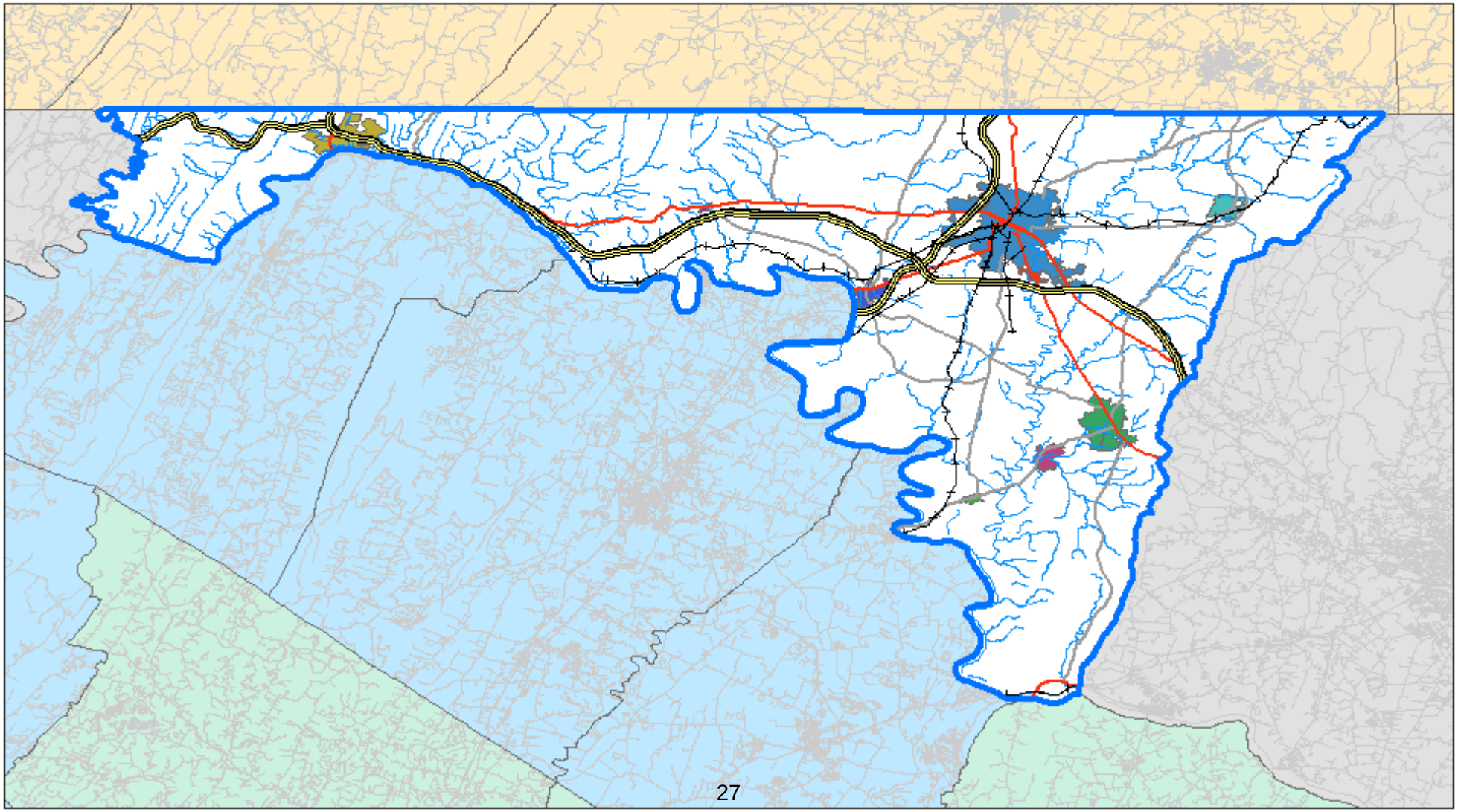
Municipalities in Washington County

Data Source(s):
Washington County GIS

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

- Boonsboro
- Clear Spring
- Funkstown
- Hagerstown
- Hancock
- Keedysville
- Sharpsburg
- Smithsburg
- Williamsport





Demographics

Population and demographic data provide baseline information for assessing the potential magnitude of hazards and can support trend analysis in potentially vulnerable populations. Washington County's population has grown steadily and consistently since 1950.

WASHINGTON COUNTY POPULATION TRENDS, 1950-2020								
Year	1950	1960	1970	1980	1990	2000	2010	2020
Population	78,726	91,219	103,829	113,086	121,393	131,923	147,430	154,705

Source: U.S. Census Bureau (i.e., various decennial Census products available online)

The following table depicts the demographic breakdown of Washington County by municipality (U.S. Census Bureau, American Community Survey, 2021, unless otherwise noted).

WASHINGTON COUNTY MUNICIPAL DEMOGRAPHICS														
Jurisdiction	*Pop. Estimate*	*White*	*Black or African American*	*American Indian and Alaskan Native*	*Asian*	*Two or More Races*	*Hispanic or Latino*	*Veterans*	*Foreign-born Persons*	*Housing Units*	*Median House-hold Income*	*Income Below Poverty Level*	*Pop. per Sq. Mi.*[1]	*Land Area (in sq. mi.)*[2]
Washington County	**153,956**	**122,969**	**16,827**	**206**	**2,742**	**9,105**	**8,862**	**9,306**	**8,137**	**63,432**	**$67,349**	**18,988**	**336.32**	**457.76**
Boonsboro	3,757	3,433	155	8	0	161	134	287	23	1,476	$105,196	321	1,227.78	3.06
Clear Spring	443	377	0	0	52	14	26	30	24	194	$54,728	10	3,691.67	0.12
Funkstown	889	872	9	0	5	3	27	80	5	546	$38,235	77	1,616.36	0.55
Hagerstown	43,015	29,139	7,813	28	801	4,246	3,798	2,327	2,895	20,169	$42,965	10,766	3,424.76	12.56
Hancock	1,622	1,536	10	1	22	36	0	114	29	819	$43,713	365	540.67	3.00
Keedysville	1,126	1,051	6	0	9	60	8	31	35	373	$124,167	29	1,237.36	0.91
Sharpsburg	671	609	0	0	8	36	27	51	32	342	$63,068	46	3,050.00	0.22
Smithsburg	2,986	2,696	104	0	104	59	34	172	98	1,094	$93,295	211	2,574.14	1.16
Williamsport	1,952	1,679	133	9	8	123	50	161	58	967	$50,509	418	1,991.84	0.98

[1] Population per square mile calculated by dividing the population estimate by the land area.
[2] Land area is 2020 data (U.S. Gazetteer Files, 2020).

Transportation

Washington County's transportation infrastructure is robust and includes roadway, railway, and airway elements.

Roadway

Three interstates traverse the county. Interstate 68 enters the county east-west from Allegany County and terminates at its intersection with Interstate 70 just outside of Hancock. Interstate 70 also traverses the county east-west. Interstate 81 runs north-south from Berkeley County, West Virginia, through Hagerstown and into Franklin County, Pennsylvania. US 11 (north-south) and US 40 (east-west) are also major thoroughfares, as is ALT US 40 and State Routes 63, 65, 67, 77, and 416 (U.S. Census Bureau, Tiger Data, 2022). Two other US routes are in the county. US 340 hits the very southern portion of the county after crossing the Potomac River from Harpers Ferry, West Virginia. US 522 runs into Hancock from Morgan County, West Virginia before meeting and continuing concurrently with I-70.

Railway

The county's railway infrastructure is also well-developed. Four freight rail services operate in Washington County. CSX Transportation largely parallels the Potomac River in the western half of the county before turning northeast toward and through Hagerstown. In Hagerstown, CSX lines split, with one going toward Chambersburg, Pennsylvania, and another toward Gettysburg, Pennsylvania. Norfolk Southern Corporation (NSC) rails run north-south through the center of the county, crossing the Potomac south of Sharpsburg and running toward and through Hagerstown. Winchester and Western (W&W) lines run north-south between Williamsport and Hagerstown. Finally, Wheeling & Lake Erie Railroad (WLE) has an operating agreement with CSX for the CSX tracks in western Washington County (though WLE has not actually operated freight rail service in Maryland for several years).

The Maryland Commuter Rail Service (MARC) operates a passenger line that passes through the southern tip of the county. The Brunswick Line runs parallel to the Potomac River between Harpers Ferry, West Virginia and the Frederick County line. Finally, there is a line marked "other inactive rail line" on the *Maryland Operating Rail Systems* map (MDOT, n.d.) between the end of NSC's operation near Breathedsville and the Weverton area, though that line does not appear on popular mapping resources such as Google Maps.

Airway

The Hagerstown Regional Airport (HGR) is just north of Hagerstown between I-81 and US Route 11. It opened in 1928 as Kreider-Reisner Field and has grown steadily since that time. Today, it offers scheduled passenger service to Orlando and St. Petersburg/Clearwater, Florida, as well as Myrtle Beach, South Carolina, through Allegiant Air. HGR also has flights related to on-demand air cargo.

The following map shows the transportation systems serving the county.

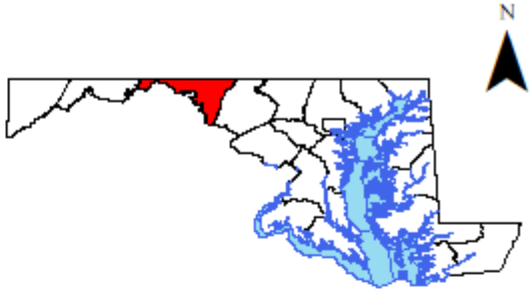
WASHINGTON COUNTY HAZARD MITIGATION PLAN

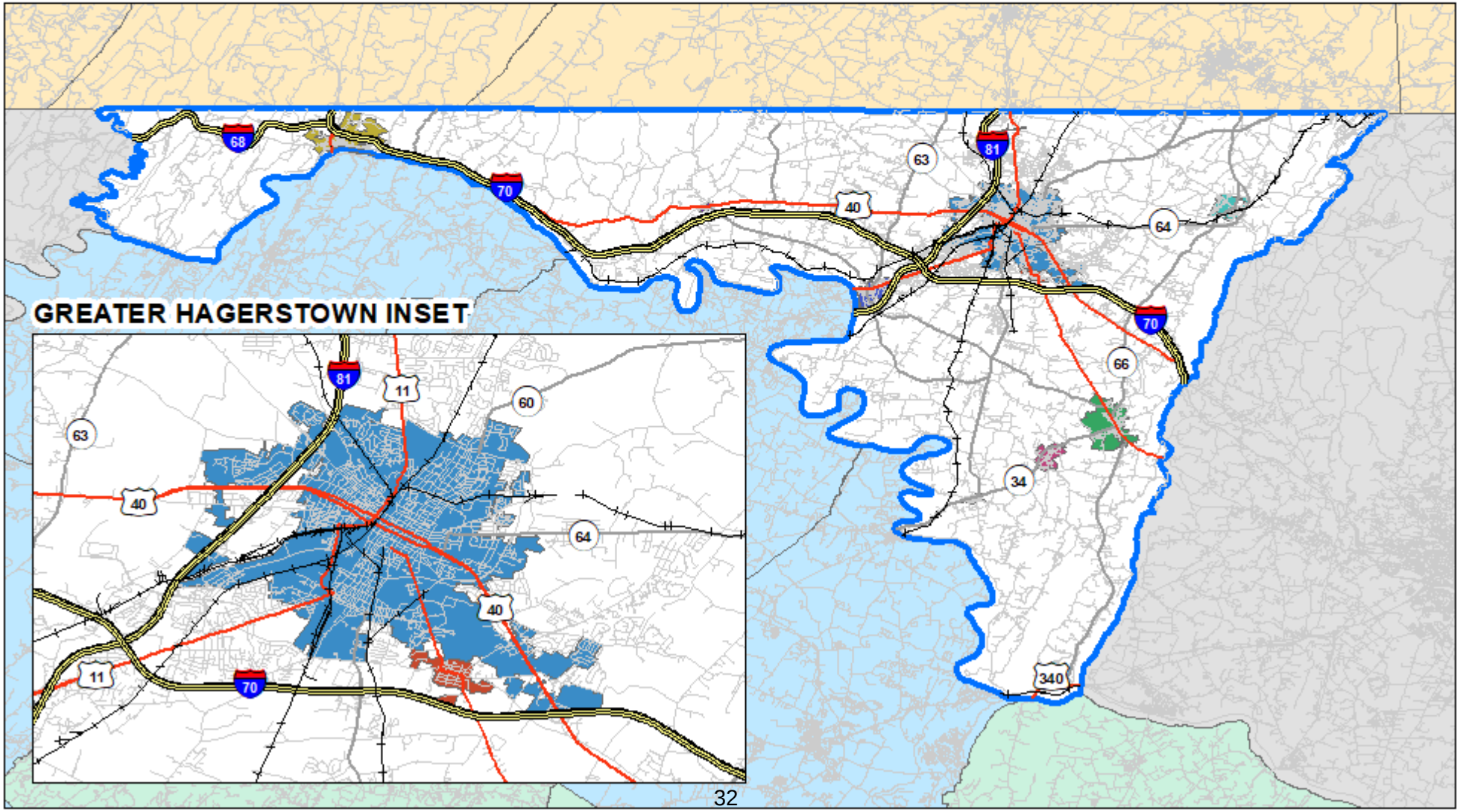
Transportation Infrastructure

Data Source(s):
FRA, US Census (Tiger Data)

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

- Runway
- Railways
- Interstates
- U.S. Routes
- State Routes
- Roadways





Economy

Washington County's economy is diverse, with representation from tourism, manufacturing, healthcare, education, government, and the service sector. Census data reports 3,442 employer establishments and a total employment of 61,034 (with approximately 59.7% of the civilian population aged 16 and older in the labor force) (U.S. Census Bureau, QuickFacts, 2020).

The Washington County Department of Business Development (n.d.) notes the key industry sectors as:

- Hospitality and tourism,
- Manufacturing,
- Science and technology,
- Agriculture,
- Transportation,
- Construction, and
- Finance.

The department of business development lists the major employers as Amazon (a new retail employer), Meritus Medical Center, CITI, Fiserv, Volvo Group Trucks, FedEx Ground, Hagerstown Community College, Bowman Group, LLC, Merkle Response Management Group, and ARC of Washington County (n.d.). The Maryland Department of Labor's "major employer list" for Washington County also shows those operators in addition to others (2022).

Though economic development loosely aligns with the population centers in the county, the greater Hagerstown area is experiencing rapid growth, particularly with respect to large warehouses whose operators are taking advantage of the access to numerous major thoroughfares and freight rail lines.

Healthcare

There are three hospitals in Washington County: (a) Brook Lane Health Services (a campus-style mental health services provider), (b) Meritus Medical Center, and (c) Western Maryland Center. There are six dialysis centers in the county.

- Fresenius Medical Care of Hagerstown
- Fresenius Medical Care of Robinwood
- Washington County Dialysis (two locations on the same campus in Hagerstown)

- New Generation Dialysis, LLC
- Western Maryland Renal Dialysis

Washington County also contains 10 long-term care facilities and 17 assisted living facilities.

WASHINGTON COUNTY ASSISTED LIVING AND LONG-TERM CARE FACILITIES	
Assisted Living Facilities	*Long-Term Care Facilities*
• Broadmore Senior Living • Brookdale Hagerstown • CJ's Senior Care, Inc. • Charlotte's Home I • Charlotte's Home II • Fahrney-Keedy Memorial Home, Inc. • Filcare Home • Greenfield Senior Living at Hagerstown • Hilltop Vistas Assisted Living • Holly Place • Mennonite Fellowship Home, Inc. • Mennonite Home • Robinwood Assisted Living • Somerford House – Hagerstown • Somerford Place – Hagerstown • Twin Oaks Assisted Living • Victoria's Meadows Assisted Living	• Coffman Nursing Home • Fahrney-Keedy Memorial Home • Golden Living Center – Hagerstown • Homewood at Williamsport • Julia Manor Nursing and Rehabilitation Center • NMS Healthcare of Hagerstown, LLC • Ravenwood Nursing Care Center • Reeders Memorial Home • Western Maryland Hospital Center • Williamsport Nursing Home

The following map shows the locations of the healthcare facilities in the county.

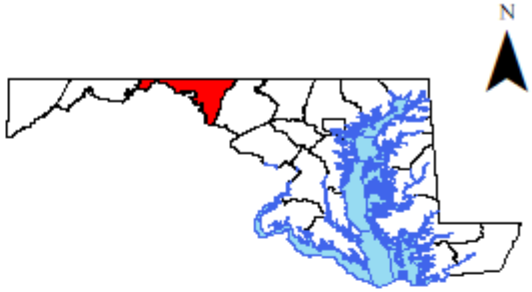
WASHINGTON COUNTY HAZARD MITIGATION PLAN

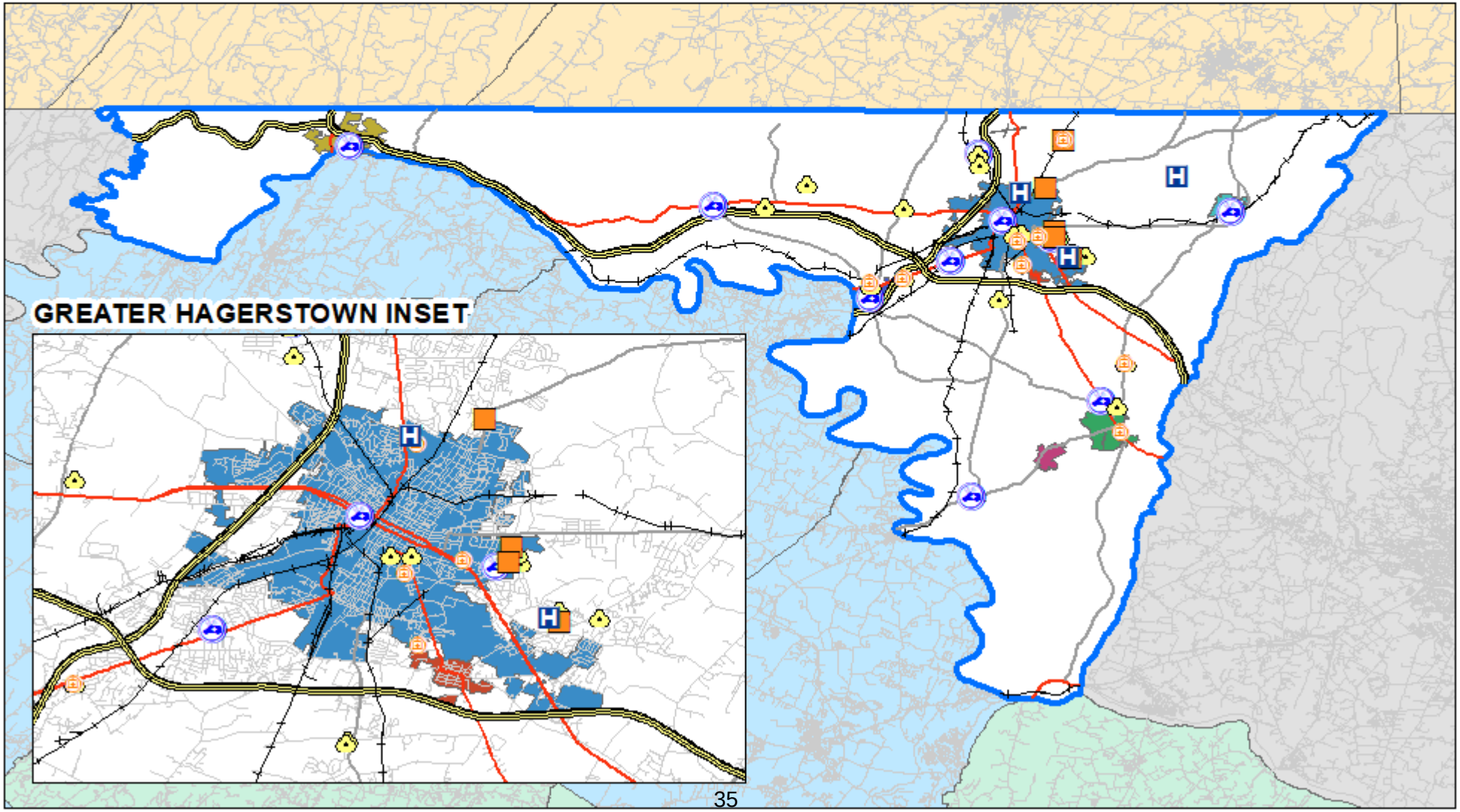
Healthcare Facilities

Data Source(s):
Maryland GIS Data Catalog

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

- Hospitals
- Long-Term Care
- Dialysis Centers
- Assisted Living





Climate

As expected, Washington County's climate is comparable to other communities in central Maryland and in nearly Pennsylvania and West Virginia. The exception is that the county receives, on average, less precipitation. The Maryland Department of the Environment (n.d.A) lists Washington County's average "normal monthly precipitation" as the second-lowest in Maryland after Allegany County. Climate statistics for Washington County are as follows (NOAA NCEI, 2023).

MONTHLY STATISTICS, 2003-2022				
Month	*Precipitation (In.)*	*Minimum Temperature (° F)*	*Average Temperature (° F)*	*Maximum Temperature (° F)*
January	2.46	22.8	31.3	39.7
February	2.47	24.3	33.2	43.1
March	2.80	31.7	42.6	54.1
April	3.60	41.3	53.3	65.3
May	4.75	51.1	62.3	74.4
June	3.90	59.6	71.1	82.6
July	3.97	64.3	75.7	87.1
August	3.57	62.8	74.0	85.2
September	4.26	55.7	67.0	78.9
October	3.59	44.7	55.6	66.5
November	2.79	34.3	44.5	54.7
December	3.44	27.7	36.1	44.6
Averages	**3.47**	**43.4**	**53.9**	**64.7**

Washington County and surrounding areas, particularly the mountainous areas to the west, frequently see dense fog conditions accompanying precipitation events, and the low-hanging clouds hamper visibility. These events occur in the Blue Ridge and the Ridge and Valley areas. Temperature inversions, which are common in winter, also cause foggy conditions when warmer air contacts accumulated snow. Some fog events will last for several hours and hinder transportation more than snow or ice storms.

Social Vulnerability

Vulnerability is the "measure of the propensity of an objective, area, individual, group, community, country, or other entity to incur the consequences of a hazard (Coppola, 2015, p. 33). Many aspects contribute to the vulnerability of society; these can include income disparity, class, race or ethnicity, gender, age, disability, health, and literacy. Understanding the overall health status of the community is essential in determining the population's vulnerability to any given hazard; disaster situations can exacerbate existing medical conditions. Vulnerable populations,

populations of concern, or populations at risk are those individuals or groups of people who are more exposed to the risks of the impacts of a hazard because of their age, gender, income, occupation, disability, physical or mental health, literacy, religion, education, or ethnicity.

The Agency for Toxic Substances and Disease Registry (ATSDR), a division of the Centers for Disease Control and Prevention (CDC), has developed a "social vulnerability index" (SVI) that measures and compares social vulnerability among census tracts. The ATSDR defines social vulnerability as the degree to which particular social conditions in a community, including poverty, car ownership, or the number of people in a household, may affect the community's ability to prevent human suffering and financial loss in the event of a disaster (2022). The dataset includes numerous variables informed by data collected and developed by the Census Bureau; data sources include the American Community Survey (ACS) administered between 2018 and 2020 (ATSDR, 2022).

Poverty and Educational Attainment

The SVI includes a variable that measures the estimated number of persons who live below the poverty level. Researchers at the CDC, who authored *A Social Vulnerability Index for Disaster Management*, explain that "economically disadvantaged populations are disproportionately affected by disasters" (Flanagan, Gregory, Hallisey, Heitgard, & Lewis, 2011). The poor are less likely to have the income or assets needed to properly prepare for a possible disaster or recover after a disaster (Cutter, Boruff, & Shirley, 2003). These areas need significant support during recovery activities and could benefit from targeted mitigation. Closely associated with the poverty level is the unemployment rate. The following graphic identifies, by Census tract, the number of persons below 150% poverty (ATSDR, 2022).

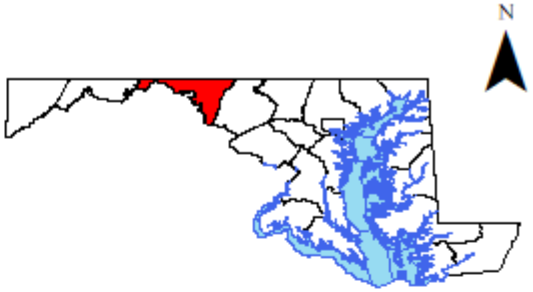
WASHINGTON COUNTY HAZARD MITIGATION PLAN

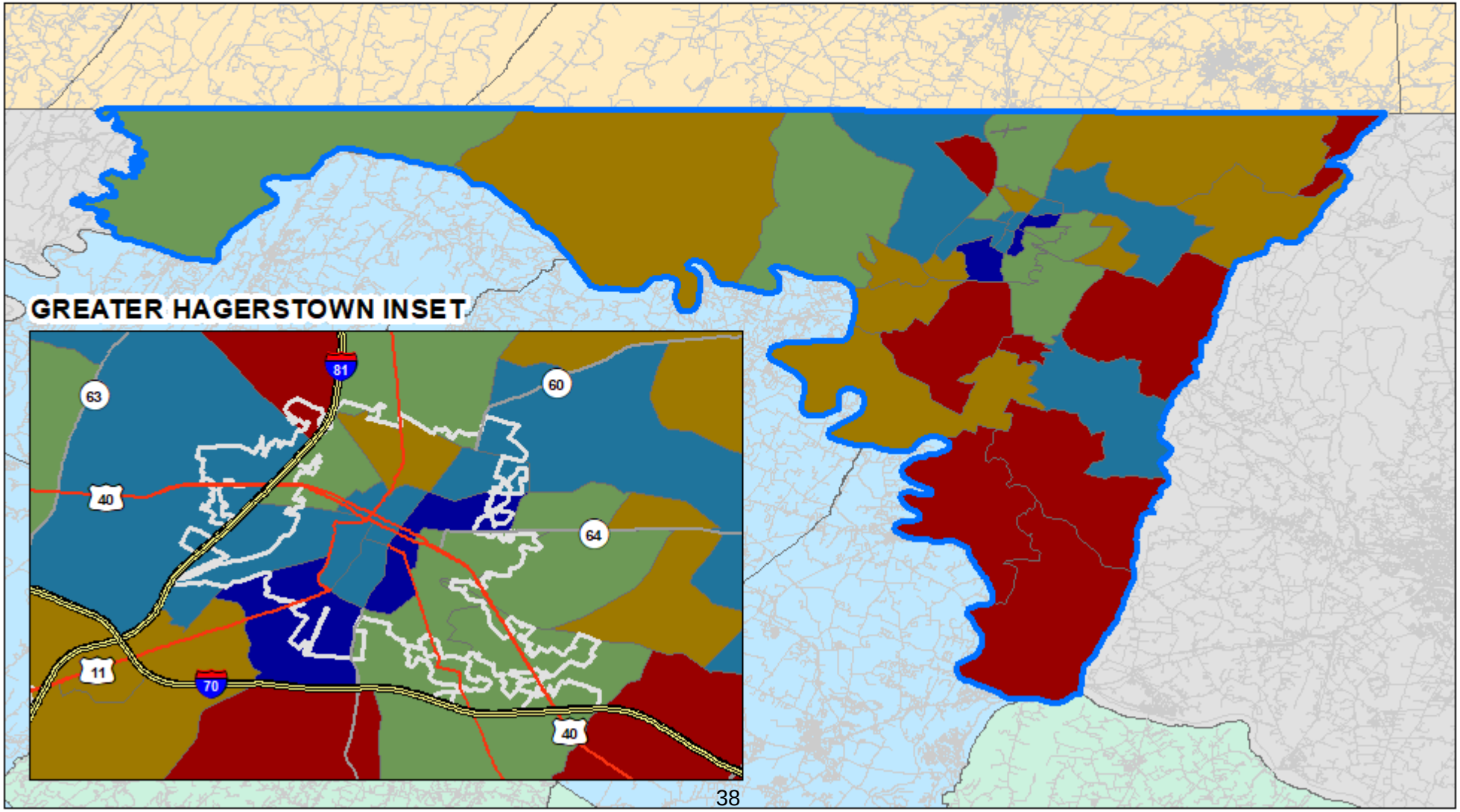
Persons below 150% of the Poverty Rate

Data Source(s):
CDC SVI Index (2020)

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

- 0 - 344 persons
- 345 - 605 persons
- 606 - 902 persons
- 903 - 1312 persons
- 1313 - 2396 persons





Scholars consider education a socioeconomic variable, though the relationship between education and vulnerability is not wholly understood (Flanagan et al., 2011). Education correlates with both income and poverty. Many people without a high school diploma will struggle to find steady, well-paying jobs. This observation is especially true within the boom-and-bust cycles of natural resource industries. During boom times, these residents can earn decent wages, but when the industry enters a bust cycle, there is little on which to fall back. Applying for federal aid and other recovery activities requires properly completing complex paperwork. For people with less education, the practical and bureaucratic hurdles to cope with and recover from disaster prove increasingly challenging (Morrow & Gladwin, 1999). The following image shows the persons (age 25+) in each Census tract with no high school diploma (ATSDR, 2022).

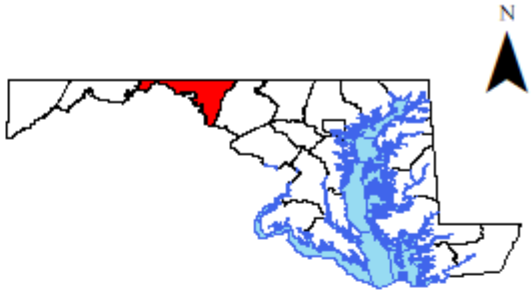
WASHINGTON COUNTY HAZARD MITIGATION PLAN

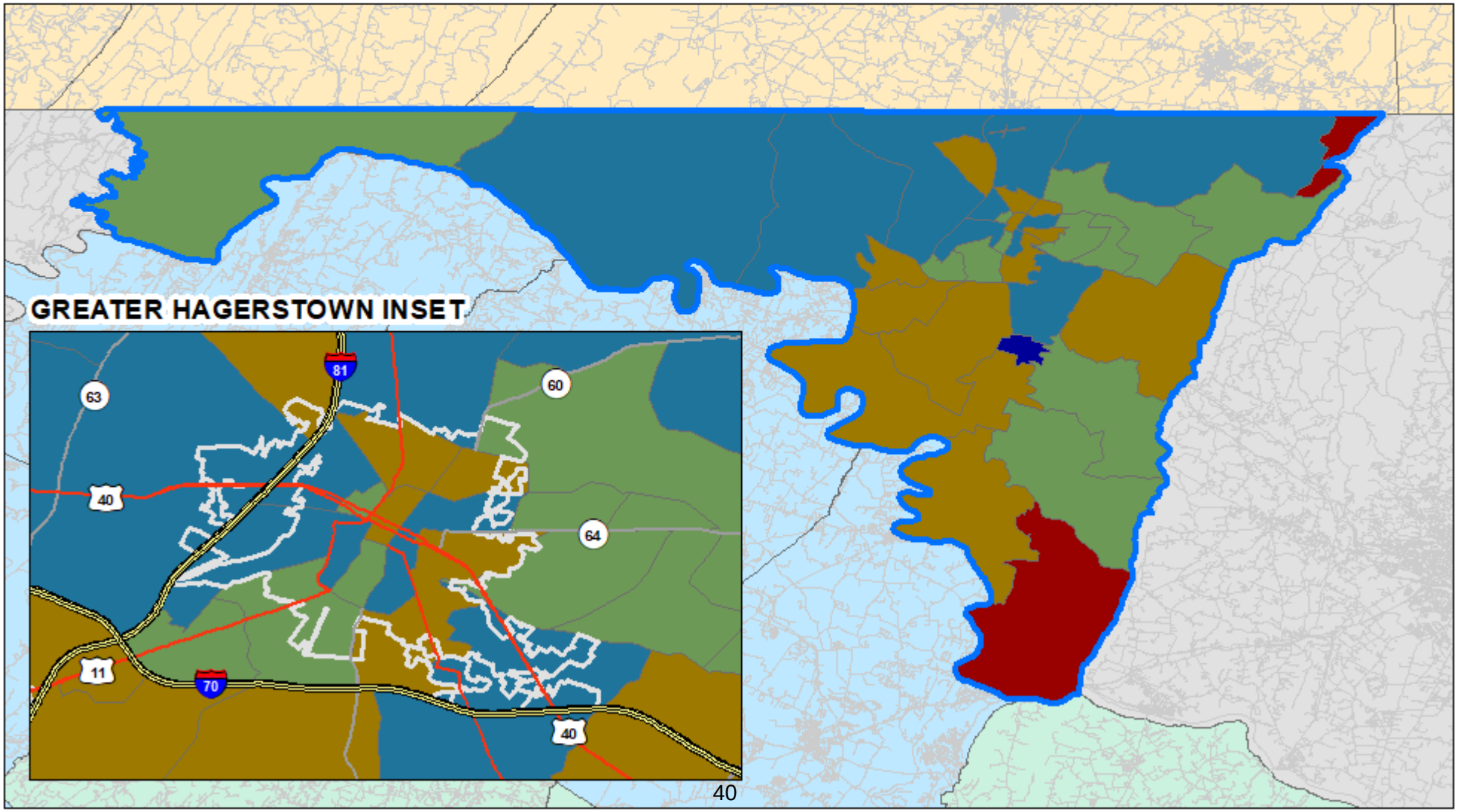
Persons (age 25+) w/ No HS Diploma

Data Source(s):
CDC SVI Index (2020)

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

- 50 - 64 persons
- 65 - 256 persons
- 257 - 398 persons
- 399 - 623 persons
- 624 - 1384 persons





Access to Internet

During the COVID-19 pandemic, the internet connected many to work, school, family, and friends. However, a Gallup analysis shows "more than half a billion of the world's most vulnerable people, who were struggling to meet even their basic food and shelter needs and didn't have anyone to help them, didn't have internet access" (Ray, Pugliese, & Espova, 2020).

Household Composition

The household composition section of the SVI includes variables measuring vulnerable ages and vulnerable households. Vulnerable ages include those under the age of 18 and those over the age of 65. Multiple researchers have concluded that children and elders are the most vulnerable in disaster events (Flanagan et al., 2011). Nearly 75% of the victims of Hurricane Katrina were elderly (Phillips, Thomas, Fothergill, & Blinn-Pike, 2013). Many elderly citizens have disabilities that require the assistance of either machines (e.g., oxygen concentrators) or others (e.g., difficulty walking). The family members or neighbors who typically assist elderly persons may be either overwhelmed by the disaster or physically unable to gain access to those persons (Flanagan et al., 2011). Extended power outages will disproportionality affect elderly populations. The figure below shows the estimated populations, by Census tract, aged 65 and over (ATSDR, 2022).

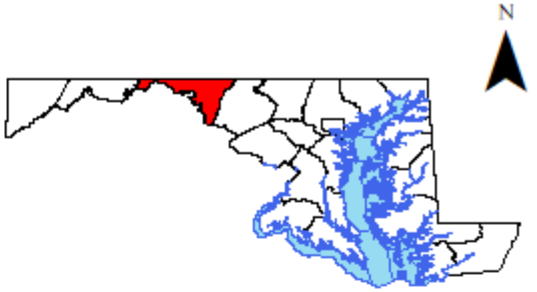
WASHINGTON COUNTY HAZARD MITIGATION PLAN

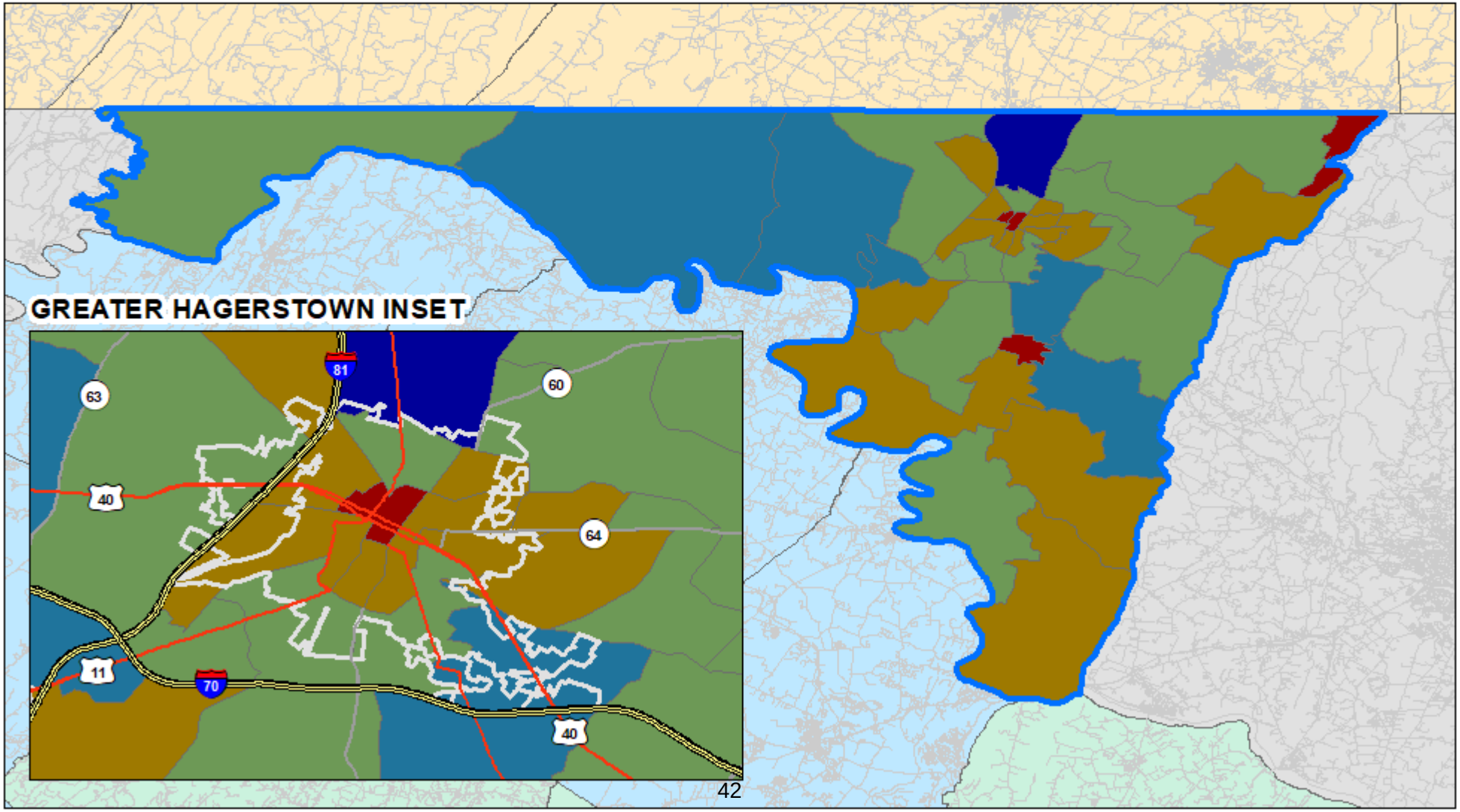
Persons Aged 65 and Older

Data Source(s):
CDC SVI Index (2020)

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

- 109 - 271 persons
- 272 - 660 persons
- 661 - 958 persons
- 959 - 1430 persons
- 1431 - 1991 persons





Children, especially the very young, generally cannot protect themselves and rely heavily on their caretakers for protection and care. Scholars have determined that children are rarely incorporated into disaster planning and scenario exercises due to the assumption of parental responsibility (Martin, Bush, & Lynch 2006). Thus, responders are not adequately prepared or equipped to deal with children. The map below shows populations aged 17 and under by Census tract (ATSDR, 2022).

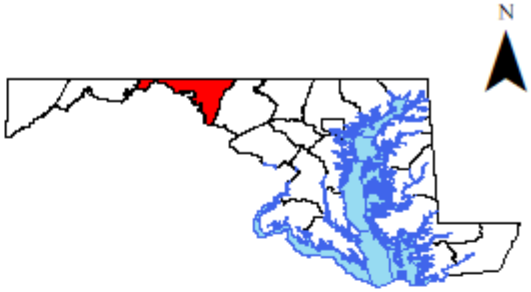
WASHINGTON COUNTY HAZARD MITIGATION PLAN

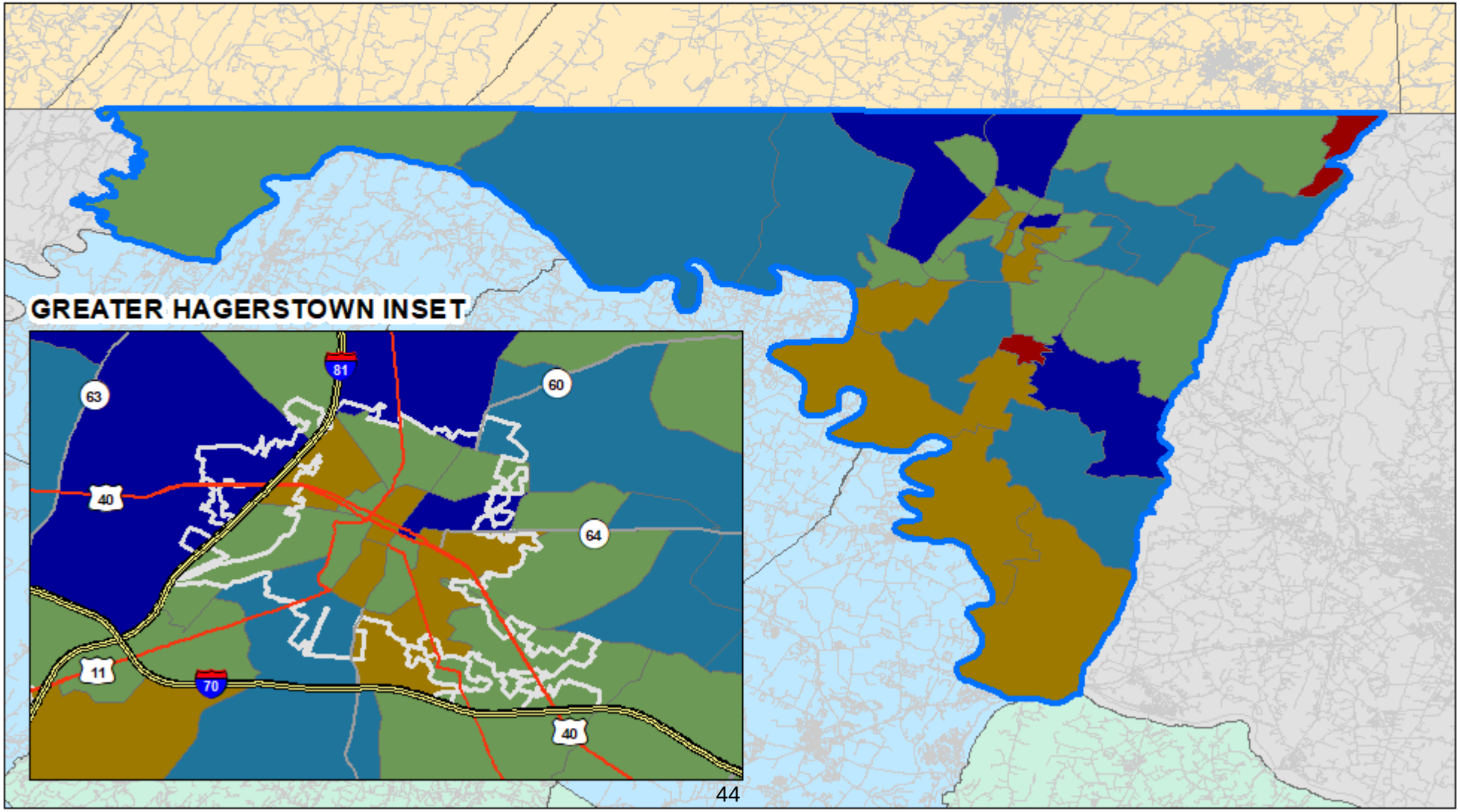
Persons Aged 17 and Younger

Data Source(s):
CDC SVI Index (2020)

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

- 12 - 250 persons
- 251 - 681 persons
- 682 - 991 persons
- 992 - 1430 persons
- 1431 - 1831 persons





The final variable among the housing composition grouping is the percentage of households that are single-parent households with children who are under the age of 18. Similar to the discussion of previous variables, children are among the most vulnerable populations, while single-parent households are among the lowest socioeconomic status households. These households are especially vulnerable during a disaster because all the caretaker duties fall to one parent, who must also deal with the disaster event and the recovery from that event (Flanagan et al., 2011). The following graphic shows, again by Census tract, the number of single-parent households with children under 18 in the home (ATSDR, 2022).

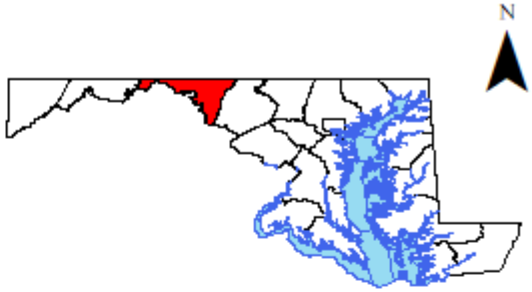
WASHINGTON COUNTY HAZARD MITIGATION PLAN

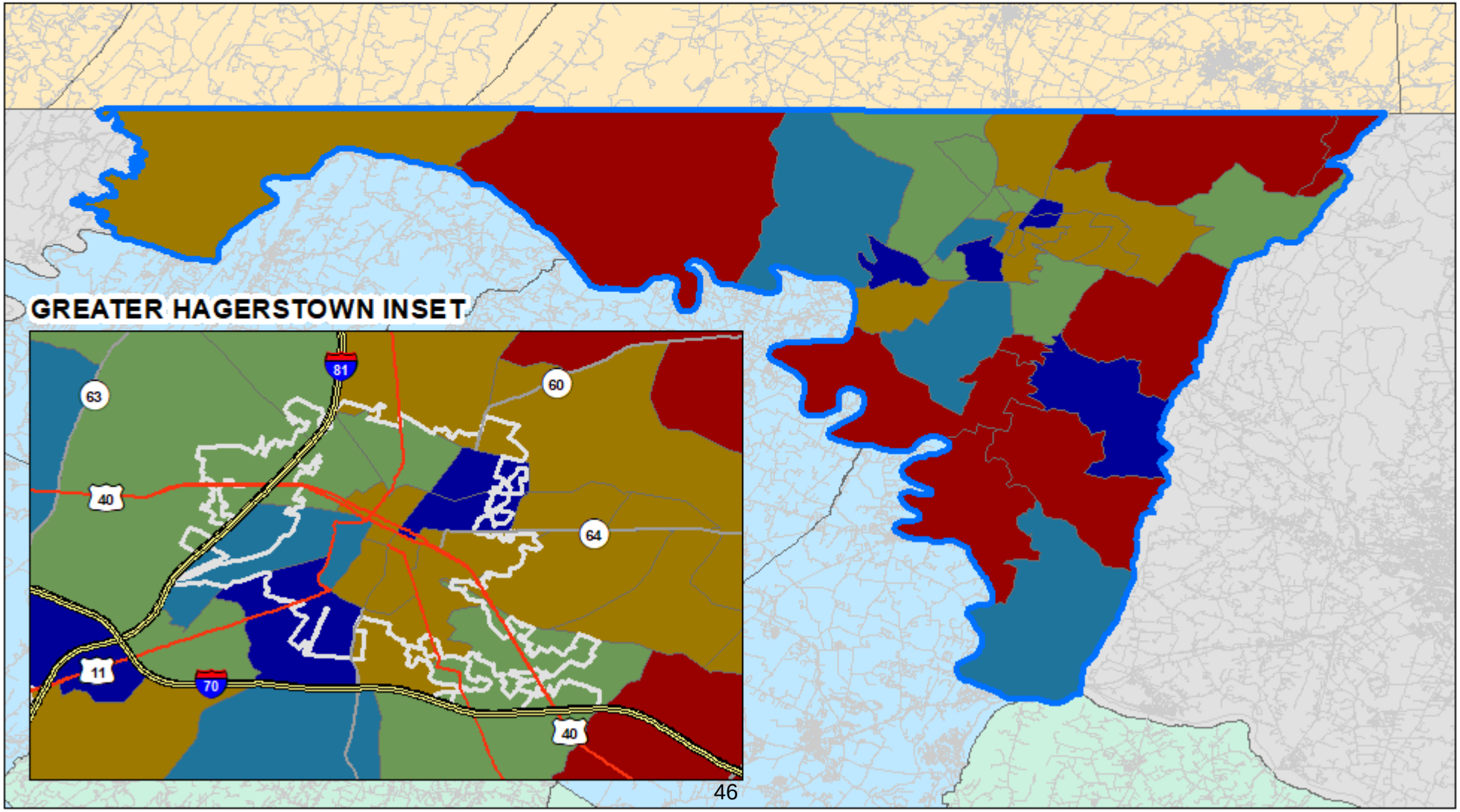
Single Parent Household (w/ Children Under 18)

Data Source(s):
CDC SVI Index (2020)

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

- 0 - 49 households
- 50 - 93 households
- 94 - 141 households
- 142 - 199 households
- 200 - 362 households





Minority Status/Language

Several studies have found that the overall marginalization of racial and ethnic minority groups has made these populations more vulnerable during all stages of a disaster (Flanagan et al., 2011). Specifically, studies have shown that populations of African Americans, Native Americans, Asian Americans, Pacific Islanders, and those of Hispanic origin are correlated with higher vulnerability rates (Flanagan et al., 2011). The following graphic shows minority populations by Census tract (i.e., Hispanic or Latino of any race; Black and African American, not Hispanic or Latino; American Indiana and Alaska Native, not Hispanic or Latino; Native Hawaiian and Other Pacific Islander, not Hispanic or Latino; two or more races, not Hispanic or Latino; other races, not Hispanic or Latino) (ATSDR, 2022).

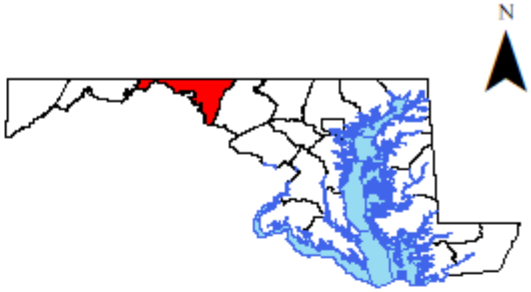
WASHINGTON COUNTY HAZARD MITIGATION PLAN

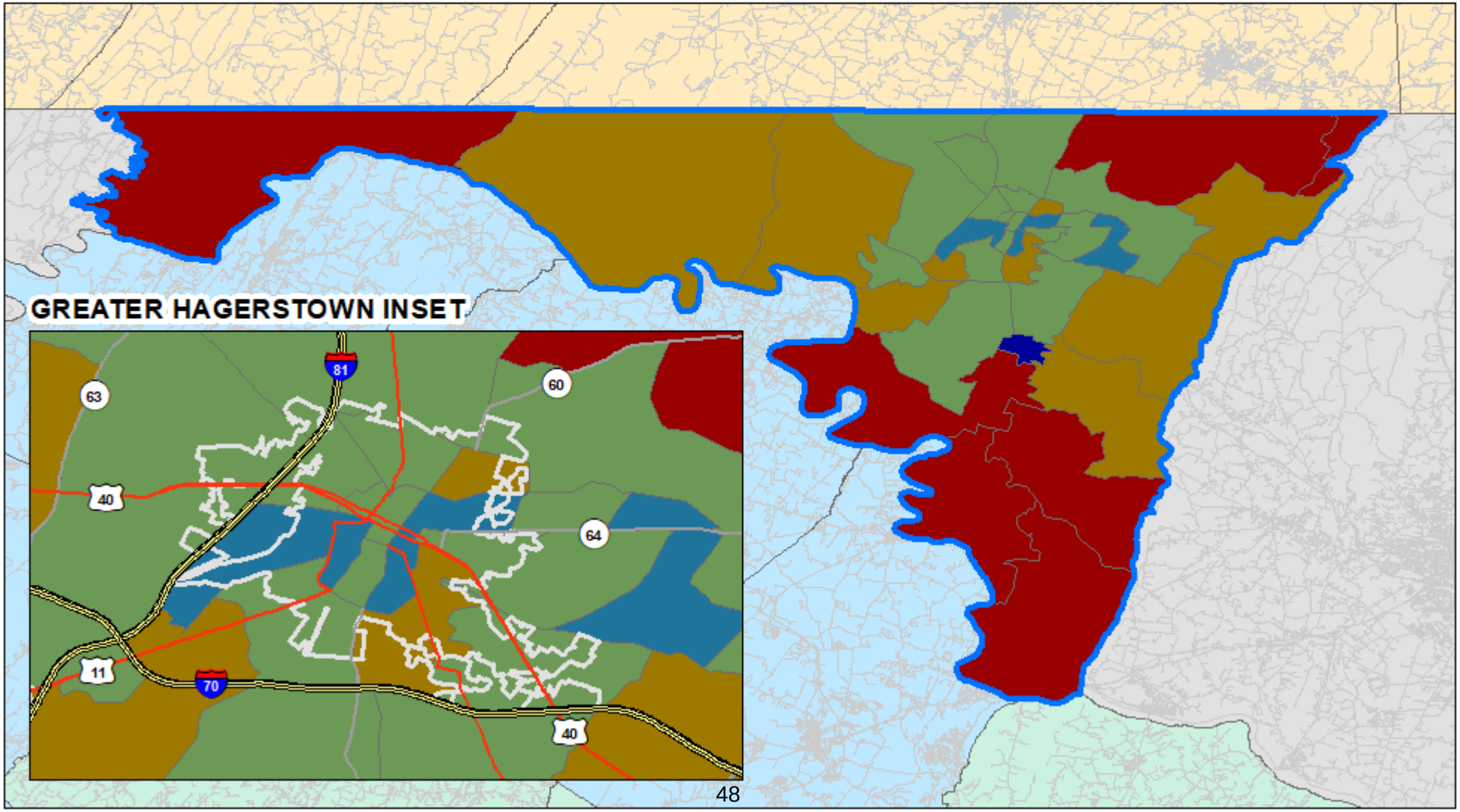
Minority Populations

Data Source(s):
CDC SVI Index (2020)

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

25 - 191 persons
192 - 713 persons
714 - 1344 persons
1345 - 2157 persons
2158 - 4789 persons





A specific variable among minorities that can increase their vulnerability during a disaster is an inability to speak or read English well. While small in comparison to the overall population of the county, this population is exceedingly vulnerable. These populations may not understand impending disasters, preparedness warnings, or evacuation notices without accurate translations. Research has shown that immigrant populations are more likely to rely on relatives, friends, and neighbors for information rather than official sources (Flanagan et al., 2011). The map below shows persons (age 5+) who speak English "less than well" by Census tract (ATSDR, 2022).

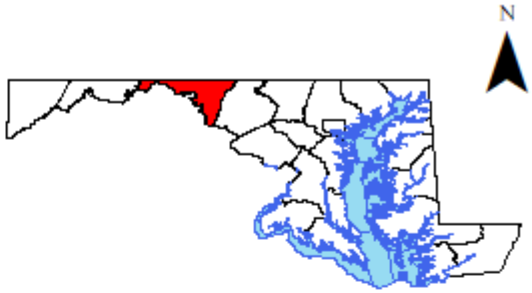
WASHINGTON COUNTY HAZARD MITIGATION PLAN

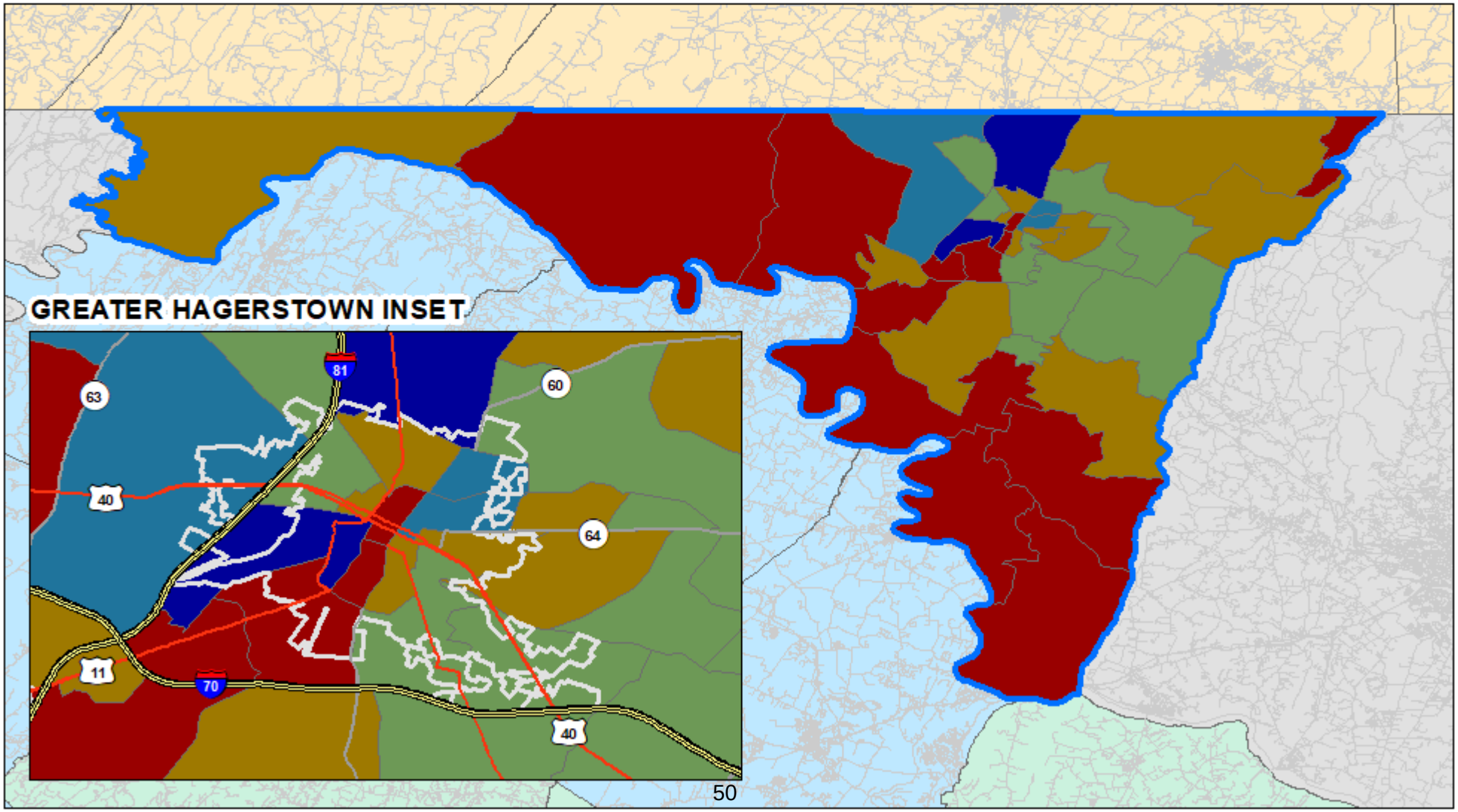
Persons Speaking English Less than Well

Data Source(s):
CDC SVI Index (2020)

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

- 0 - 10 persons
- 11 - 36 persons
- 37 - 75 persons
- 76 - 127 persons
- 128 - 235 persons





Housing/Transportation

The SVI includes several variables that describe housing and transportation, three of which appear here: mobile homes, vehicle ownership/access, and institutionalized housing. Housing quality is important in evaluating vulnerability and is closely tied to socioeconomic status and personal wealth (Flanagan et al., 2011). Mobile homes, which typically are inhabited by those of lower socioeconomic groups, are not designed to withstand severe weather events or flooding. Mobile homes are frequently found outside of metropolitan areas, making access difficult in normal conditions, even more so during and immediately after a disaster (Flanagan et al., 2011). Mobile homes are often clustered in communities, which increases the overall vulnerability of these communities (Flanagan et al., 2011). The following graphic estimates mobile homes by Census tract (ATSDR, 2022).

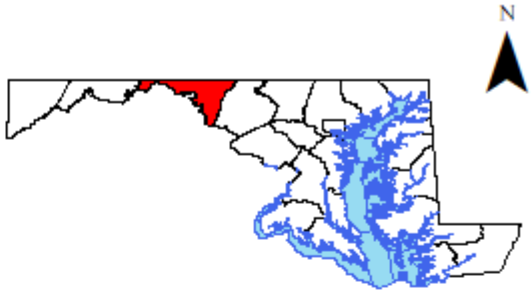
WASHINGTON COUNTY HAZARD MITIGATION PLAN

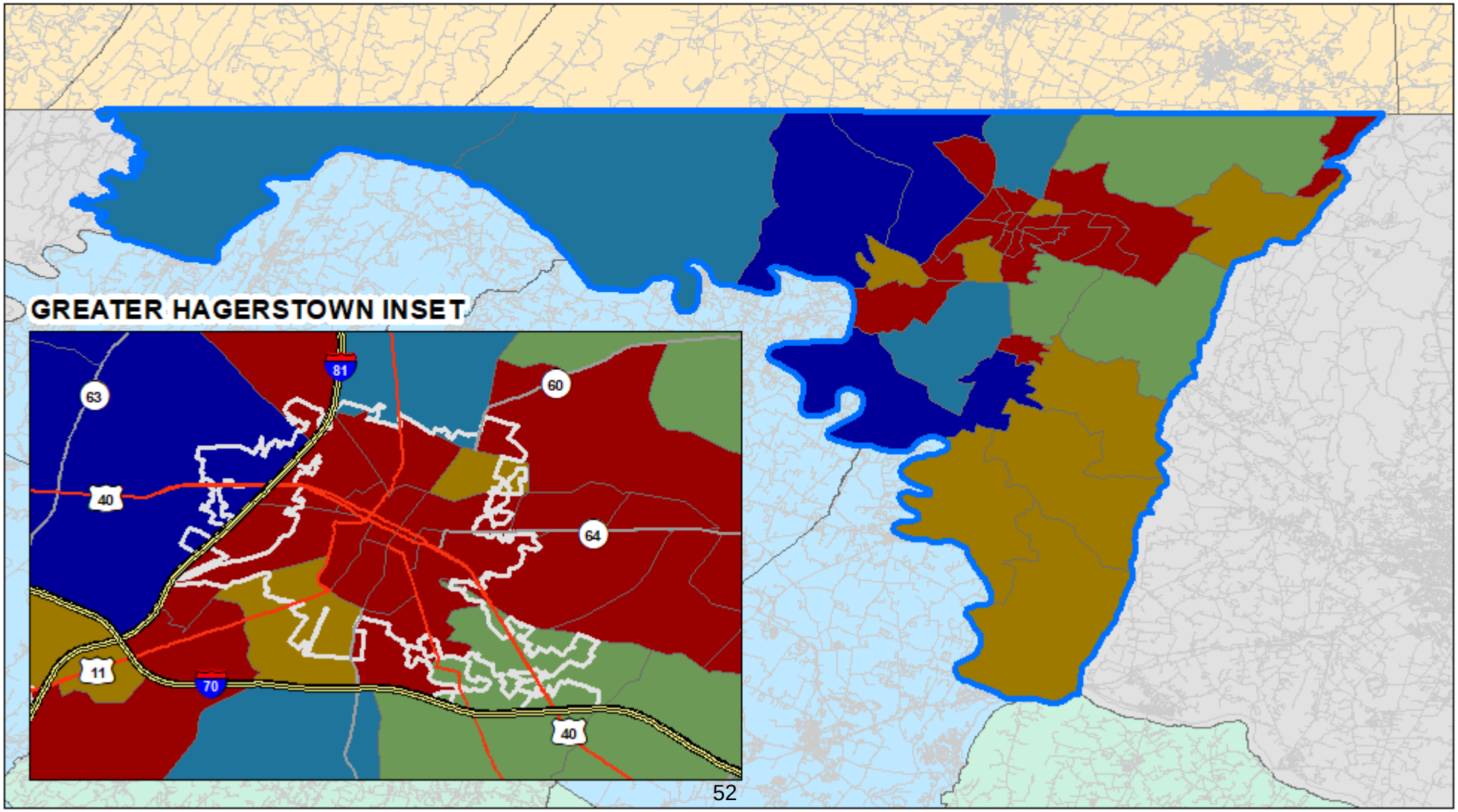
Mobile Homes in Washington County

Data Source(s):
CDC SVI Index (2020)

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

- 0 - 10 mobile homes
- 11 - 27 mobile homes
- 28 - 65 mobile homes
- 66 - 162 mobile homes
- 163 - 467 mobile homes





Vehicle ownership/access is crucial to being prepared and evacuating when needed. Those who do not possess (or have access to) a vehicle will have difficulty going to stores to obtain preparedness supplies. They will have less capacity to bring those supplies back to their home. Transit providers, like the Washington County Transit Department, may be overwhelmed before an impending disaster, such as a snowstorm, or may not operate immediately following an event. The graphic below shows an estimated number of households, by Census tract, with no vehicle available (ATSDR, 2022).

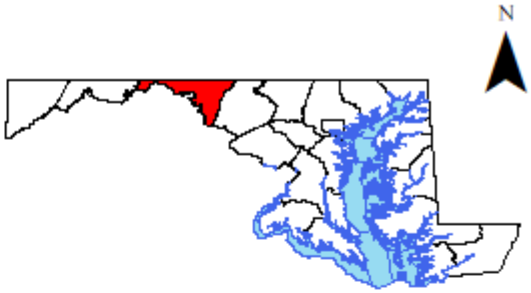
WASHINGTON COUNTY HAZARD MITIGATION PLAN

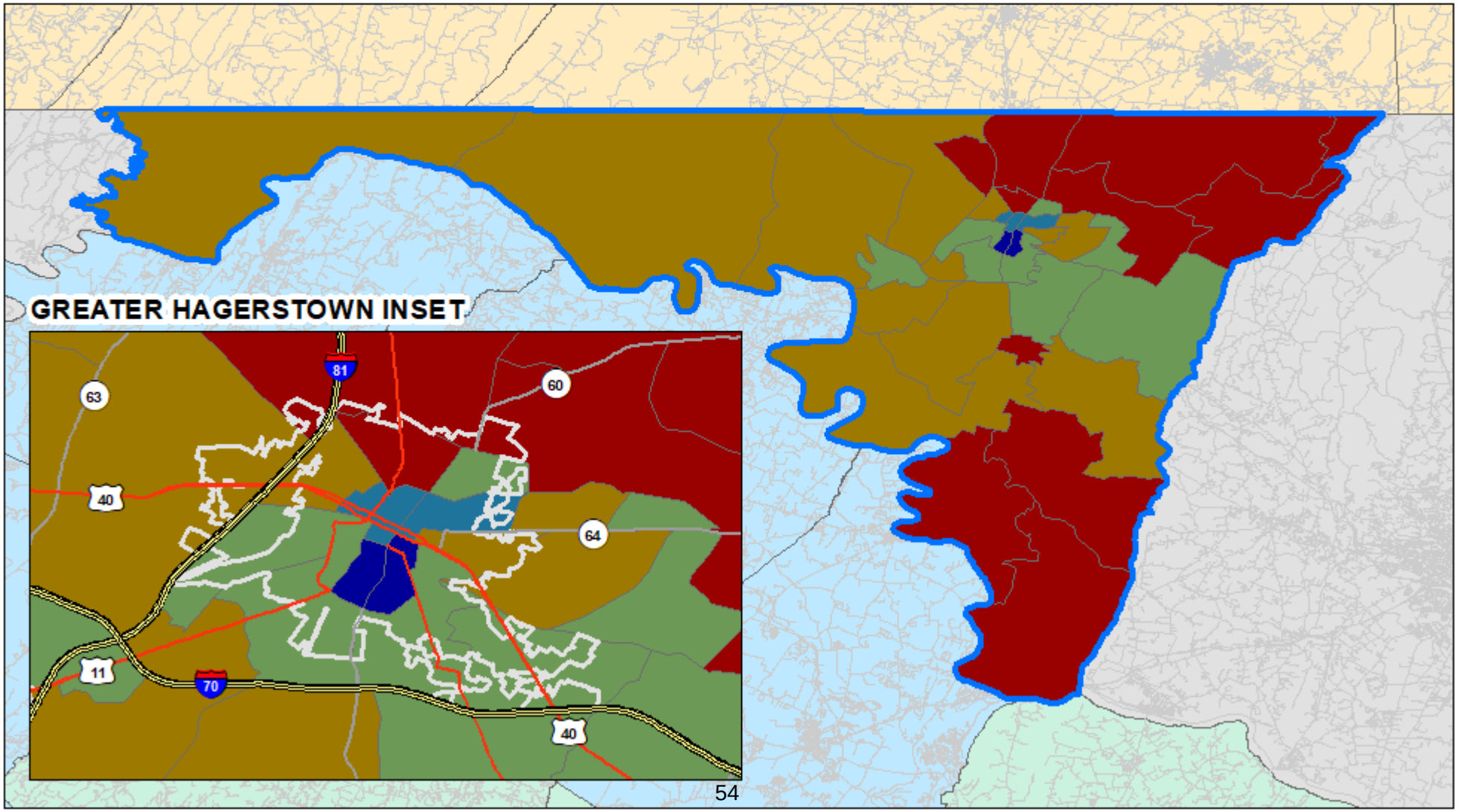
Households w/ No Vehicle Available

Data Source(s):
CDC SVI Index (2020)

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

- 0 - 45 households
- 46 - 103 households
- 104 - 202 households
- 203 - 405 households
- 406 - 681 households





The final housing/transportation vulnerability variable to discuss is those who live in institutional settings. These include college dorms, farm workers' dormitories, health institutions, and prisons, which present unique evacuation concerns (Flanagan et al., 2011). Nursing homes and other residential medical facilities are particularly vulnerable. The increased vulnerability is due to the special and timely needs of the residents and because of understaffing in these institutions in emergencies (Flanagan et al., 2011). Evacuating these facilities is time- and resource-consuming, requiring numerous specialty vehicles and staff, such as advanced life support ambulances. While these facilities will have backup generators for vital machines, these generators may need additional fuel deliveries in an extended power outage. The map below estimates the persons living in group quarters by Census tract (ATSDR, 2022).

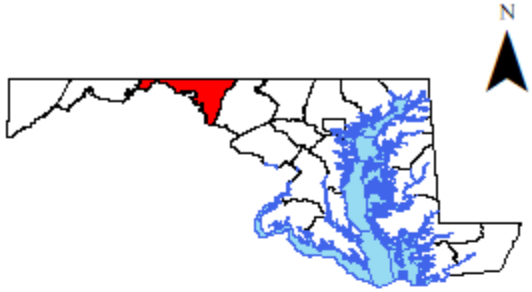
WASHINGTON COUNTY HAZARD MITIGATION PLAN

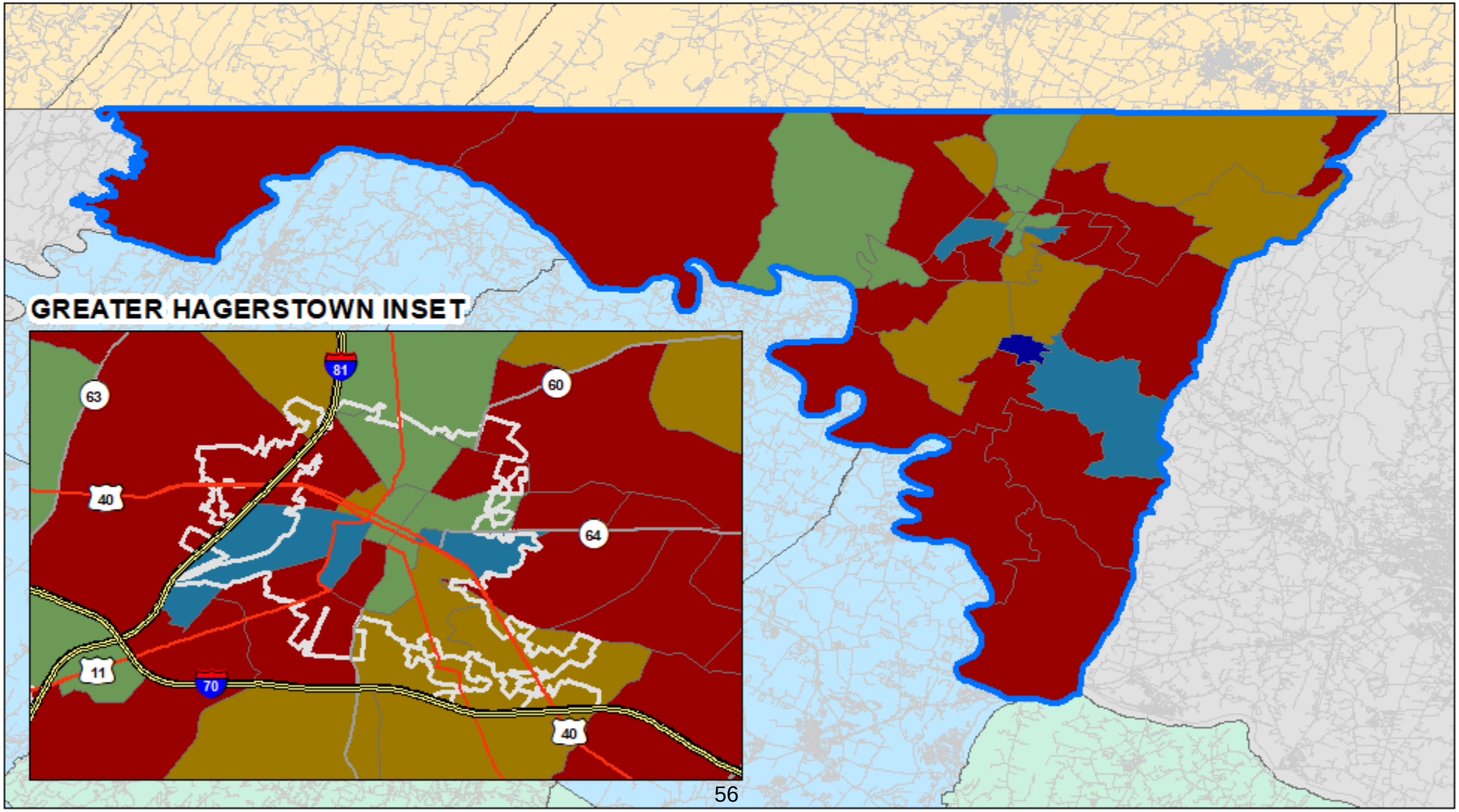
Persons Living in Group Quarters

Data Source(s):
CDC SVI Index (2020)

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

- 0 - 25 persons
- 26 - 77 persons
- 78 - 208 persons
- 209 - 414 persons
- 415 - 6490 persons





Asset Inventory

§201.6(c)(2)(ii)	[The risk assessment shall include a] description of the jurisdiction's vulnerability of the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community.
§201.6(c)(2)(ii)(A)	The plan should describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas.

Assets are "the people, structures, facilities, and systems that have value to [a] community" (FEMA, 2013b, p. 5-1). This plan considers potentially-vulnerable community assets such as the following.

- **Critical Facilities:** Governmental facilities, emergency services locations, medical facilities (e.g., hospitals, clinics), schools, nursing homes, senior centers
- **Infrastructure Systems:** Water/wastewater, transportation (roads, railways, waterways)
- **Economic Assets:** Large commercial/industrial facilities, large employers (not covered in other categories)
- **Historic Considerations:** Areas/structures listed on the National Register of Historic Places

The assets on the list above are built environment and economy assets (FEMA, 2013b). FEMA's *Local Mitigation Planning Handbook* also identifies "people" and "natural environment" as community assets, and Washington County's steering committee agrees. The demographic and social vulnerability discussions consider *people* assets in detail. *Natural environment* assets appear more indirectly, starting with the rural and conservation areas noted below as well as discussions of features like "floodplains" in Section 2.0: Risk Assessment. The following map shows the location of the community assets (with full street addresses versus "districts" or broad areas) in Washington County. The table below the map lists and categorizes them.

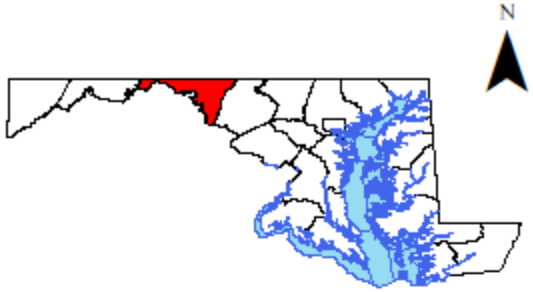
WASHINGTON COUNTY HAZARD MITIGATION PLAN

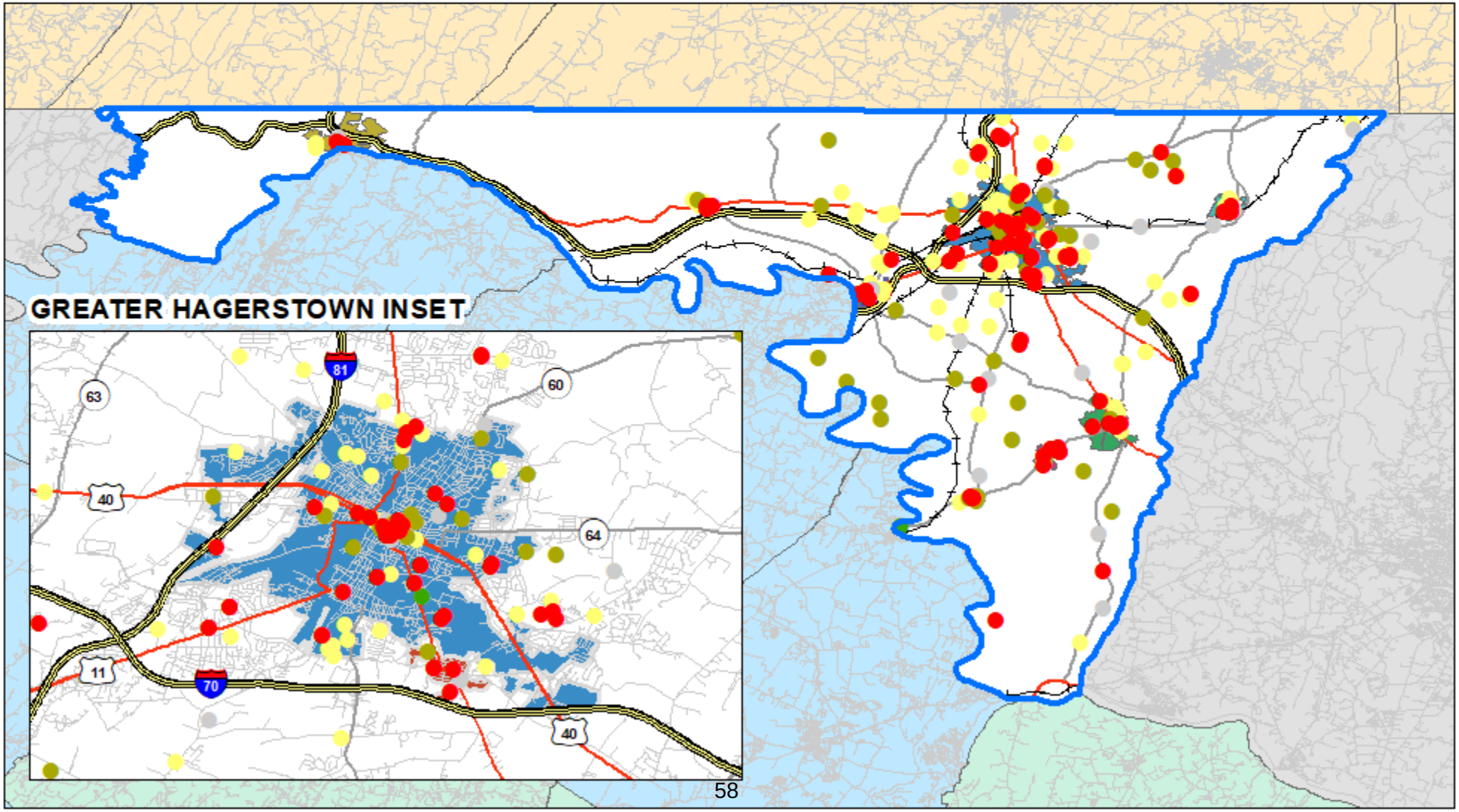
Washington County Asset Inventory

Data Source(s):
HMP Steering Committee, Participating Jurisdictions

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

- Critical Facilities
- Economic Assets
- Historic Considerations
- Special Considerations
- Vulnerable Populations





WASHINGTON COUNTY ASSET INVENTORY								
Critical Facility	*Economic Asset*	*Historic Consideration*	*Special Consideration*	*Vulnerable Population*	*Asset Type*	*Name*	*Address*	*City*
	X				Business	Airport Business Park	Pennsylvania Ave.	Maugansville
		X			Landmark	Alms House	239 N. Locust St.	Hagerstown
				X	School	Antietam Academy	40 W. Oak Ridge Dr.	Hagerstown
				X	Higher Education	Antietam Bible College	13535 Broadfording Church Rd.	Maugansville
X					Fire	Antietam Co. 2	790 Potomac Ave.	Hagerstown
		X			Site	Antietam Furnace Complex Archeological Site	22043 Mt. Aetna Rd.	Hagerstown Area
		X			Building	Antietam Hall	11806 Indian Ln.	Hagerstown Area
		X			District	Antietam Iron Furnace Site and Antietam Village	Confluence of Antietam Creek and Potomac River	Antietam
			X		Recreational	Antietam Nat. Battlefield HQ	5831 Dunker Church Rd.	Sharpsburg Area
		X			District	Antietam National Battlefield	N of Sharpsburg off MD 45	Sharpsburg Area
				X	Medical	Arc of Washington County	820 Florida Ave.	Hagerstown
				X	Nursing Home	Avalon Manor Nursing Home	14014 Marsh Pike	Long Meadow
		X			Structure	B & O Bridge	NW of Keedysville over Antietam Creek	Keedysville
		X			Site	B&O Railroad Potomac River Crossing	At confluence of the Shenandoah and Potomac Rivers	Harpers Ferry
		X			Building	Baker Farm	N of Keedysville off MD Rt. 34	Keedysville
		X		X	School	Barbara Ingram School for the Arts	7 S. Potomac St.	Hagerstown
		X			Building	Bell-Varner House	SE of Leitersburg on Unger Rd.	Leitersburg
				X	School	Bester Elementary School	30 E. Memorial Blvd.	Hagerstown
			X		Recreational	Big Pool Boat Ramp	Ft. Frederick St. Park	Clear Spring
			X		Post Office	Big Pool Post Office	Big Pool Rd.	Clear Spring
			X		Recreational	Blairs Valley Boat Ramp	Indian Springs Wildlife Area	Clear Spring

WASHINGTON COUNTY ASSET INVENTORY								
Critical Facility	*Economic Asset*	*Historic Consideration*	*Special Consideration*	*Vulnerable Population*	*Asset Type*	*Name*	*Address*	*City*
X					Fire	Boonsboro Company #6 FD	5 St. Paul St.	Boonsboro
				X	School	Boonsboro Elementary School	5 Campus Ave.	Boonsboro
				X	School	Boonsboro High School	10 Campus Ave.	Boonsboro
		X			District	Boonsboro Historic District	Main St., Potomac St., St. Paul St., High St., Lakin Ave., Center St., Park Dr., Park Ln., Park View, Young Ave.	Boonsboro
			X		Library	Boonsboro Library	19 N. Main St.	Boonsboro
				X	School	Boonsboro Middle School	1 J-H Wade Dr.	Boonsboro
X					Police	Boonsboro Police	St. Paul St.	Boonsboro
			X		Post Office	Boonsboro Post Office	5 Potomac St.	Boonsboro
X					Infrastructure	Boonsboro Substation	Near Boonsboro	Boonsboro
X					Government	Boonsboro Town Hall	21 N. Main St.	Boonsboro
X					Infrastructure	Boonsboro WWTP	6927 Monroe Rd.	Boonsboro
X					Infrastructure	Boonsboro WTP	37 Park Dr.	Boonsboro
		X			Building	Bowman House	323 N. Main St.	Boonsboro
		X			Building	Brightwood	N. of Hagerstown off MD 6, 2 mi. N. of Paramont	Hagerstown Area
				X	School	Broadfording Chr. Academy	13535 Broadfording Church Rd.	Maugansville
X					Medical	Brook Lane Psychiatric Hospital	13218 Brooklane Dr.	Leitersburg
			X		Post Office	Brownsville Post Office	2439 Boteler Rd.	Rohrersville
			X		Recreational	C&O Canal National Park	North Bank Potomac River	Clear Spring
	X				Business	C&O Canal Park HQ	16500 Shepherdstown Pike	Sharpsburg Area
			X		Recreational	Camp Harding County Park	Pectonville Rd.	Clear Spring
				X	School	Cascade Elementary School	14519 Pennersville Rd.	Cascade
			X		Post Office	Cascade Post Office	25208 Military Rd.	Cascade
X					Infrastructure	Cascade WTP		Cascade

WASHINGTON COUNTY ASSET INVENTORY								
Critical Facility	*Economic Asset*	*Historic Consideration*	*Special Consideration*	*Vulnerable Population*	*Asset Type*	*Name*	*Address*	*City*
			X		Post Office	Cavetown Post Office	22509 Cavetown Church Rd.	Cavetown
		X			Building	Cedar Grove	15435 Dellinger Rd.	Williamsport
				X	School	Cedar Ridge School	12146 Cedar Ridge Rd.	Williamsport
		X			Building	Chapline, William, House	109 W. Main St.	Sharpsburg
				X	Nursing Home	Charlotte's Home	212 Maple Ave.	Boonsboro
			X		Post Office	Chewsville Post Office	21106 Twin Springs Dr.	Chewsville
				X	Daycare	CitiCorp Family Center	14629 Citicorp Dr.	Maugansville
X					Infrastructure	City Electric Substations	590 Security Rd., 789 Mitchell Ave., 828 North Burhans Blvd., 625 Ridge Ave., 1220 Kenly Dr. East, 500 Eastern Blvd., 650 Tracy's Ln.	Hagerstown
		X			Building	Clagett, Robert, Farm	Garrett's Mill Rd.	Knoxville
X					Medical	Clear Spring Ambulance Company #49	233 Cumberland St.	Clear Spring
X					Fire	Clear Spring Company #4	30 Mulberry St.	Clear Spring
				X	School	Clear Spring Elementary School	12627 Broadfording Rd.	Clear Spring
				X	School	Clear Spring High School	12630 Broadfording Rd.	Clear Spring
				X	School	Clear Spring Middle School	12628 Broadfording Rd.	Clear Spring
			X		Recreational	Clear Spring Park	West St.	Clear Spring
			X		Post Office	Clear Spring Post Office	21 Mulberry St.	Clear Spring
X					Government	Clear Spring Town Hall	146 Cumberland St.	Clear Spring
X					Infrastructure	Clear Spring WWTP	Toms Run	Clear Spring
X					Infrastructure	Clear Spring WTP	Rt. 40 West	Clear Spring
X					Infrastructure	Clear Spring WTP	Cedar Ridge School	Clear Spring
				X	Nursing Home	Clearview Nursing Home	9946 Downsville Pike	Williamsport

WASHINGTON COUNTY ASSET INVENTORY								
Critical Facility	*Economic Asset*	*Historic Consideration*	*Special Consideration*	*Vulnerable Population*	*Asset Type*	*Name*	*Address*	*City*
		X			Building	Colonial Theatre	12-14 S. Potomac St.	Hagerstown
X					EMS	Community Rescue Service Co. 75	110 Eastern Blvd. North	Hagerstown
X					Fire	Company 10 Fire and Rescue	2 S. Westside Ave.	Funkstown
				X	School	Conococheague Elementary School	12408 Learning Ln.	Williamsport
X		X			Government	County Courthouse	95 W. Washington St.	Hagerstown
X					Medical	County Health Department	1302 Pennsylvania Ave.	Hagerstown
X					Government	County Office Building	100 W. Washington St.	Hagerstown
X					Government	County Office Building	33 W. Washington St.	Hagerstown
X					Government	County Office Building	747 Northern Ave.	Hagerstown
			X		Government	County Park & Rec. HQ	11400 Robinwood Dr.	Hagerstown Area
			X		Public Parks	County Parks	Woodland Way and Doubs Woods	Hagerstown
			X		Government	County Transit Center	119 W. Franklin St.	Hagerstown
X					Infrastructure	County Transportation Dept.	1000 W. Washington St.	Hagerstown
	X				Business	Crossroads Corporate Center	Near I-81 & Rt. 40 Int	Halfway
	X				Business	CSX Jamison Railyard	End of Hump Rd.	Hagerstown Area
		X			Building	Ditto Knolls	E. of Hagerstown on Landis Rd.	Hagerstown Area
		X			Building	Donnelly, Daniel, House	14906 Falling Waters Rd.	Williamsport
		X			Building	Dorsey-Palmer House	N. of Hagerstown on MD 60	Hagerstown Area
		X			Building	Doub Farm	N of Keedysville	Keedysville
		X			District	Doub's Mill Historic District	SW of Beaver Creek on Beaver Creek Rd.	Beaver Creek
				X	School	E. Russell Hicks Middle School	1321 S. Potomac St.	Hagerstown
	X				Business	Early Ind. Park	Rt. 65	Fairplay
				X	School	Eastern Elementary School	1320 Yale Dr.	Hagerstown Area

WASHINGTON COUNTY ASSET INVENTORY								
Critical Facility	*Economic Asset*	*Historic Consideration*	*Special Consideration*	*Vulnerable Population*	*Asset Type*	*Name*	*Address*	*City*
				X	School	Ebenezer Christian School	Virginia Ave.	Halfway
		X			Building	Elliot-Bester House	205-207 S. Potomac St.	Hagerstown
		X			Building	Elmwood	16311 Kendle Rd.	Williamsport
X					Medical	Emergency Air Unit Co. 25	17556 York Rd.	Halfway
X					Emergency Support Services	Emergency Services Special Operations Team Station 20	638 Frederick St.	Hagerstown
				X	School	Emma K Doub Elementary School	1221 S. Potomac St.	Hagerstown
				X	School	Emmanuel Christian School	16221 National Pike	Williamsport
		X			Landmark	F. Stevens House	414 W. Washington St.	Hagerstown
				X	Nursing Home	Fahrney-Keedy Home	8507 Mapleville Rd.	Boonsboro
X					Fire	Fairplay Co. 12	18002 Tilghmanton Rd.	Fairplay
			X		Post Office	Fairplay Post Office	8215 Sharpsburg Pike	Fairplay
				X	School	Fairview Outdoor Educational Center	12808 Draper Rd.	Clear Spring
		X			Building	Fiery, Joseph, House	15107 Hicksville Rd.	Clear Spring
X					Fire	Fire Training Center	940 Bowman Ave.	Hagerstown
X		X			Fire	First Hose Co.1	33 S. Potomac St.	Hagerstown
			X		Recreational	Fort Frederick State Park	RT. 56 near Big Pool	Clear Spring
		X			Structure	Fort Frederick State Park	SE of Big Pool near jct. of MD 56 and 44	Big Pool
				X	School	Fountain Rock Elementary School	17145 Lappens Rd.	Fairplay
				X	School	Fountaindale Elementary School	901 Northern Ave.	Hagerstown
			X		Recreational	Four Locks Boat Ramp	Four Locks Rd.	Clear Spring

WASHINGTON COUNTY ASSET INVENTORY								
Critical Facility	*Economic Asset*	*Historic Consideration*	*Special Consideration*	*Vulnerable Population*	*Asset Type*	*Name*	*Address*	*City*
	X				Business	Friendship Technology Park	Near I-70 & Rt. 632 Int	Halfway
		X			Building	Funk, Jacob M., Farm	21116 Black Rock Rd.	Hagerstown Area
		X			District	Funkstown Historic District	Roughly bounded by Antietam Creek, US 40A, Stouffer Ave., and High St.	Funkstown
			X		Post Office	Funkstown Post Office	29 Frederick St.	Funkstown
X					Government	Funkstown Town Hall	30 E. Baltimore St.	Funkstown
X					Fire	Funkstown Volunteer Fire Co.	2 S. Westside Ave.	Funkstown
X					Infrastructure	Funkstown WWTP	Lagoon Rd.	Funkstown
		X			Building	Garden Hill	1251 Frederick St.	Hagerstown Area
	X				Business	Gateway Business Park	Near I-81 & Rt. 40 Int	Halfway
				X	School	Gateway Christian Academy	11017 Kemps Mill Rd.	Williamsport
		X			Building	Geeting Farm	S of Keedysville at Geeting and Dog Rds.	Keedysville
		X			Building	Good-Hartle Farm	13357 Little Antietam Rd.	Hagerstown Area
		X			Building	Good--Reilly House	107 E. Main St.	Sharpsburg
				X	School	Grace Academy	13321 Cearfoss Pike	Hagerstown Area
				X	School	Greenbrier Elementary School	21222 San Mar Rd.	Boonsboro
			X		Recreational	Greenbrier State Park	South Mountain	Boonsboro
		X			Landmark	Greystone Manor	640 Security Rd.	Hagerstown
				X	School	Hag. Mennonite Fellowship	12341 Huyett Ln.	Maugansville
		X			Building	Hagerman, William, Farmstead	7207 Dam #4 Rd.	Sharpsburg Area
		X			Building	Hagerstown Armory	328 N. Potomac St.	Hagerstown

WASHINGTON COUNTY ASSET INVENTORY								
Critical Facility	*Economic Asset*	*Historic Consideration*	*Special Consideration*	*Vulnerable Population*	*Asset Type*	*Name*	*Address*	*City*
				X	Higher Education	Hagerstown Business College	18618 Crestwood Dr.	Long Meadow
	X				Business	Hagerstown Business Park	Burhans Blvd.	Hagerstown
X					Infrastructure	Hagerstown Central Maint. Garage	425 E. Baltimore St.	Hagerstown
		X		X	School	Hagerstown Charity School	102 E. Washington St.	Hagerstown
				X	School	Hagerstown Children's School	22 N. Mulberry St.	Hagerstown
X		X			Government	Hagerstown City Hall	1 E. Franklin St.	Hagerstown
X					Government	Hagerstown City Hall Annex (Early 2024)	32 N. Potomac St.	Hagerstown
		X			District	Hagerstown City Park Historic District	Roughly bounded by W. Howard St., Guilford Ave., Memorial, S. Walnut St., and the Norfolk & Western RR Tracks	Hagerstown
		X			District	Hagerstown Commercial Core Historic District	Potomac, Washington, Franklin, Antietam, Summit and Jonathan Sts.	Hagerstown
				X	Higher Education	Hagerstown Community College	11400 Robinwood Dr.	Hagerstown
			X		Government	Hagerstown Department of Community and Economic Development	14 N. Potomac St.	Hagerstown
X					Infrastructure	Hagerstown Edgemont Reservoir	Warner Hollow Rd.	Smithsburg Area
X					Infrastructure	Hagerstown Electric Division	425 E. Baltimore St.	Hagerstown
X					Fire	Hagerstown Fire Dept.	25 W. Church St.	Hagerstown
		X			District	Hagerstown Historic District	Roughly bounded by Prospect and Canon Aves., Memorial Blvd. and the CSX RR tracks.	Hagerstown
	X				Business	Hagerstown Industrial Park	Frederick St.	Hagerstown

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Critical Facility	*Economic Asset*	*Historic Consideration*	*Special Consideration*	*Vulnerable Population*	*Asset Type*	*Name*	*Address*	*City*
			X		Government	Hagerstown Park & Rec.	351 N. Cleveland Ave.	Hagerstown
			X		Public Parks	Hagerstown Parks	Fairgrounds Park, City Park, Wheaton Park, University Plaza, Greens at Hamilton Run, Hager Park, Pangborn Park, Hellane Park, Funkhouser Park, Ridge Ave. Playground, Staley Park, Potterfield Pool, Mills Park, Long Meadows Park, Oswald Park, Bloom Park, Memorial Park, Geenawalt Park, Kiwanis Park, Terrapin Park, National Rd. Park, Hagerstown Cultural Trail	Hagerstown
X					Police	Hagerstown Police Auxiliary	309 Valley Rd.	Hagerstown
X		X			Police	Hagerstown Police HQ	50 N. Burhans Blvd.	Hagerstown
X		X			Police	Hagerstown Police Substation	32 W. Washington St.	Hagerstown
X					Police	Hagerstown Police Substation	Murph Ave.	Hagerstown
X					Police	Hagerstown Police Watch Center	14 N. Potomac St.	Hagerstown
		X	X		Post Office	Hagerstown Post Office	44 W. Franklin St.	Hagerstown
X					Government	Hagerstown Public Works	51 W. Memorial Blvd.	Hagerstown
X					Infrastructure	Hagerstown RC Willson WTP	10802 Water Works Rd.	Williamsport Area
X					Government	Hagerstown Water Division	51 W. Memorial Blvd.	Hagerstown
X					Infrastructure	Hagerstown Water Pump Stations	North at Short Rd., Pennsylvania Ave. at Orchard Hills, Hellane Park, Jefferson at Greendale Dr.	Hagerstown and Hagerstown Area
X					Infrastructure	Hagerstown Water Tanks	Hellane, Rock Willow, Park Ave., Mack Truck, Orchard Hills,	Hagerstown and Hagerstown Area

WASHINGTON COUNTY ASSET INVENTORY								
Critical Facility	*Economic Asset*	*Historic Consideration*	*Special Consideration*	*Vulnerable Population*	*Asset Type*	*Name*	*Address*	*City*
							Showalter, Henson, Smithsburg	
X					Infrastructure	Hagerstown WM Breichner WTP	Crystal Falls Dr.	Smithsburg Area
X					Infrastructure	Hagerstown WW Pump Stations	18 city locations and 7 outside city locations	Hagerstown and Hagerstown Area
X					Infrastructure	Hagerstown WWTP	1 Cleanwater Circle	Hagerstown
X					Fire	Halfway Co. 26	11114 Lincoln Ave.	Halfway
X					Fire	Halfway Fire Co.	11114 Lincoln Ave.	Halfway
				X	School	Hancock Elementary School	290 W. Main St.	Hancock
X					Fire	Hancock Fire Company 5	3 Fulton St.	Hancock
			X		Library	Hancock Library	220 Park Rd.	Hancock
				X	School	Hancock Middle and High School	289 W. Main St.	Hancock
			X		Museum	Hancock Museum	126 W. High St.	Hancock
X					Police	Hancock Police Department	126 W. High St.	Hancock
			X		Post Office	Hancock Post Office	210 N. Pennsylvania Ave.	Hancock
X					Fire	Hancock Rescue Company 59	6 E. Main St.	Hancock
X					Government	Hancock Town Hall	126 W. High St.	Hancock
X					Infrastructure	Hancock Transfer Station	Tonoloway Creek	Hancock
X					Infrastructure	Hancock WTP	Graves Dr.	Hancock
X					Infrastructure	Hancock WWTP	Tonoloway Creek	Hancock
		X			Building	Hays, Joseph C., House	103-105 W. Main St.	Sharpsburg
X					Fire	HazMat Response Team	17556 York Rd.	Halfway
				X	School	Heritage Academy	12215 Walnut Point Way	Williamsport
				X	School	Hickory Elementary School	11101 Hickory School Rd.	Halfway

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Critical Facility	*Economic Asset*	*Historic Consideration*	*Special Consideration*	*Vulnerable Population*	*Asset Type*	*Name*	*Address*	*City*
		X			Building	Highbarger, Jacob, House	201 W. Main St.	Sharpsburg
				X	School	Highland View Academy	10100 Academy Dr.	Mt. Aetna
		X			Building	Hills, Dales, and the Vineyard	16 Dogstreet Rd.	Keedysville
				X	School	Hillside Mennonite School	11610 Greencastle Pike	Williamsport
					Culture	Historic Walls (Main St. from Church to the National Cemetery)	N/A	Sharpsburg
		X			Building	Hitt's Mill and Houses	W of Keedysville off MD 34	Keedysville
		X			Building	Hoffman Farm	18651 Keedysville Rd.	Keedysville
		X			District	Hogmire-Berryman Farm	N of Spielman off MD 63	Spielman
				X	Nursing Home	Homewood Nursing Home	16107 Elliott Pkwy	Halfway
		X			Building	Houses at 16-22 East Lee St.	16-22 E. Lee St.	Hagerstown
		X			Building	Huckleberry Hall	Charles Mill Rd. W of jct. with MD 64	Leitersburg
	X				Business	Hunt Ridge Bus. Park	Near I-81 & Rt. 40 Int	Halfway
	X				Business	Hunters Green Bus. Center	North of I-70	Halfway
	X				Business	Hunters Green Business Center	Hunters Green Pkwy.	Williamsport
	X				Business	Huyetts Business Park	Greencastle Pike	Williamsport
				X	School	Huyetts Mennonite School	16404 National Pike	Williamsport
X					Fire	Independent Co. 3	100 Eastern Blvd. N.	Hagerstown
			X		Recreational	Indian Springs Wildlife Area	Fairview Mountain Area	Clear Spring
		X			Building	Ingram-Schipper Farm	N of Boonsboro	Boonsboro
	X				Business	Interstate Industrial Park	Governor Lane Blvd.	Williamsport
	X				Business	Jamison Railyard	W. of Hagerstown	Halfway
		X			Building	John Brown's Headquarters	Chestnut Grove Rd.	Samples Manor

WASHINGTON COUNTY ASSET INVENTORY								
Critical Facility	*Economic Asset*	*Historic Consideration*	*Special Consideration*	*Vulnerable Population*	*Asset Type*	*Name*	*Address*	*City*
				X	School	Jonathan Hager Elementary School	12615 Sedgwick Way	Hagerstown
		X			Building	Jonathan Hager House	19 Key St.	Hagerstown
				X	Higher Education	Kaplan University	18618 Crestwood Dr.	Long Meadow
		X			Building	Keedy House	NW of Boonsboro off U.S. 40A on Barnes Rd.	Boonsboro
X					Infrastructure	Keedysville Booster Pump Station	120 N. Main St.	Keedysville
			X	X	Community Center	Keedysville Community Center (Old School)	40 Mount Vernon Dr.	Keedysville
		X			District	Keedysville Historic District	Along Main St.	Keedysville
			X		Library	Keedysville Library	22 Taylor Dr.	Keedysville
			X		Post Office	Keedysville Post Office	21 S. Main St.	Keedysville
X					Government	Keedysville Town Hall	19 S. Main St.	Keedysville
X					Infrastructure	Keedysville Water Storage Tank	14 1/2 Appomattox Court	Keedysville
X					Infrastructure	Keedysville WTP	33 Mt. Hebron Rd.	Keedysville
		X			Building	Kefauver Place	20515 Park Hall Rd.	Rohrersville
	X				Business	Lakeside Corporate Center	Ritchie Rd.	Smithsburg
		X			Building	Lantz-Zeigler House	21000 Leitersburg Pike	Hagerstown Area
				X	School	Laurel Hill School	13210 Brook Lane Dr.	Leitersburg
		X			District	Lehman's Mill Historic District	Lehman's Mill Rd. between Marsh Pike and Marsh Run	Hagerstown Area
X					Fire	Leitersburg Co. 9	21431 Leiter St.	Leitersburg
		X			District	Leitersburg Historic District	Leitersburg-Smithsburg Rd., Leiter St., Leiter's Mill Rd., Ringgold St.	Leitersburg
		X			Landmark	Leonard Middlekauf House	1011 Pennsylvania Ave.	Hagerstown

WASHINGTON COUNTY ASSET INVENTORY								
Critical Facility	*Economic Asset*	*Historic Consideration*	*Special Consideration*	*Vulnerable Population*	*Asset Type*	*Name*	*Address*	*City*
	X				Business	Light Business Park	Cameo Dr.	Hagerstown
				X	School	Lincolnshire Elementary School	17545 Lincolnshire Rd.	Halfway
		X			Building	Long Meadows	N. of Hagerstown on Marsh Pike	Hagerstown Area
X					Fire	Longmeadow Co. 27	19307 Longmeadow Rd.	Long Meadow
X					Fire	Longmeadow FD	19307 Longmeadow Rd.	Hagerstown Area
				X	Nursing Home	Loyalton Nursing Home	20009 Rosebank Way	Hagerstown
		X			Building	Magnolia Plantation	NW of Knoxville off Sandy Hook Rd.	Knoxville
		X			Building	Mannheim	San Mar Rd.	Sanmar
		X			Building	Maples, The	2 mi. SW of Smithsburg on MD 66	Smithsburg
		X			Building	Marsh Mills	17426 and 17432 Spielman Rd.	Fairplay
				X	School	Marshall St. School/Job Development Program	1350 Marshall St.	Hagerstown
X					Government	Maryland Dept. of Social Services	122-128 N. Potomac St.	Hagerstown
X					Government	Maryland District Court	36 W. Antietam St.	Hagerstown
		X			Site	Maryland Heights, Spur Battery	Hoffmaster Rd.	Sandy Hook
X					Police	Maryland State Police	Col. Henry K Douglas Dr.	Hagerstown
		X	X		Building	Maryland Theatre Performing Arts Center	21 S. Potomac St.	Hagerstown
X					Fire	Maugansville Co. 19	13730 Maugansville Rd.	Maugansville
X					Fire	Maugansville Co. 35	18440 Showalter Rd.	Maugansville
X					Fire	Maugansville Goodwill Fire Co.	13729 Maugansville Rd.	Maugansville
			X		Post Office	Maugansville Post Office	13809 Maugansville Rd.	Maugansville
				X	School	Maugansville School	18023 Maugans Ave.	Maugansville

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Critical Facility	*Economic Asset*	*Historic Consideration*	*Special Consideration*	*Vulnerable Population*	*Asset Type*	*Name*	*Address*	*City*
		X			Building	McCauley, Henry, Farm	E. of Hagerstown on Mt. Aetna Rd.	Hagerstown Area
			X		Recreational	McCoys Ferry Boat Ramp	McCoys Ferry Rd.	Clear Spring
X			X		Government	MD VEIP	Washington St. W.	Halfway
X					Government	Md. Corr. Inst. Hagerstown	Roxbury Rd.	Fairplay
X					Government	Md. Corr. Training Center	18800 Roxbury Rd.	Fairplay
				X	Nursing Home	Mennonite Fellowship Home	12349 Huyett Ln.	Williamsport
				X	Nursing Home	Mennonite Old People's Home	13346 Maugansville Rd.	Maugansville
				X	Medical & Higher Education	Meritus Family Medicine & USMH	24 N. Walnut St.	Hagerstown
X					Medical	Meritus Medical Center	11116 Medical Campus Rd.	Hagerstown
X					Medical	Meritus Medical Center (Hospital)	1116 Medical Campus Rd.	Hagerstown Area
		X			Landmark	Middlekauf House	837 Concord St.	Hagerstown
	X				Business	MKS Business Park	Eastern Blvd.	Hagerstown
		X			Building	Mount Airy	MD 34	Sharpsburg Area
				X	School	Mt. Aetna 7th Day Adventist School	10207 Crystal Falls Dr.	Mt. Aetna
X					Fire	Mt. Aetna Co. 16	10305 Crystal Falls Dr.	Mt. Aetna
X					Infrastructure	Mt. Aetna WTP	Mt. Aetna	Mt. Aetna
X					Infrastructure	Mt. Aetna WTP	Greenbrier State Park	Mt. Aetna
			X		Recreational	Museum of History	Main St.	Boonsboro
X					Government	MVA	Col. Henry K Douglas Dr.	Hagerstown
			X		Post Office	N. Hagerstown Post Office	12912 Conamar Dr.	Hagerstown
	X				Business	Newgate Industrial Park	Near I-81 & Rt. 40 Int	Halfway
		X			Building	Nicodemus Mill Complex	20019 Nicodemus Mill Rd.	Keedysville

WASHINGTON COUNTY ASSET INVENTORY								
Critical Facility	*Economic Asset*	*Historic Consideration*	*Special Consideration*	*Vulnerable Population*	*Asset Type*	*Name*	*Address*	*City*
				X	School	N. Hagerstown High School	1200 Pennsylvania Ave.	Hagerstown
				X	School	Northern Middle School	701 Northern Ave.	Hagerstown
		X			District	Oak Hill Historic District	Roughly bounded by W. Irvin, Potomac, and Prospect Aves. and Forest Dr.	Hagerstown
				X	School	Oak Hill House	12806 Independence Rd.	Clear Spring
		X			Building	Old Forge Farm	E. of Hagerstown	Hagerstown Area
		X			Building	Old Washington County Library	21 Summit Ave.	Hagerstown
				X	School	Pangborn Elementary School	195 Pangborn Blvd.	Hagerstown
		X			Building	Paradise Manor	N. of Hagerstown at 2550 Paradise Dr.	Hagerstown Area
				X	School	Paradise Mennonite School	19308 Paradise Church Rd.	Long Meadow
				X	School	Paramount Elementary School	19410 Longmeadow Rd.	Long Meadow
X					Infrastructure	PE Electric Substations	Memorial Blvd., E. Wilson, Northern Ave., Eastern Blvd., Sterling Rd., Etc.	Hagerstown and Hagerstown Area
		X			Building	Piper House	200 E. Main St.	Sharpsburg
				X	School	Pleasant Valley Elementary School	1707 Rohrersville Rd.	Potomac Valley
		X			Building	Plumb Grove	12654 Broadfording Rd.	Clear Spring
		X			District	Potomac Broadway Historic District	Roughly, Potomac St. & Oak Hill Ave. from Franklin St. to Maple Ave. & North Ave. & Broadway from Park Pl. to Mulberry	Hagerstown
				X	School	Potomac Heights Elementary School	310 E. Magnolia Ave.	Hagerstown Area
X					Fire	Potomac Valley Co. 11	2202 Dargan School Rd.	Potomac Valley
		X			Building	Price-Miller House	131-135 W. Washington St.	Hagerstown

WASHINGTON COUNTY ASSET INVENTORY								
Critical Facility	*Economic Asset*	*Historic Consideration*	*Special Consideration*	*Vulnerable Population*	*Asset Type*	*Name*	*Address*	*City*
X					Infrastructure	R Paul Smith Power Station	15952 Lockwood Rd.	Williamsport
				X	Nursing Home	Reeders Memorial Home	141 S. Main St.	Boonsboro
X					Emergency Support Services	REHAB-Air Unit Rescue Co. 255	17556 York Rd.	Halfway
X					Fire	Rescue Co. 19	110 1/2 W. Chapline St.	Sharpsburg
X					Fire	Rescue Company #69 FD	7619 Old National Pike	Boonsboro
		X			Landmark	Ridenour's Folly	17514 W. Washington St.	Hagerstown
X					Medical	Robinwood Medical Center	11110 Medical Campus Rd.	Hagerstown
		X			Building	Rockland Farm	728 Antietam Dr.	Hagerstown Area
				X	School	Rockland Woods School	18201 Rockland Dr.	Fairplay
		X			Building	Rockledge	13535 Foxfire Ln.	Hagerstown Area
		X			Building	Rohrer House	11850 Indian Ln.	Hagerstown
			X		Recreational	Rohrersville Comm. Building	Rohrersville School Rd.	Rohrersville
			X		Post Office	Rohrersville Post Office	4314 Main St.	Rohrersville
		X			Building	Rose Hill	0.5 mi. S of Williamsport on MD 63	Williamsport
X					Government	Roxbury Corr. Inst	18701 Roxbury Rd.	Fairplay
				X	School	Ruth Anne Monroe Primary School	1311 Yale Dr.	Hagerstown Area
		X			Landmark	Sailor House	End of Dynasty Dr.	Hagerstown
				X	School	Salem Ave. Elementary School	1323 Salem Ave.	Hagerstown
				X	School	San Mar Childrens Home	8504 Mapleville Rd.	Boonsboro
		X			Building	Search Well	SE of Burtner on Manor Church Rd.	Burtner
			X		Government	SHA Maintenance Shop	Old National Pike	Boonsboro
			X		Recreational	Shafer Memorial Park	N/A	Boonsboro
X					Government	Sharpsburg Co. 1	110 W. Main St.	Sharpsburg

WASHINGTON COUNTY ASSET INVENTORY								
Critical Facility	*Economic Asset*	*Historic Consideration*	*Special Consideration*	*Vulnerable Population*	*Asset Type*	*Name*	*Address*	*City*
				X	School	Sharpsburg Elementary School	17525 Shepherdstown Pike	Sharpsburg Area
		X			District	Sharpsburg Historic District	E. and W., Chapline, Antietam, and High Sts., N. and S. Church, Main St., Mechanic, Hall, and Potomac Sts.	Sharpsburg
			X		Library	Sharpsburg Library	106 E. Main St.	Sharpsburg
			X		Post Office	Sharpsburg Post Office	118 E. Chapline St.	Sharpsburg
X					Government	Sharpsburg Town Hall	106 E. Main St.	Sharpsburg
X					Police	Sheriff & Detention Center	500 Western Md. Pkwy.	Halfway
				X	Medical	Shiningtree Childrens Home	21328 Mt. Aetna Rd.	Mt. Aetna
			X		Recreational	Sligo Adventist Camp	Girl Scout Rd.	Boonsboro
X					Infrastructure	Smithsburg Electric Substation	Ringgold	Smithsburg
				X	School	Smithsburg Elementary School	67 N. Main St.	Smithsburg
				X	School	Smithsburg High School	66 N. Main St.	Smithsburg
			X		Library	Smithsburg Library	66 W. Water St.	Smithsburg
				X	School	Smithsburg Middle School	68 N. Main St.	Smithsburg
X					Police	Smithsburg Police Department	63 Railroad Land	Smithsburg
			X		Post Office	Smithsburg Post Office	43 Grove Ln.	Smithsburg
X					Fire	Smithsburg Rescue Company 79	8 N. Maple Ave.	Smithsburg
X					Infrastructure	Smithsburg Sewer Pumping Station	Henrietta St.	Smithsburg
X					Infrastructure	Smithsburg Sewer Pumping Station	Chips Meadow	Smithsburg

WASHINGTON COUNTY ASSET INVENTORY								
Critical Facility	*Economic Asset*	*Historic Consideration*	*Special Consideration*	*Vulnerable Population*	*Asset Type*	*Name*	*Address*	*City*
X					Infrastructure	Smithsburg Sewer Pumping Station	E. School Ln.	Smithsburg
X					Infrastructure	Smithsburg Town Hall	21 W. Water St.	Smithsburg
X					Infrastructure	Smithsburg Water Pumping Station	66 W. Water St.	Smithsburg
X					Infrastructure	Smithsburg Water Tank	Federal Lookout Rd.	Smithsburg
		X			Building	Snively Farm	N of Eakles Mills on Mt. Briar Rd.	Eakles Mills
				X	Nursing Home	Somerford Nursing Home	10116 Sharpsburg Pike	Hagerstown
X					Fire	S. Hagerstown Co. 5	409 W. First St.	Hagerstown
				X	School	S. Hagerstown High School	1101 S. Potomac St.	Hagerstown
			X		Recreational	South Mountain State Park	South Mountain	Boonsboro
		X			District	S. Prospect St. Historic District	18-278 S. Prospect St.	Hagerstown
		X			Building	Sprechers Mill House	NE of Williamsport on Hopewell Rd.	Williamsport
X					Infrastructure	Spring House	33 Mt. Hebron Rd.	Keedysville
		X			Building	Springfield Farm	S of U.S. 11	Williamsport
				X	School	Springfield Middle School	334 Sunset Ave.	Williamsport
			X		Post Office	St. James Post Office	17619-B Lappens Rd.	Fairplay
				X	School	St. James School	17641 College Rd.	Fairplay
				X	School	St. Maria Goretti High School	18614 Crestwood Dr.	Hagerstown Area
		X			Building	St. Mark's Episcopal Church--Lappans	18313 Lappans Rd.	Boonsboro
				X	School	St. Mary Catholic School	218 W. Washington St.	Hagerstown
				X	School	Stone Bridge Academy	13200 Brook Lane Dr.	Leitersburg
X					Government	Storage Shed & Park Restrooms	Taylor Park - 22 Taylor Dr.	Keedysville
X					Infrastructure	Substation	Near Halfway	Halfway
X					Infrastructure	Substation	Near Reid	Long Meadow

WASHINGTON COUNTY ASSET INVENTORY								
Critical Facility	*Economic Asset*	*Historic Consideration*	*Special Consideration*	*Vulnerable Population*	*Asset Type*	*Name*	*Address*	*City*
X					Infrastructure	Substation 8	3417 Rohrersville Rd.	Rohrersville
		X			Building	Tammany	NE of Williamsport off US 11	Williamsport
		X		X	Higher Education	The Collegium	36 S. Potomac St., 32 W. Washington St., 92 W. Washington St.	Hagerstown
				X	School	The Early Childhood Program at Funkstown Elementary	23 Funkstown Rd.	Hagerstown
		X			Building	Tolson's Chapel	111 E. High St.	Sharpsburg
	X				Business	Top Flight Air Ind. Park	Showalter Rd.	Maugansville
X					Infrastructure	Transfer Station	Dargan Rd.	Potomac Valley
				X	School	Tri-State Christian Academy	7605 Old National Pike	Boonsboro
		X			Building	Trovinger Mill	3 mi. E. of Hagerstown on Trovinger Mill Rd. and Antietam Creek	Hagerstown Area
				X	School	Truth Christian Academy	41 Bryan Circle	Hagerstown
				X	Higher Education	U of Md. Exp. Farm	Sharpsburg Pike	Fairplay
X					Government	U.S. Ag. Dept. NRCS, SCD	1260 Maryland Ave.	Hagerstown
X					Government	U.S. Social Security Admin.	1258 Maryland Ave.	Hagerstown
		X		X	Higher Education	University System of Maryland Center at Hagerstown (USMH)	32 W. Washington St.	Hagerstown
		X			Building	Valentia	S. of Hagerstown on Poffenberger Rd. off MD 65	Hagerstown Area
		X			Landmark	Verdant Mead	12810 Shank Farm Way	Hagerstown
				X	Nursing Home	Village at Robinwood Nursing Home	19800 Tranquility Circle	Hagerstown
				X	Higher Education	Washington Co. Ag. Ed. Center	7303 Sharpsburg Pike	Fairplay
X					Infrastructure	Washington Co. Airport	18434 Showalter Rd.	Maugansville
X					Fire	Washington Co. Airport Squad	18434 Showalter Rd.	Maugansville

WASHINGTON COUNTY ASSET INVENTORY								
Critical Facility	*Economic Asset*	*Historic Consideration*	*Special Consideration*	*Vulnerable Population*	*Asset Type*	*Name*	*Address*	*City*
	X				Business	Washington Co. Bus. Air Park	Air Park Rd.	Maugansville
	X				Business	Washington Co. Bus. Park	Near I-81 & Rt. 40 Int	Halfway
			X		Library	Washington Co. Free Library	100 S. Potomac St.	Hagerstown
				X	School	Washington Co. Tech. School	50 W. Oak Ridge Dr.	Hagerstown
	X		X		Government	Washington County Board of Education	820 Commonwealth Ave.	Hagerstown
			X		Government	Washington County Board of Education	10435 Downsville Pike	Hagerstown Area
X					Infrastructure	Washington County Landfill	Landfill Rd.	Maugansville
			X		Recreational	Washington Mon. State Park	South Mountain	Boonsboro
		X			Structure	Washington Monument	Washington Monument State Park	Boonsboro
X					Infrastructure	Water Transfer Station	Near Rt. 34	Sharpsburg
	X				Business	Wesel Blvd. Industrial Park	Wesel Blvd.	Hagerstown
X					Fire	Western Enterprise Co. 4	526 Washington Square	Hagerstown
				X	School	Western Heights Middle School	1300 Marshall St.	Hagerstown
X					Medical	Western Maryland Hospital	1500 Pennsylvania Ave.	Hagerstown
			X		Recreational	Western Maryland Rail Trail	North Bank Potomac River	Clear Spring
		X			Structure	Western Maryland Railway Steam Locomotive No. 202	City Park	Hagerstown
				X	Nursing Home	Wilhelm Assisted Living	1205 Kuhn Ave.	Hagerstown
X					Government	Williamsport City Hall	2 N. Conococheague St.	Williamsport
				X	School	Williamsport Elementary School	1 S. Clifton Dr.	Williamsport

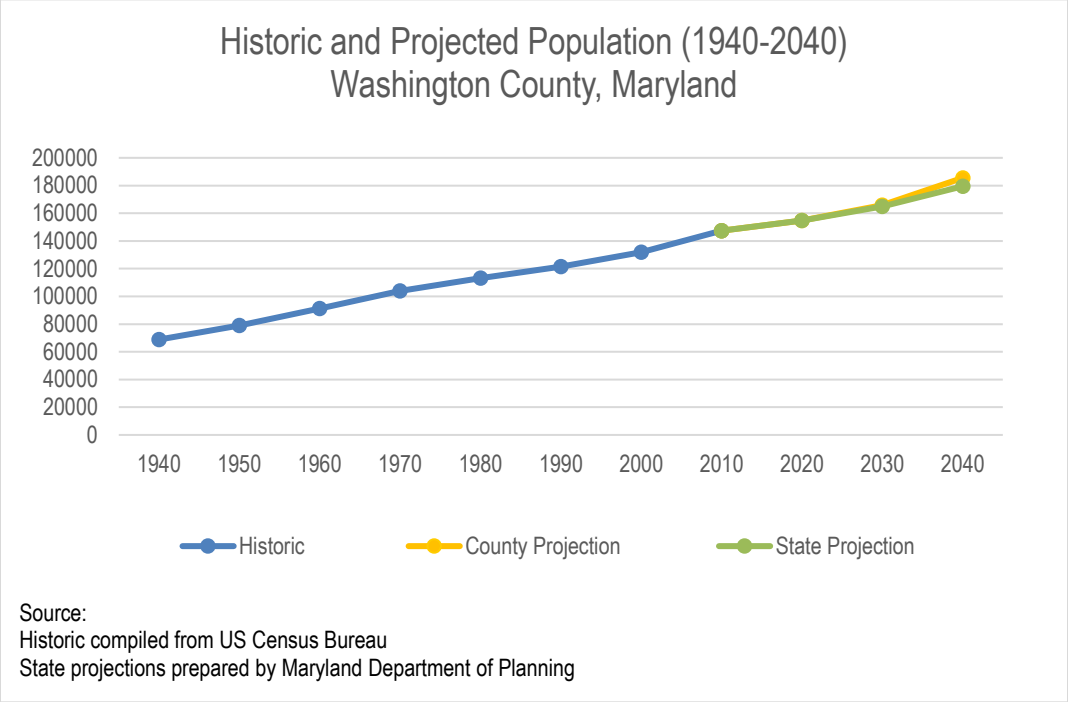
WASHINGTON COUNTY ASSET INVENTORY								
Critical Facility	*Economic Asset*	*Historic Consideration*	*Special Consideration*	*Vulnerable Population*	*Asset Type*	*Name*	*Address*	*City*
				X	School	Williamsport High School	5 S. Clifton Dr.	Williamsport
		X			District	Williamsport Historic District	Roughly bounded by C&O Canal, Conococheague Cr., Springfield Ln., and W. Frederick St.	Williamsport
			X		Library	Williamsport Library	104 E. Potomac St.	Williamsport
X					Police	Williamsport Police	2 N. Conococheague St.	Williamsport
			X		Post Office	Williamsport Post Office	28 W. Salisbury St.	Williamsport
				X	Nursing Home	Williamsport Retirement Village	154 N. Artizan Ave.	Williamsport
X					Fire	Williamsport VFD & EMS	2 Brandy Dr.	Williamsport
X					Infrastructure	Williamsport Water and Sewer	16232 Elliott Pkwy.	Williamsport
		X			Building	Willows, The	SW of Cavetown on MD 66	Cavetown
		X			Building	Wilson School	Rufus Wilson Rd.	Clear Spring
		X			Building	Wilson, Rufus, Complex	14293 Rufus Wilson Rd.	Clear Spring
		X			Building	Wilson-Miller Farm	SE of Sharpsburg	Sharpsburg Area
		X			Structure	Wilson's Bridge	U.S. 40	Hagerstown Area
		X			Building	Woburn Manor	7661 Dam #4 Rd.	Sharpsburg Area
X					Infrastructure	WTP	Martins Crossroads	Maugansville
X					Infrastructure	WTP	Sandy Hook	Potomac Valley
X					Infrastructure	WTP	Elk Ridge	Potomac Valley
X					Infrastructure	WTP	Weverton	Potomac Valley
X					Infrastructure	WTP	Snyders Landing	Sharpsburg Area
X					Infrastructure	WTP	Keedysville	Sharpsburg Area
X					Infrastructure	WTP (Hagerstown)	Edgemont Reservoir	Smithsburg
X					Infrastructure	WWTP	MCI	Fairplay
X					Infrastructure	WWTP	Sandy Hook	Potomac Valley
X					Infrastructure	WWTP	Harpers Ferry Rd.	Sharpsburg Area
X					Infrastructure	WWTP	Keedysville	Sharpsburg Area

WASHINGTON COUNTY ASSET INVENTORY								
Critical Facility	*Economic Asset*	*Historic Consideration*	*Special Consideration*	*Vulnerable Population*	*Asset Type*	*Name*	*Address*	*City*
X					Infrastructure	WWTP (Washington Co. DEM)	Little Grove Creek	Smithsburg

Development and Other Trends

§201.6(c)(2)(ii)(C)	[The plan should describe vulnerability in terms of] providing a general discussion of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.

This section will examine three primary types of development trends: population, residential (i.e., housing), and business (i.e., commercial/industrial). The Washington County Planning and Zoning Department maintains population projections for the county. The following table, compiled by Planning & Zoning (2021), depicts the historic and projected population of the county for the 100-year period, 1940-2040.



Source:
Historic compiled from US Census Bureau
State projections prepared by Maryland Department of Planning

County estimates out-pace state population projections. Starting with a population of 154,705, Washington County predicts a 2030 population of 165,884 (compared to the Maryland Department of Planning's 164,900). For 2040, the county is planning for a population of 185,509, while the state's estimate is 179,450.

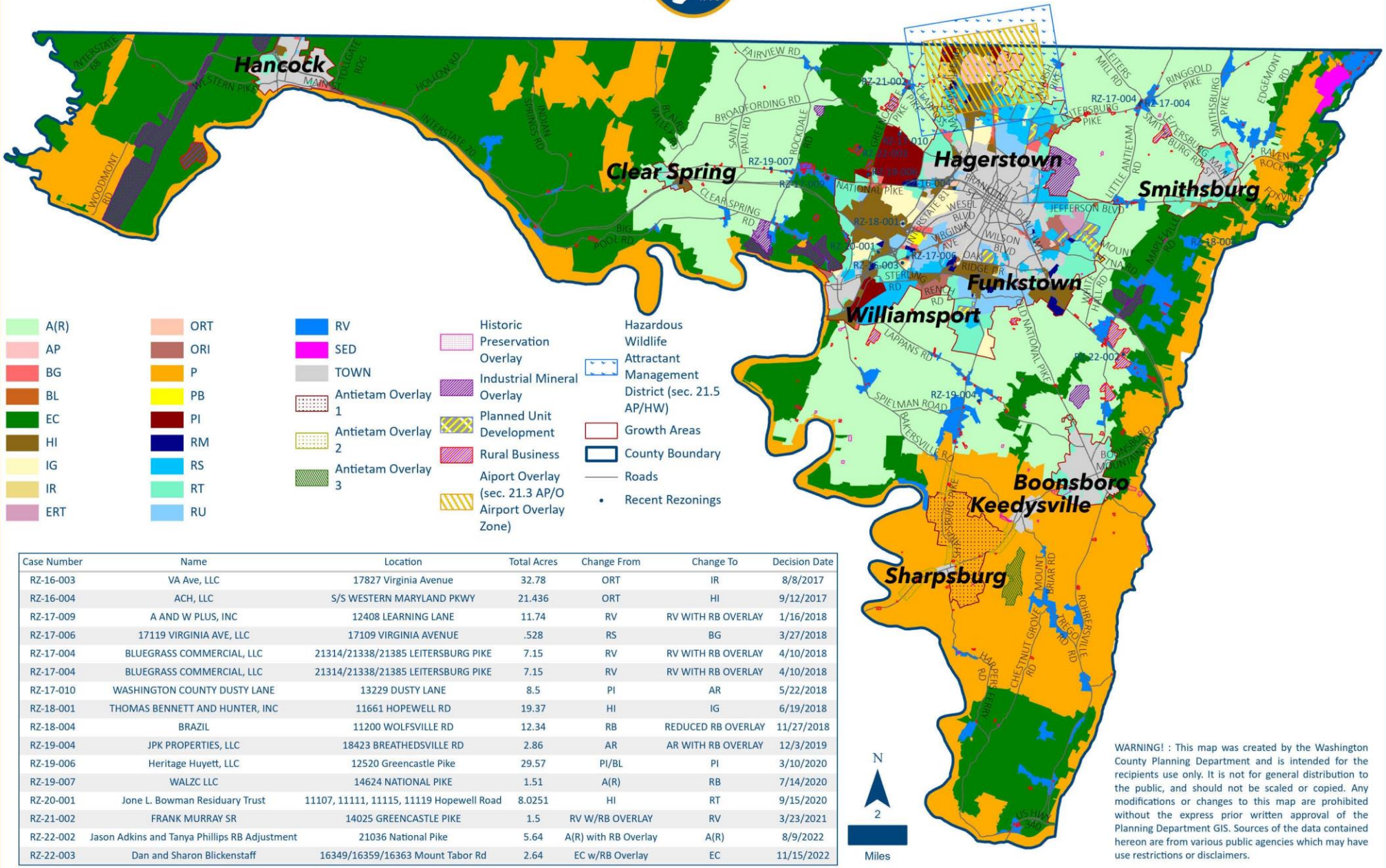
Perhaps intuitively, the number of households and housing units will climb with population increases. The following table lists estimated increases in households, housing units, and housing vacancies (Washington County Planning & Zoning, 2021).

WASHINGTON COUNTY PROJECTIONS (HOUSING)					
Category	*2020*	*2025*	*2030*	*2035*	*2040*
Households	60,445	65,796	71,625	77,954	84,847
Housing Units	63,862	69,515	75,674	82,360	89,643
Housing Vacancy	3,417	3,719	4,049	4,406	4,796

To begin examining residential and business development, the following map shows the current zoning of the county. The second map that follows shows "growth areas," which appear with maroon outlines, and these are the areas targeted for development. Areas outside of the designated growth areas are "significantly down-zoned" (J. Baker, personal communication, April 19, 2023), and as such, typically see single-family residential development or small commercial developments along major thoroughfares. These designations appear to be important to Washington County's residents, particularly in the southeastern areas of the county. The public survey that solicited input for this plan included several comments about a desire for responsible development.

Washington County, Maryland

Current Zoning

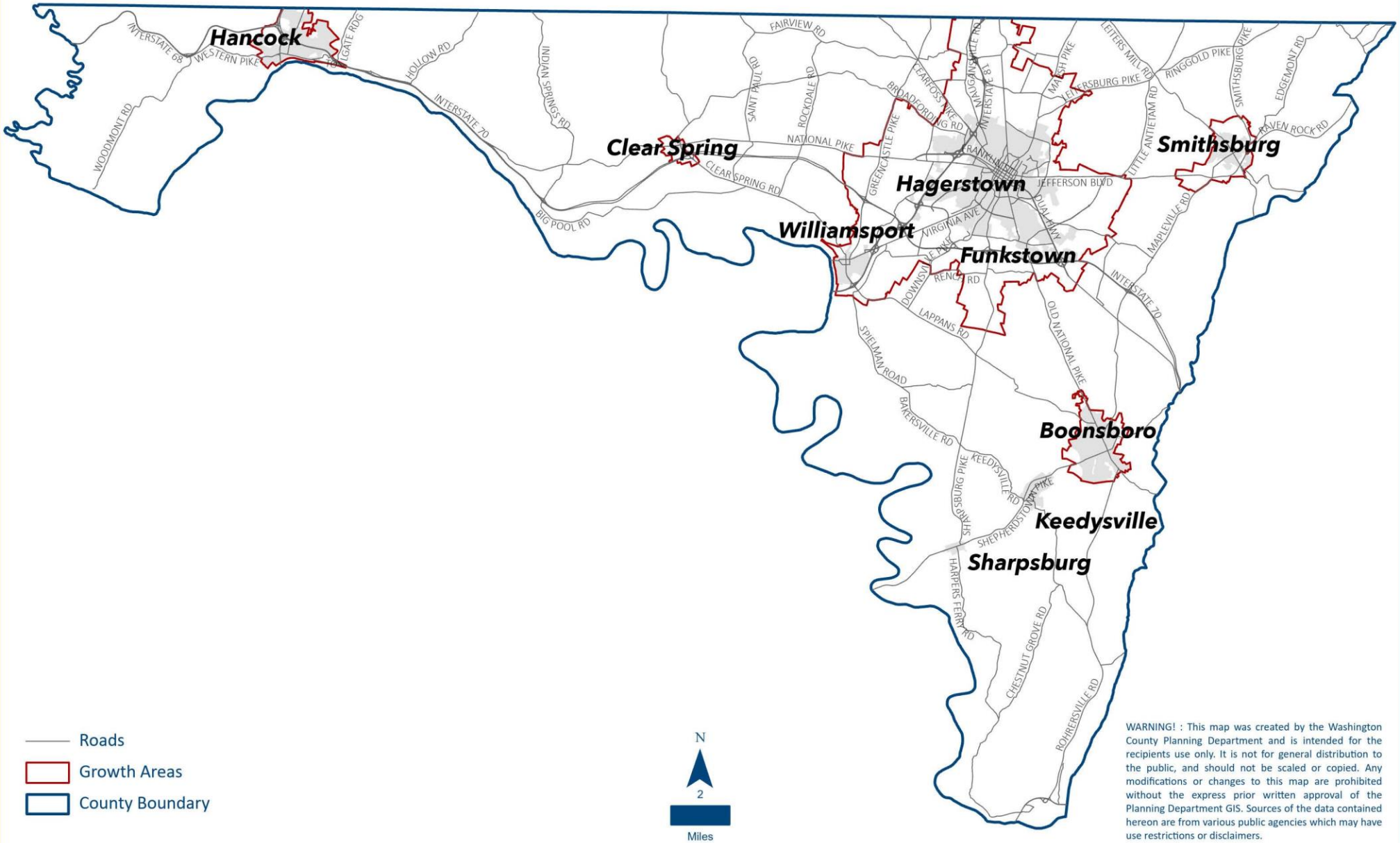


Case Number	Name	Location	Total Acres	Change From	Change To	Decision Date
RZ-16-003	VA Ave, LLC	17827 Virginia Avenue	32.78	ORT	IR	8/8/2017
RZ-16-004	ACH, LLC	S/S WESTERN MARYLAND PKWY	21.436	ORT	HI	9/12/2017
RZ-17-009	A AND W PLUS, INC	12408 LEARNING LANE	11.74	RV	RV WITH RB OVERLAY	1/16/2018
RZ-17-006	17119 VIRGINIA AVE, LLC	17109 VIRGINIA AVENUE	.528	RS	BG	3/27/2018
RZ-17-004	BLUEGRASS COMMERCIAL, LLC	21314/21338/21385 LEITERSBURG PIKE	7.15	RV	RV WITH RB OVERLAY	4/10/2018
RZ-17-004	BLUEGRASS COMMERCIAL, LLC	21314/21338/21385 LEITERSBURG PIKE	7.15	RV	RV WITH RB OVERLAY	4/10/2018
RZ-17-010	WASHINGTON COUNTY DUSTY LANE	13229 DUSTY LANE	8.5	PI	AR	5/22/2018
RZ-18-001	THOMAS BENNETT AND HUNTER, INC	11661 HOPEWELL RD	19.37	HI	IG	6/19/2018
RZ-18-004	BRAZIL	11200 WOLFSVILLE RD	12.34	RB	REDUCED RB OVERLAY	11/27/2018
RZ-19-004	JPK PROPERTIES, LLC	18423 BREATHEDSVILLE RD	2.86	AR	AR WITH RB OVERLAY	12/3/2019
RZ-19-006	Heritage Huyett, LLC	12520 Greencastle Pike	29.57	PI/BL	PI	3/10/2020
RZ-19-007	WALZC LLC	14624 NATIONAL PIKE	1.51	A(R)	RB	7/14/2020
RZ-20-001	Jone L. Bowman Residuary Trust	11107, 11111, 11115, 11119 Hopewell Road	8.0251	HI	RT	9/15/2020
RZ-21-002	FRANK MURRAY SR	14025 GREENCASTLE PIKE	1.5	RV W/RB OVERLAY	RV	3/23/2021
RZ-22-002	Jason Adkins and Tanya Phillips RB Adjustment	21036 National Pike	5.64	A(R) with RB Overlay	A(R)	8/9/2022
RZ-22-003	Dan and Sharon Blickenstaff	16349/16359/16363 Mount Tabor Rd	2.64	EC w/RB Overlay	EC	11/15/2022

Path: S:\Policy\Zone\Zone\Zone.aprx

Washington County, Maryland

Growth Areas



Roads

Growth Areas

County Boundary

N

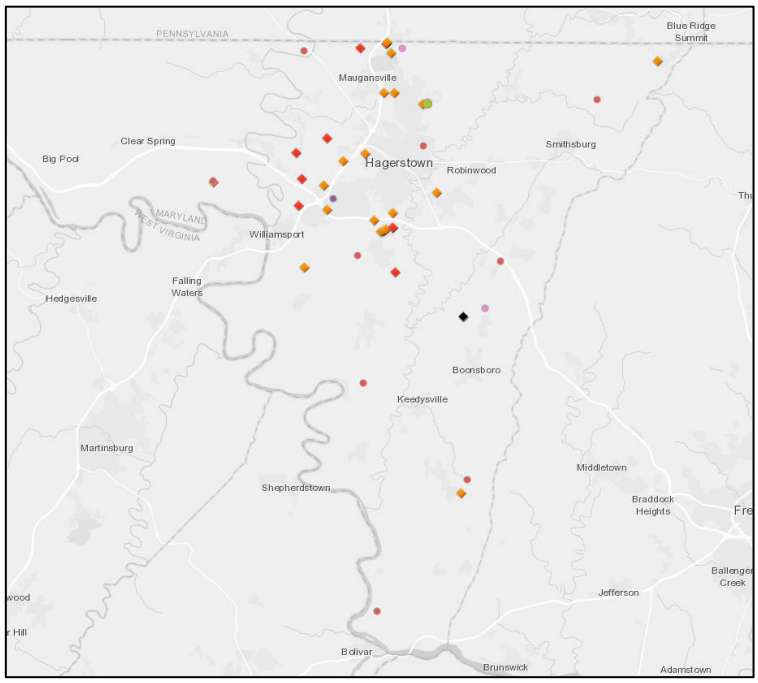
2

Miles

WARNING! : This map was created by the Washington County Planning Department and is intended for the recipients use only. It is not for general distribution to the public, and should not be scaled or copied. Any modifications or changes to this map are prohibited without the express prior written approval of the Planning Department GIS. Sources of the data contained hereon are from various public agencies which may have use restrictions or disclaimers.

Path: S:\Policy\Zone\Zone\Zone.aprx

The planning department also makes available a "development tracker" map via its website (see image, at right). In-process residential developments are occurring largely within the areas identified by the preceding zoning map, though there are single family developments in the southern areas of the county. The red circles in the image at right represent single family developments, while the green circle is a "planned unit development," the pink circles near the airport and north of Boonsboro are mixed type developments, and the purple circle near the I-70/I-81 interchange is a town house development.

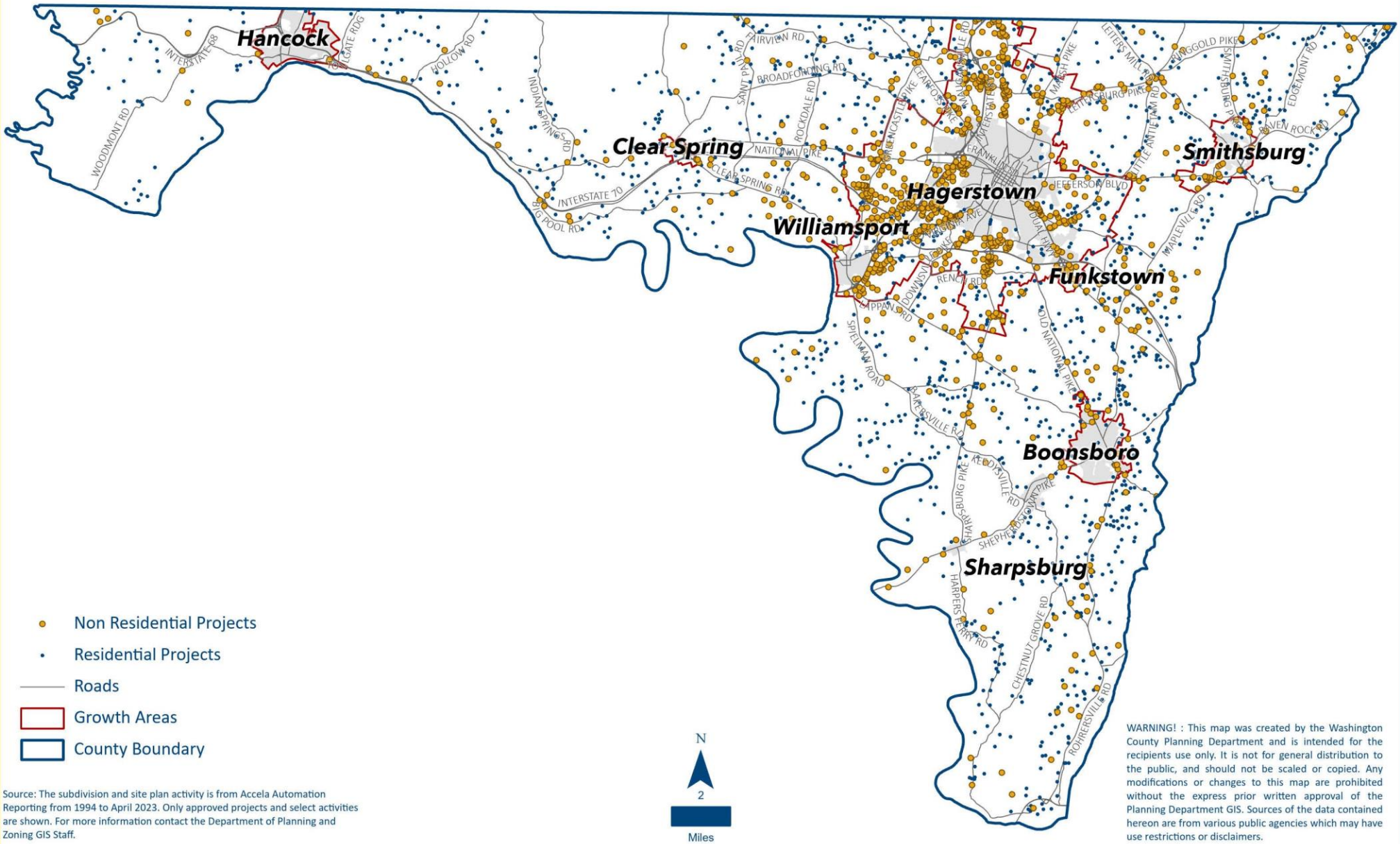


In-progress non-residential developments also follow the preceding zoning map, with numerous commercial developments (the orange diamonds in the image above) along the I-70 and I-81 corridors. Industrial developments (the red diamond shapes) are also near the interstates, with most of them being west of I-81.

The map below is a more comprehensive version of the county's development tracker map, showing subdivision and site plan activity between 1994 and April 2023. Though this map shows considerable development, particularly residential development, outside of growth areas, it demonstrates the concentration of development in municipal areas (which later become the growth areas).

Washington County, Maryland

Development Activity



- Non Residential Projects
- Residential Projects
- Roads
- Growth Areas
- County Boundary

N

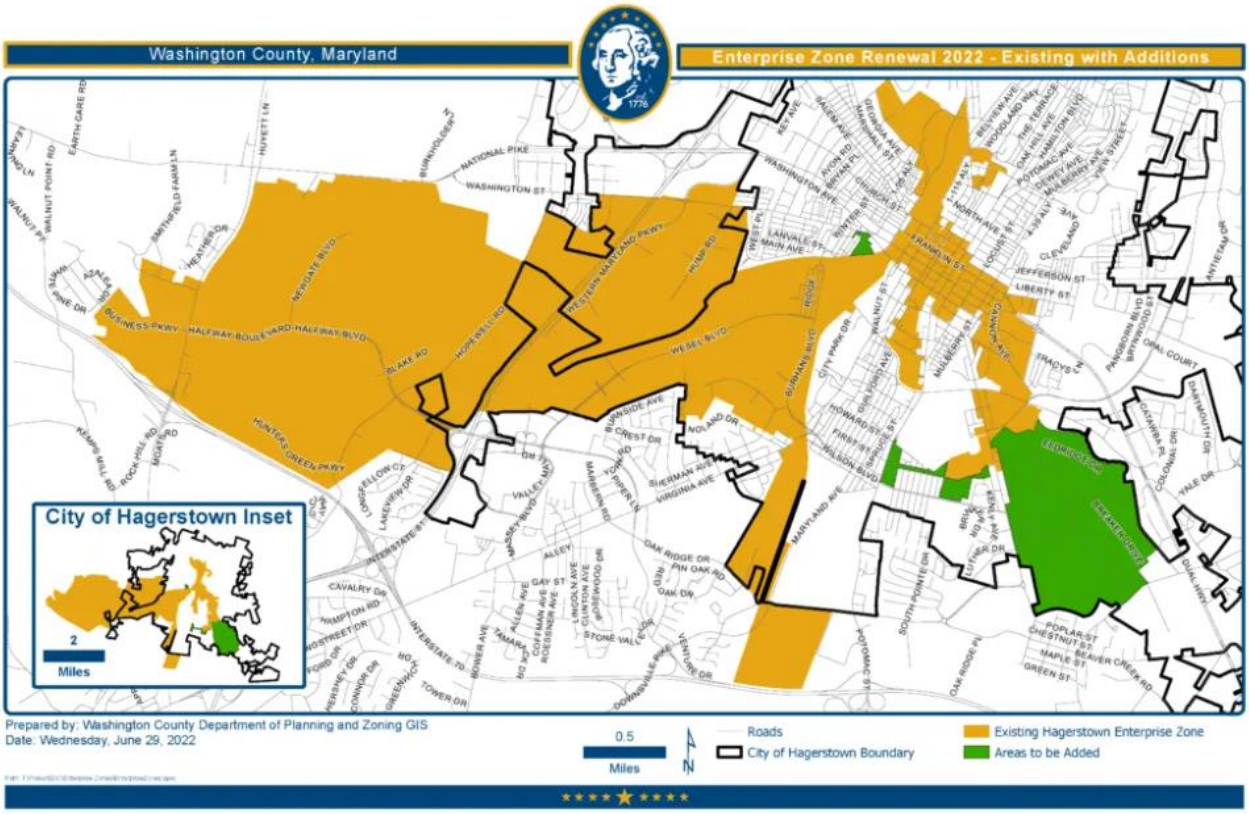
2

Miles

Source: The subdivision and site plan activity is from Accela Automation Reporting from 1994 to April 2023. Only approved projects and select activities are shown. For more information contact the Department of Planning and Zoning GIS Staff.

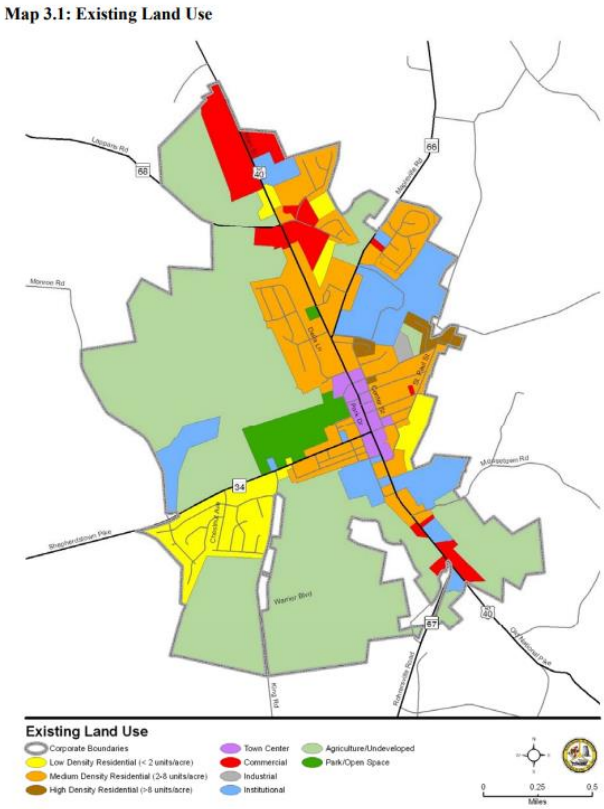
Path: S:\Policy\Zone\Zone\Zone.aprx

The Washington County Department of Business Development administers an "enterprise zone" to attract businesses to the area. The program provides qualifying businesses with state income tax credits and local real property tax credits in return for capital investments and job creation. The following graphic shows the location of the enterprise zone (Washington County Government, Department of Business Development, n.d.), with the gold areas the existing zone and the green areas those to be added.

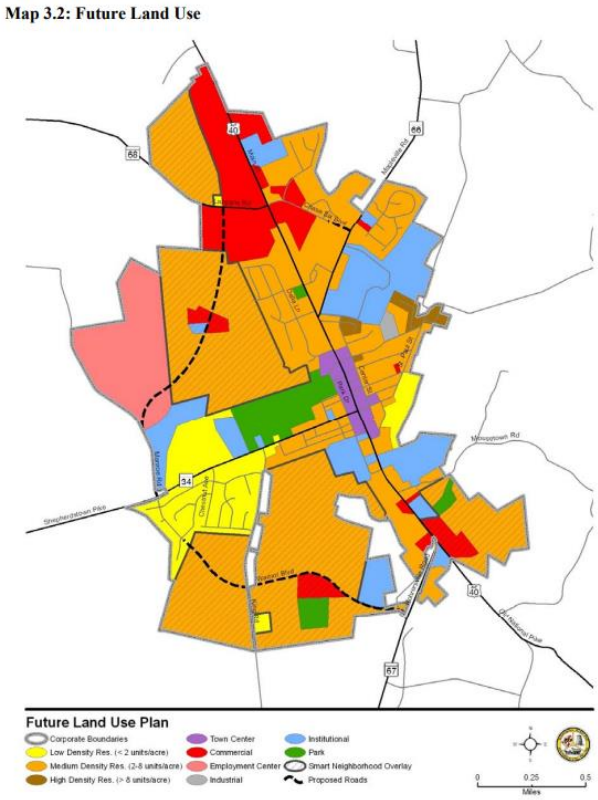


The municipalities in Washington County also maintain comprehensive plans that identify goals for development and often depict those areas graphically. (Planners included graphics from those plans for reference, though the resolution of the images varies. Readers should refer directly to these comprehensive plans for additional information.) Boonsboro's 2009 comprehensive plan depicts both existing and future land use as shown below (Boonsboro, Town of, 2009). That plan shows existing agricultural areas, primarily on the west side of town (i.e., light green on the left-hand image), migrating toward low density residential (yellow on the right-hand graphic) and medium density residential (orange on the right-hand graphic).

Existing Land Use (Boonsboro)



Future Land Use (Boonsboro)



Clear Spring's most recent available comprehensive plan is from 1995, and it referenced a "town growth plan" study. That document identified most of the town's area as residential with interspersed light commercial. The plan identified areas adjacent to Interstate 70 near the SR 68 interchange as those to be considered by the growth study as potential commercial areas (Clear Spring, Town of, 1995). Funkstown's 2005 comprehensive plan notes that the town's land use pattern is unlikely to change, but the areas adjacent to the town will likely see continued development from the larger Hagerstown area (Funkstown Planning Commission, 2005). Notably, Funkstown, along with Hagerstown and Williamsport, is in the "urban growth area" in central Washington County.

Hagerstown's 2018 plan, *Vision Hagerstown 2035*, considers growth management and land use extensively. It analyzes land capacity within the city and the Hagerstown Urban Growth Area and identifies a medium-range growth area (MRGA) to guide annexation plans and utility

investments. The image at right shows the MRGA, with the hatched areas being annexation incentive areas. The city's plan also notes the benefits of revitalizing and strengthening its downtown core (Hagerstown Planning Commission, 2018).

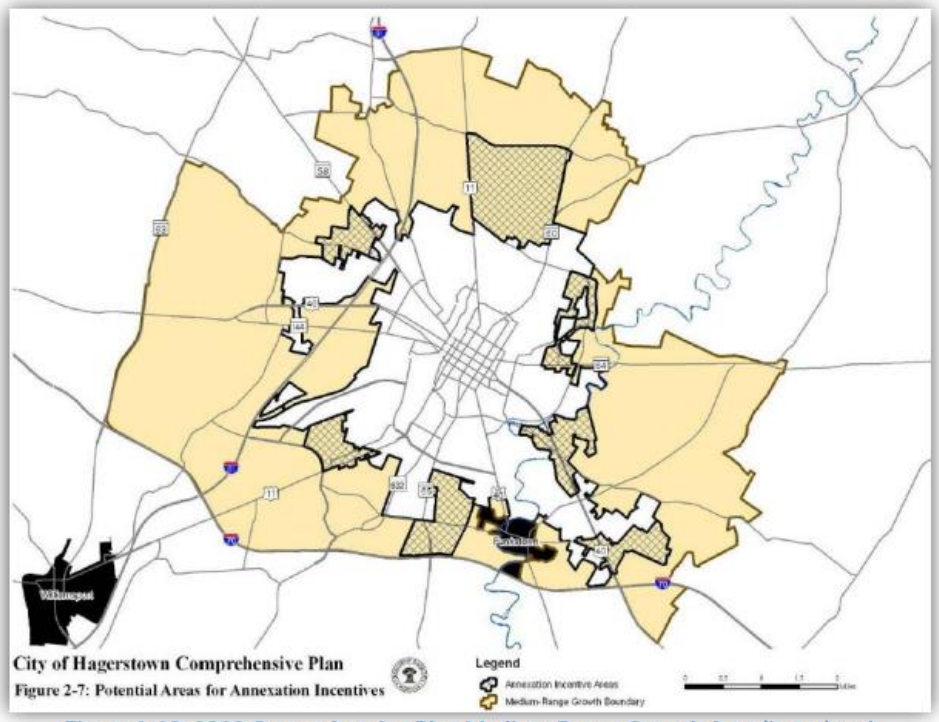
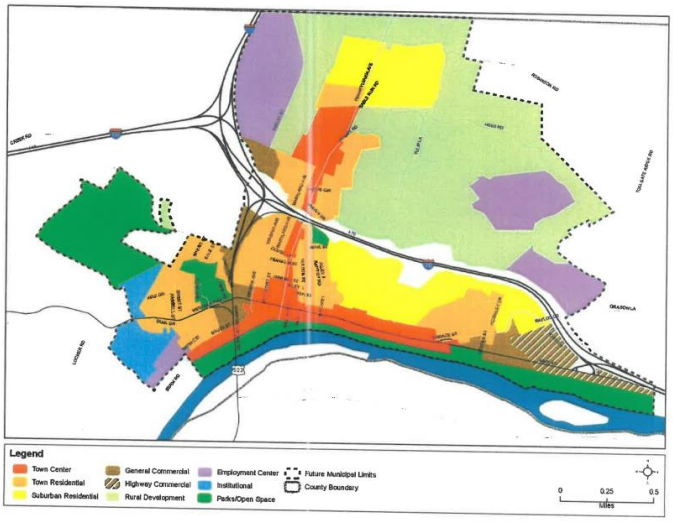
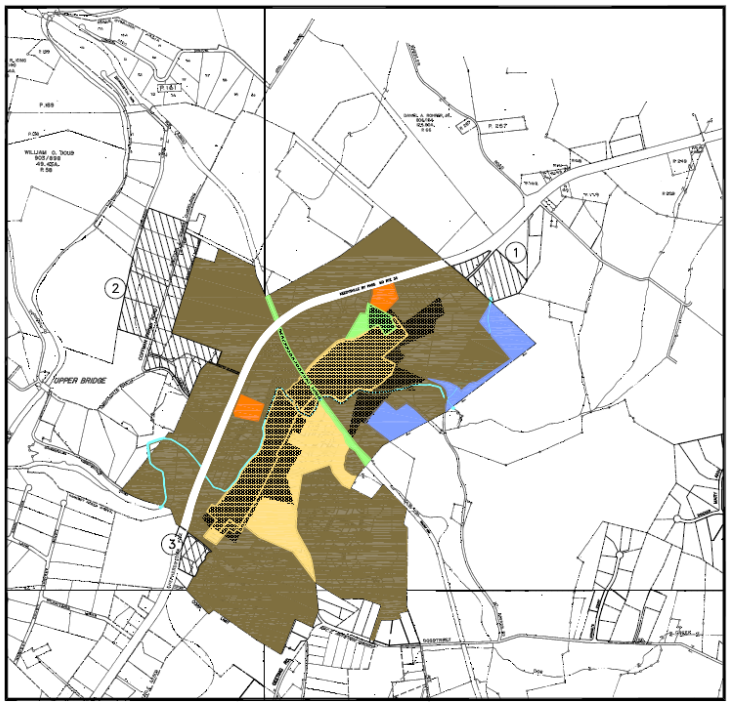


Figure 1-19: 2008 Comprehensive Plan Medium-Range Growth Area (in tan) and Annexation Incentive Areas (black hatched)

Hancock's 2010 comprehensive plan includes a graphic for potential future land uses (see below), though the town recognizes that much of its existing developable areas within the town center are in the special flood hazard area (SFHA) (M. Faith, personal communication, April 25, 2023). There are employment center areas designated accessible by I-70, though most areas (i.e., the yellow and orange areas) appear as residential (Hancock Planning Commission, 2010).



For Keedysville, the town's 2010 plan shows most land uses as low- and medium-density residential (i.e., brown and yellow). There are some agricultural and rural legacy areas (i.e., blue) in the northeastern portion of the corporate limits and small commercial areas (i.e., orange) just south of Shepherdstown Pike. Targeted annexation areas are on the western side of town, as denoted by the hatched areas in the graphic below (Keedysville Planning Commission, 2010).



Sharpsburg's 2016 plan identifies the town as a "small, compact residential community" (pp. 32 & 34), with commercial properties occupying about 3% of the land area (Sharpsburg, Town of, 2016, p. 32). Smithsburg's 2012 plan notes that annexation will be likely to accommodate expected population growth, with residential growth throughout town and limited commercial growth along the SR 64 corridor (Smithsburg, Town of, 2012). Williamsport's 2010 plan, like the other municipal plans, considers annexation and growth, noting that the potential for annexation is typically northward (Williamsport, Town of, 2010). Williamsport, as noted earlier, lies within the urban growth area in the central portion of the county.

1.0 INTRODUCTION

1.3 Capabilities

§201.6(b)(3)	Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.
§201.6(c)(4)(ii)	[This plan shall include a] process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.

This section discusses the capabilities present within Washington County that can support risk reduction. The county and the municipalities within the county have many resources to implement mitigation activities, including complementary plans, development ordinances, available state and federal funding sources, and various materials to support educational outreach. These resources facilitate community resilience by supporting actions before, during, and after hazard occurrences.

This section builds on survey information collected in 2017/2018 that looked at similar capability categories: planning and regulatory, administrative and technical, financial, and political. Process-wise, there were no changes to the capability assessment from 2018 (i.e., planners used the same survey questions for the 2023 update). Since the 2023 update only includes the second iteration of this survey, it is difficult to denote trends despite having comparable data sets. The narrative below will compare the results of the survey from 2018 with this update to identify the initial context for future trends.

Capability Assessment Findings

This section presents the findings of the capability assessment; the table below summarizes the capabilities by municipality. Data sources for the summary included the self-assessment survey responses as well as web-based searches for existing ordinances.

JURISDICTIONAL CAPABILITIES (SUMMARY)								
Jurisdiction	*Planning Body / Commission*	*Comprehensive Plan*	*NFIP*[1]	*Building Codes*	*Zoning Ordinance*	*SALDOs*	*Capital Budget*[2]	*Public Works Budget*[2]
Washington County	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**N/A**	**N/A**
Boonsboro, Town of	YES	YES	YES	YES	YES	YES	YES	N/A
Clear Spring, Town of	YES	YES	YES	NO	YES	NO	N/A	N/A
Funkstown, Town of	YES	YES	YES	NO	YES	NO	NO	NO
Hagerstown, City of	YES	YES	YES	YES	YES	YES	YES	NO
Hancock, Town of	YES	YES	YES	YES	YES	YES	YES	YES
Keedysville, Town of	YES	YES	YES	YES	YES	YES	YES	YES
Sharpsburg, Town of	YES	YES	YES	YES	YES	YES	NO	NO
Smithsburg, Town of	YES	YES	YES	YES	YES	YES	YES	YES
Williamsport, Town of	YES	YES	YES	YES	YES	YES	NO	NO

Eight jurisdictions (80.00%) took the survey. In addition to questions about specific codes and ordinances, the survey asked respondents to generally rank their jurisdiction's capabilities under four headings: (a) planning and regulatory, (b) administrative and technical, (c) financial, and (d) political. The following table depicts the results.

SELF-ASSESSMENT: GENERAL CAPABILITIES									
	Low			*Moderate*			*High*		
Capability	**2018**	**2023**	**CH.**	**2018**	**2023**	**CH.**	**2018**	**2023**	**CH.**
Planning & Regulatory	22%	13%	**- 41%**	33%	63%	**91%**	44%	25%	**- 43%**
Administrative & Technical	44%	25%	**- 43%**	33%	13%	**- 61%**	22%	63%	**186%**
Financial	56%	13%	**- 77%**	44%	38%	**- 14%**	0%	50%	**N/A**
Political	22%	25%	**14%**	78%	38%	**- 51%**	0%	38%	**N/A**

Self-assessment respondents indicated that the administrative and technical capability is the most developed in Washington County, and it is interesting to note the change in opinion regarding that capability. For the administrative and technical, financial, and political categories, a substantially higher percentage of respondents stated a high capability than in 2018, which suggests that capabilities are increasing. However, the perceived capability within the planning and regulatory capability fell. Complementary plans, considered generally, remained consistent with those available in 2018. While that is a positive sign, planners noted that only two

[1] See Section 2.2.5: Flooding for additional information on the NFIP.
[2] Listed as "N/A" unless the jurisdiction specifically noted the availability (or unavailability) of funds in either budget.

comprehensive plans had been updated since 2018. Planners further recognized that the planning/regulatory capability did not swing from "high" to "low" but instead saw a significant increase in the "moderate" category. A reasonable assumption could be that respondents viewed the existing comprehensive plans as not unviable but simply in need of an update.

Another section of the self-assessment survey asked respondents to rank six potential mitigation projects by how willing they felt their jurisdiction would be to implement them. The two sample projects targeting regulations saw the "very much unwilling" and "unwilling" responses increase. Together, these responses suggest that the perceived benefit of development regulations is declining.

Finally, the most striking finding of the self-assessment is the increase in the respondents indicating a high financial capability for their jurisdictions. Though there could be several reasons for this increase (e.g., the successful implementation of several acquisition projects could lead respondents to recognize the grant sources funding those projects as more readily available, the visibility of the press surrounding the reasonably new Building Resilient Infrastructure in Communities [BRIC] program, etc.), the most likely reason would be the access to the American Rescue Plan Act (ARPA) funding following the COVID-19 pandemic. Several municipalities pointed to their use of ARPA funds for infrastructure projects as complementary to hazard mitigation. Another contributing variable could be a growing understanding of the types of complementary projects (e.g., stormwater management, utility system maintenance and upgrades, etc.) that can support risk reduction.

Planning and Regulatory Capability

Several planning commissions serve the jurisdictions in Washington County. These commissions support general community planning within their designated jurisdictions. Miscellaneous powers and duties (Md. Land Use Code Ann. §2-105) include (but may not be limited to) the following.

- Promote planning
- Enter on any land and make examinations and surveys
- Accept and use gifts and public or private grants for the performance of the commission’s functions (i.e., planning activities)
- Enact, adopt, amend, and execute a comprehensive plan
- Adopt zoning regulations to control street congestion; promote health, public safety, and general welfare; provide adequate light and air; promote the conservation of natural resources; prevent environmental pollution; properly manage growth and development;

and promote or facilitate adequate transportation, water, sewerage, schools, recreation, parks, and other public facilities

- Recommend subdivision regulations to the legislative body
- Support the preservation of historic structures

Though the planning commissions do not directly coordinate hazard mitigation planning in Washington County, their responsibilities for coordinating community-level planning make them valuable resources for creating actionable mitigation strategies.

COMPREHENSIVE PLANS

Comprehensive plans promote sound land use and regional cooperation among local governments to address planning issues. These plans serve as the official policy guide for influencing the location, type, and extent of future development by establishing the fundamental decision-making and review processes on zoning matters, subdivision and land development, land uses, public facilities, and housing needs over time. Despite minor updates at various intervals, the existing countywide comprehensive plan for Washington County was adopted in 2002. (It is currently under full review and will be re-written before the 2028 mitigation plan update.) It includes some goals and objectives that promote mitigation activities. The county plan complies with the Maryland Economic Growth, Resource Protection, and Planning Act of 1992. The Act requires each county to address visions that, in large part, promote hazard mitigation through land use regulation. These visions concentrate development in suitable areas having existing or planned water and sewer service, protect sensitive areas, including 100-year floodplains and steep slopes, and direct growth to existing population centers. For additional information, see the development trends discussion (specifically "growth areas").

The comprehensive plan goals include measures designed to meet the visions. These measures include the provision of adequate environmental safeguards to control and minimize development in floodplain areas and on steep slopes. The plan also calls for measures to control or eliminate environmental health hazards and to provide adequate public safety services. The county zoning ordinance, subdivision regulations, sediment and erosion control ordinance, stormwater management ordinance, floodplain regulations, and related municipal ordinances all serve as capabilities that broadly support hazard mitigation.

The nine other cities and towns in Washington County also maintain comprehensive plans. The following table summarizes these documents.

MUNICIPAL COMPREHENSIVE PLANS		
Jurisdiction	*Current Plan Date*	*Description*
Boonsboro	2009	The latest Boonsboro comprehensive plan includes some goals. Under land use, one such goal is to ensure future development avoids environmentally sensitive areas. The plan also includes goals for maintaining a safe and adequate water supply and protecting the town's sensitive environmental resources. The plan also references the town's floodplain management ordinance that prohibits most development in the 100-year floodplain.
Clear Spring	1995	Clear Spring's plan identifies land use areas, including those in 100-year floodplains, particularly along Tom's Run. The goals listed in the plan include appropriately re-using vacant spaces in the town and leaving a legacy of clean air and water for future generations. Clear Spring's plan highlights the benefits of small-town life and expresses the town's desire to remain a small town.
Funkstown	2005	Funkstown's plan focuses on maintaining the town's sense of place. It includes goals and strategies that target mitigation. For instance, the town limits development on slopes greater than 25% and encourages a buffer strip along Antietam Creek.
Hagerstown	2018	The City of Hagerstown completed its comprehensive plan in April 2018. The plan contains goals for environmental resources and sustainability, community facilities, urban design and historic preservation, housing and neighborhoods, downtown, transportation, water resources, economic development, and growth management and land use. The *Vision Hagerstown 2035* document faces the challenges of vacancies, minimal investment, and declining property values in some areas of the city. As such, current planning offers unique opportunities to integrate resilient concepts into potential solutions to these challenges.
Hancock	2010	Hancock's most recent plan highlights property maintenance and protection, including designated areas for environmental conservation, maintaining trees and plantings, restricting potential contaminating sources in the town's wellhead area, amending the town's stormwater management ordinance, and preserving sensitive environmental areas.
Keedysville	2009	The Keedysville plan discusses promoting new development and redevelopment, incorporating environmental resources as site amenities. Such action includes zoning and stormwater management elements. The town seeks to create a town tree list for conservation and aesthetics. The plan also notes the importance of restricting development in floodplains.
Sharpsburg	2016	Sharpsburg's 2016 plan lists, as goals, recognizing, respecting, and deriving maximum benefit from natural and environmental features; assuring the presence of public facilities and utility services to accommodate local needs; and achieving full compatibility between land uses and undeveloped land.
Smithsburg	2012	Smithburg's plan includes numerous strategies that can support hazard mitigation. The plan states that the town values environmental preservation and promulgates actions that protect wetlands, streams, floodplains, forested areas, and steep slopes from development. The plan also identifies the town's desire to be "formed by the natural landscape." It includes using porous materials for paving in floodplains, the creation of a one-mile greenbelt around the town, etc.
Williamsport	2010	The comprehensive plan for Williamsport seeks to maintain the town's historic appeal and take advantage of locations along SR 68 and I-81 for economic development (i.e., "employment activities"). It also includes a goal for preserving land along the Conococheague Creek and the railroad right-of-way for open space and a trail.

BUILDING CODES

Building codes regulate construction standards for new construction and substantially renovated buildings. Communities can adopt standards that require resistant or resilient building design practices to address common hazard impacts. Most jurisdictions in Washington County have adopted the *Maryland Building Performances Standards,* including the *2018 International Guideline Code (IBC), the 2018 International Residential Code (IRC),* and the *2018 International Energy Conservation Code* (IECC). This code contains wind and snow loading requirements for new structures tailored to the county's climate. The code also has footing depth requirements related to the frost line and tie-down requirements for mobile homes. The building codes in the county also include mechanical codes (e.g., *the 2018 International Fuel Gas Code* and the *2018 International Mechanical Code*), electrical codes (e.g., *the 2017 National Electrical Code*), and the *2018 International Plumbing Code*. Significantly, some municipalities (e.g., Funkstown) coordinate with the county regarding the enforcement of building codes.

SUBDIVISION AND LAND USE DEVELOPMENT ORDINANCES

Subdivision and land development ordinances (SALDOs) regulate the development of housing, commercial, industrial or other uses, including associated public infrastructure, as communities and developers subdivide land into buildable lots. Within these ordinances, guidelines on how to divide the land, the placement and size of roads, and the location of infrastructure can reduce exposure of development to hazard events. Eight of the nine jurisdictions in Washington County have adopted and enforced a subdivision and land development ordinance (though some, like Funkstown, coordinate with the county regarding enforcement).

ZONING ORDINANCES

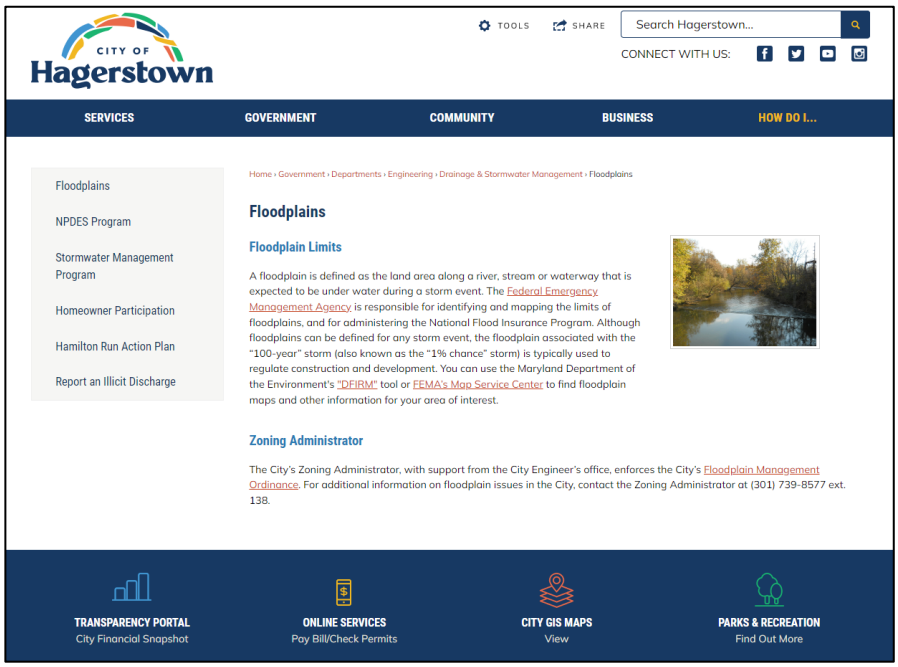
Zoning ordinances allow local communities to regulate the use of land to protect the interests and safety of the general public. Zoning ordinances can address unique conditions or concerns within a given community. They may be used to create buffers between structures and high-risk areas, limit the type or density of development, or require land development to consider specific hazard vulnerabilities. All nine jurisdictions in Washington County have zoning regulations.

NATIONAL FLOOD INSURANCE PROGRAM (NFIP) PARTICIPATION AND FLOODPLAIN MANAGEMENT ORDINANCES

Through the administration of floodplain ordinances, municipalities can ensure that all new construction or substantial improvements to existing structures located in the floodplain are flood-proofed, dry-proofed, or built above anticipated flood elevations. Floodplain ordinances may also prohibit development in certain areas. The National Flood Insurance Program (NFIP) establishes minimum ordinance requirements which must be met for that community to participate in the program. However, a community is permitted and (in fact) encouraged to adopt standards that exceed NFIP requirements. All nine governmental jurisdictions within the county have floodplain regulations in place. Four jurisdictions (i.e., Boonsboro, Funkstown, Keedysville, and Williamsport) adopted the county ordinance. Municipal floodplain ordinances are generally easy to find via their websites. The images below show a sampling of how these ordinances appear.

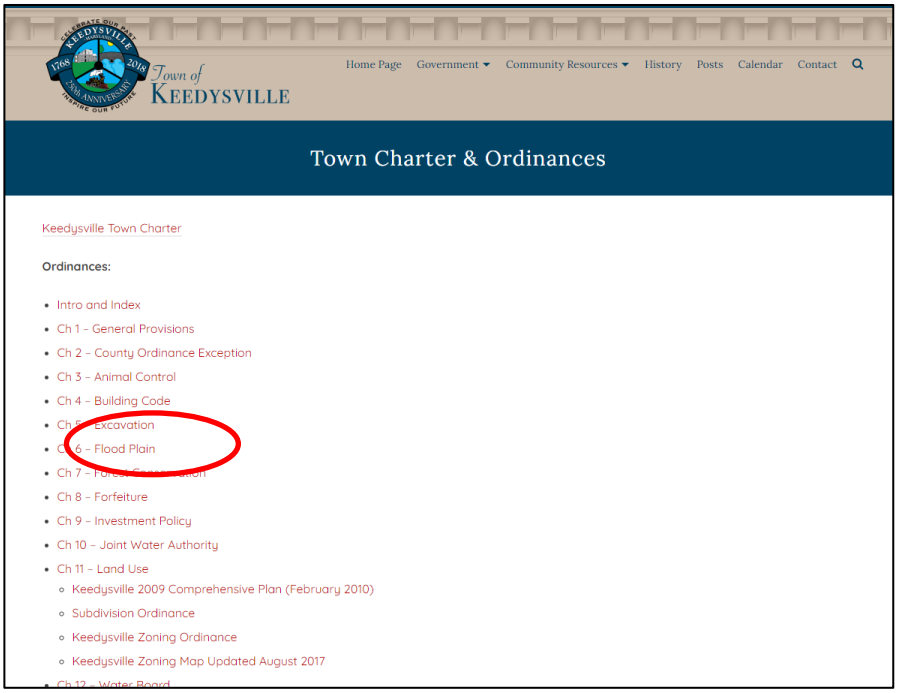
Hagerstown:

https://www.hagerstownmd.org/261/Floodplains



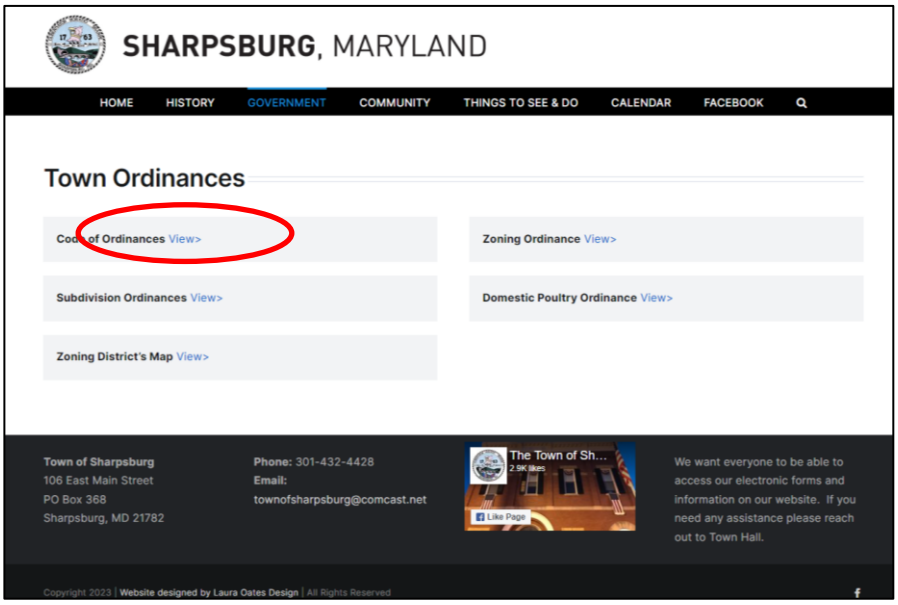
Keedysville:

https://keedysvillemd.com/government/documents/



Sharpsburg:

https://sharpsburgmd.com/town-ordinances/

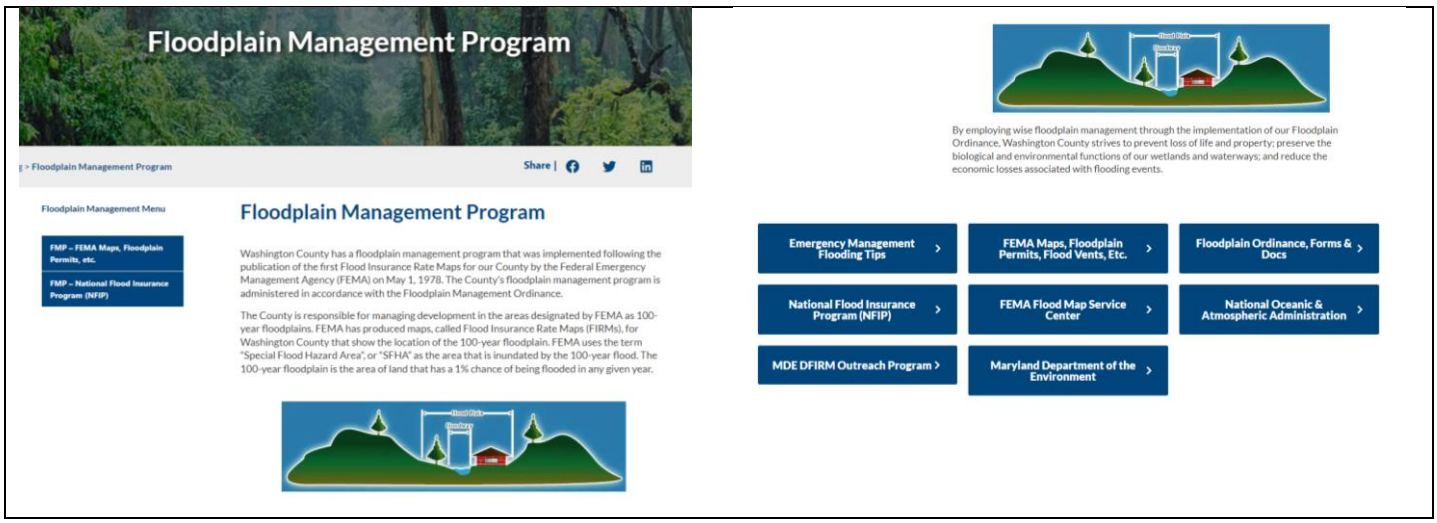


Typical means of keeping new and substantially-improved construction reasonably safe from flooding, per floodplain ordinances, include anchoring, using flood-resistant materials, and designing/locating utilities and services to prevent water damage. In August 2017, Washington County adopted a new floodplain ordinance to coincide with the adoption of the county's new Flood Insurance Rate Maps (FIRMs) as part of the Federal Emergency Management Agency's map modernization project. The 2017 FIRMs replaced the original maps from 1978 (with some

intermittent, minor updates). The following table identifies the current map date for the jurisdictions in Washington County (FEMA, 2022a).

CURRENT EFFECTIVE MAP DATE (PER NFIP PARTICIPATION)			
Jurisdiction	*Date*	*Jurisdiction*	*Date*
Washington County	08/15/2017	Hancock	08/15/2017
Boonsboro	08/15/2017	Keedysville	08/15/2017
Clear Spring	08/15/2017	Sharpsburg	08/15/2017
Funkstown	08/15/2017	Smithsburg	08/15/2017 (M)
Hagerstown	08/15/2017	Williamsport	08/15/2017

The self-assessment survey included several questions regarding NFIP management. One question asked respondents the adoption date of their most current DFIRM/FIRM map. Responses ranged from 2017 (which would be expected based on the preceding table) to 1980, "at least 10 years," and "unknown." Responses also varied when asked about how municipalities share DFIRM/FIRM data. Some, like the City of Hagerstown, refer residents to the state's geographic information system (GIS) website, which includes the layer. Others, such as the Town of Boonsboro, make the data available via their municipal website. The Washington County Division of Engineering manages the county's floodplain development, and it makes a variety of information available via its website (i.e., FEMA maps, the county ordinance, NFIP information, etc.). The images below show the Division of Engineering's Floodplain Management Program page. Still, other jurisdictions make the information available upon request from their permitting and zoning office.



Most Washington County municipalities indicated that they do not support requests for map updates. Two respondents indicated that they support those requests: Smithsburg uses its permitting/zoning office, while Funkstown works with the county. General technical assistance provided to residents includes encouragement to work with a civil engineer (e.g., Hagerstown) and information on base flood elevations (e.g., Boonsboro). The planning and zoning offices were typically the sources that maintained records of Letters of Map Changes.

- **Permits/Zoning:** Smithsburg
- **Planning:** Hagerstown and Boonsboro
- **Planning and Zoning:** Sharpsburg and Williamsport
- **Town Office:** Hancock

SUMMARY OF KEY FLOODPLAIN MANAGEMENT REQUIREMENTS			
Jurisdiction	*FP Coordinator*	*Enforcement*	*Substantial Improvement (SubI) / Substantial Damage (SubD)*
Washington County	LOCAL/COUNTY: County Engineering Department	Via the permitting process and on-site inspections during construction	See below.
Boonsboro	LOCAL: Town Planner (in consultation with the county)	Via the permitting process and on-site inspections during construction	See narrative provided by Washington County below.
Clear Spring	LOCAL: Zoning Administrator (in consultation with the county)	Via the permitting process	See narrative provided by Washington County below.
Funkstown	COUNTY: Solely in consultation with the county (with the Town Manager as the point of contact)	In consultation with the county	See narrative provided by Washington County below.
Hagerstown	LOCAL: Engineering Dept.	PCAD and Engineering review site plans for new development and redevelopment	From the city's ordinance: SubI: Any reconstruction, rehabilitation, addition, or other improvement of a building/structure, the cost of which equals/exceeds 50% of the market value of the structure before the start of construction SubD: Notify owners of the need to obtain a permit to repair, rehabilitate, or reconstruct substantially damaged buildings (and prohibit noncompliant repair) except for temporary emergency protective measures for property protection/stabilization Calculated per 50% of the *market value* of the building or structure before the damage occurred

SUMMARY OF KEY FLOODPLAIN MANAGEMENT REQUIREMENTS			
Jurisdiction	*FP Coordinator*	*Enforcement*	*Substantial Improvement (SubI) / Substantial Damage (SubD)*
Hagerstown (cont.)	LOCAL: Engineering Dept.	When floods occur, floodplain management staff coordinate with first response personnel and emergency management staff doing damage assessments. If assessment data suggests that repairs may result from substantial damage (and, thus, applicable to this provision), floodplain management staff visit the area to work with the property owners.	
Hancock	LOCAL: Town Manager (in consultation with the county)	Via collaboration with the county	See narrative provided by Washington County below.
Keedysville	LOCAL: Town Administrator (in consultation with the county)	Consults with county for new construction; no town-level enforcement	See narrative provided by Washington County below.
Sharpsburg	LOCAL: Zoning Administrator (in consultation with the county)	Via the permitting process, zoning administration, and inspection during construction	See narrative provided by Washington County below.
Smithsburg	LOCAL: Zoning Administrator (in consultation with the county)	Via the permitting process, inspections during construction (as a part of zoning administration)	See narrative provided by Washington County below.
Williamsport	LOCAL: Planning & Zoning (in consultation with the county)	Through the permitting process	See narrative provided by Washington County below.

Per the Washington County Floodplain Manager, the floodplain manager[3] and a building inspector visit flooded locations to evaluate structures for safety and to document damages (following significant flooding events). This outreach is an opportunity for the floodplain manager to leave property owners with contact information and other materials. If a property is in the SFHA, a Washington County floodplain permit and a Maryland Department of the Environment (MDE) non-tidal wetlands and waterways permit is necessary to make improvements to the structures. Properties within the SFHA will be evaluated against substantial improvement/substantial damage criteria using the *Substantial Improvement/Substantial Damage Desk Reference Publication* (FEMA P-758), May 2010 as part of the floodplain permit review process. Additional tools to help make a SubI/SubD determination may include:

- Maryland DFIRM outreach mapping https://mdfloodmaps.net/map/,
- Property and zoning search GIS mapping and SDAT links to determine the assessed value of the structure(s) and the year the primary structure was built https://www.washco-md.net/gis-home/gis-digital-spatial-data-maps/,

[3] There are additional certified floodplain managers in the county engineering department to assist if the volume of floodplain permit applications exceeds the floodplain manager's ability to review them in a timely manner.

- Elevation certificates (existing and/or new),
- Electronic plan review software for electronic submission of documentation and drawings for floodplain permit applications and building permit applications,
- Documentation of market value of structures, and/or
- Documentation of cash value of all proposed work.

If a property is outside of the SFHA, the floodplain manager provides information on how to build back safer, better, and stronger through the FEMA publication: https://agents.floodsmart.gov/sites/default/files/fema_nfip-rebuilding-safer-stronger-after-flood-guide-12-2022.pdf.

WATER AND SEWER PLAN

The water and sewer plan shared many of the goals and objectives outlined in the comprehensive plans (particularly at the county level), including the concentration of development in areas having adequate water and sewer service and the elimination or treatment of hazardous pollutants. During the 2012 mitigation plan update, the committee reviewed the 2009 water and sewer plan to identify some of the problems experienced in the county and the corrective actions being taken. The Washington County Department of Water Quality pursues wastewater projects to address health and water quality issues in the county. These projects appear in the county's capital improvement plan. They are incorporated into the water and sewerage plan as they are developed.

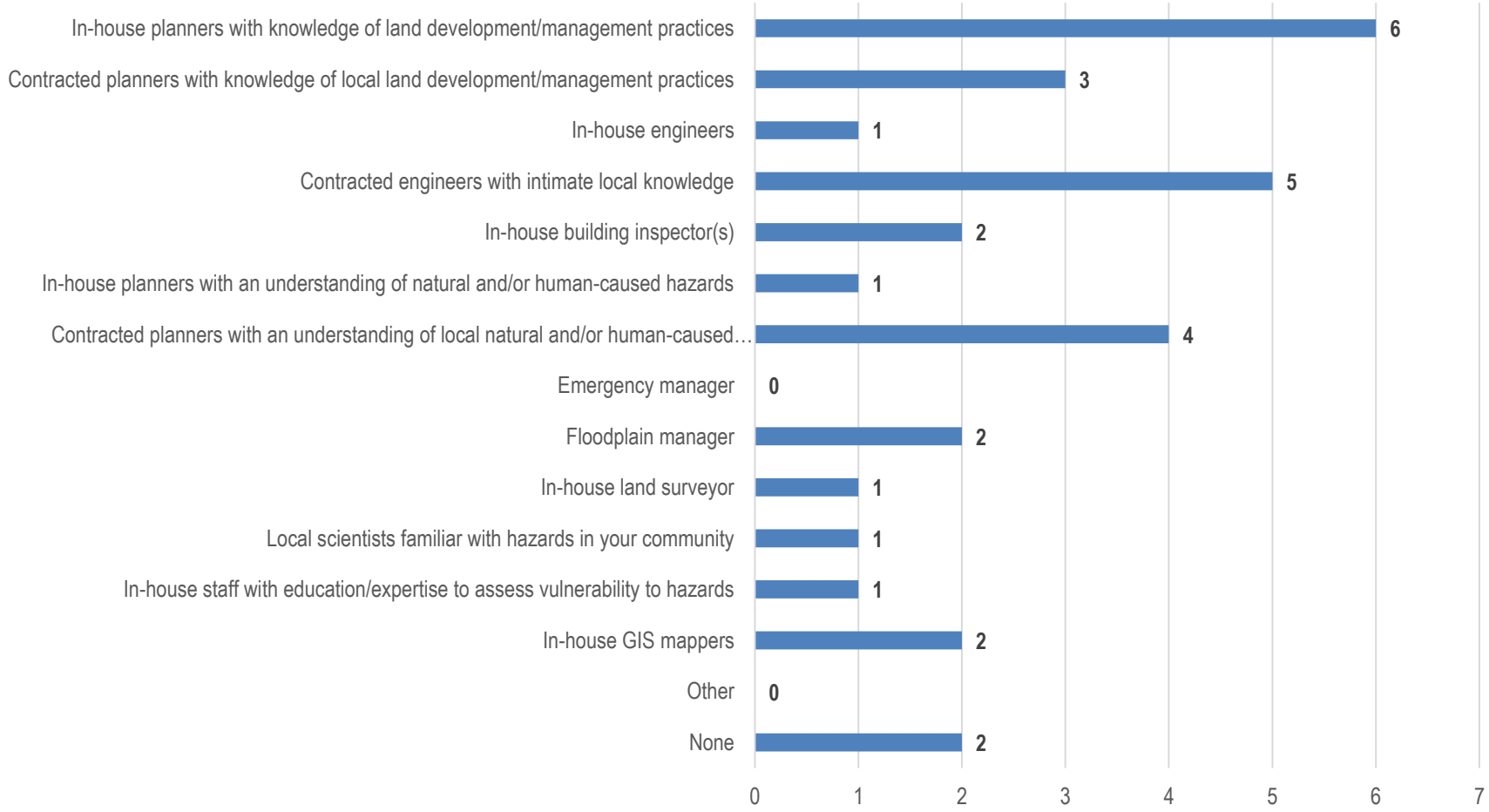
Administrative and Technical Capability

Administrative capability refers to the adequacy of departmental and personnel resources for implementing mitigation-related activities. Technical capability relates to the adequacy of local government employees' knowledge and technical expertise to effectively execute mitigation activities (or the ability to contract outside resources for this expertise). Common examples of skill sets and technical personnel for hazard mitigation include planners with knowledge of land development/management practices, engineers or professionals trained in construction practices related to buildings or infrastructure (e.g., building inspectors), planners or engineers with an understanding of natural and human-caused hazards, emergency managers, floodplain managers, land surveyors, scientists familiar with hazards in the community, staff with the education or expertise to assess community vulnerability to hazards, personnel skilled in

geographic information systems, resource development staff or grant writers, and fiscal staff to handle complex grant application processes.

The table below shows the results from the self-assessment survey regarding the availability of these resources. The results from these questions are somewhat surprising. For instance, only two respondents indicated the presence of a floodplain manager. Yet, all possible respondents participate in the National Flood Insurance Program (NFIP), which would suggest the presence of a floodplain manager. Some jurisdictions may partner with, for example, the county, which may have skewed the data. Regardless, the variety of responses suggests that education on the types and quantities of administrative and technical mitigation-centric resources may be helpful.

ADMINISTRATIVE & TECHNICAL RESOURCES



The Washington County Planning & Zoning Department and Washington County Office of Emergency Management provide technical assistance to municipalities. Other local organizations that could act as partners in mitigating natural and human-caused hazards include the Community Foundation of Washington County, Washington County Community Action Council, Reach of Washington County, environmental advocacy groups, and watershed associations.

State agencies that can provide technical assistance for mitigation activities include, but are not limited to:

- Governor's Grants Office,
- Governor's Office of Homeland Security,
- Maryland Department of Emergency Management,
- Maryland Department of the Environment,
- Maryland Department of Housing and Community Development,
- Maryland Economic Development Corporation, and
- Maryland Environmental Service.

Federal agencies which can provide technical assistance for mitigation activities include, but are not limited to:

- U.S. Army Corps of Engineers (USACE)
- U.S. Department of Agriculture (USDA)
- U.S. Department of Homeland Security (USDHS), Federal Emergency Management Agency (FEMA)
- USDHS/FEMA Emergency Management Institute (EMI)
- U.S. Department of Housing and Urban Development (HUD)
- U.S. Economic Development Administration (USEDA)
- U.S. Environmental Protection Agency (USEPA)
- U.S. Small Business Administration (SBA)

Financial Capability

The decision and capacity to implement mitigation-related activities often depend on funding availability. While some mitigation actions are less costly than others, money must be available locally to implement policies and projects. Financial resources are particularly important if communities are trying to take advantage of state or federal mitigation grant funding opportunities that require local-match contributions. Six jurisdictions indicated having a grants

specialist on their payroll, and the county also has grants specialists. Often, these individuals are not *dedicated* grant personnel; e.g., the town manager may have the grant experience.

Several jurisdictions noted the availability of local funds in capital and public works budgets to support mitigation projects. State programs that may provide financial support for mitigation activities include, but are not limited to the following.

STATE PROGRAMS WITH POTENTIAL FINANCIAL SUPPORT FOR MITIGATION ACTIVITIES		
Program	*Notes*	*Relevant Hazard(s)*
319 Nonpoint Source Program Maryland Department of the Environment	Grant funds from the Federal Clean Water Act Section §319(h) to fund projects to help reduce water quality impairments caused by nonpoint sources.	Hazardous Materials Reportable Disease Epidemic (possible waterborne illnesses)
Brownfields & Voluntary Cleanup Programs Maryland Department of the Environment	Brownfields Revitalization Incentive Program (BRIP) Competitive grant and loan funding to support economic development through identifying and redeploying underutilized properties, making efficient use of existing infrastructure, and providing an alternative to developing open space that contributes to urban sprawl. Voluntary Cleanup Program (VCP) TECHNICAL ASSISTANCE: Seeks to increase the number of sites cleaned by streamlining the process while ensuring compliance with environmental regulations.	Hazardous Materials
Emergency Management Performance Grant (EMPG) Program Maryland Department of Emergency Management	Reimbursement for expenditures related to operating an emergency management program in local communities (focused on all phases of emergency management).	All Hazards
Hazardous Materials Emergency Preparedness (HMEP) Program Maryland Department of Emergency Management	Grant funds to support planning for transportation-based hazardous materials emergencies.	Hazardous Materials
Non-Profit Security Grant Program (NSGP) Maryland Department of Emergency Management	Grant funds for physical and cybersecurity enhancements and other security-related activities to non-profit organizations at high risk of terrorist or other extremist attack.	Cybersecurity
Resilient Maryland Revolving Loan Fund Maryland Department of Emergency Management	Low-interest loans to local governments to help finance projects and activities that mitigate the effects of natural hazards. Local governments can take out loans on behalf of homeowners, businesses, non-profit organizations, and communities.	Drought Flooding Extreme Temperatures Severe Winter Weather Tornadoes Wildfires
State Homeland Security Grant Program (SHSP) Maryland Department of Emergency Management	Risk-based grants to support local efforts in preventing, protecting against, mitigating, responding to, and recovering from acts of terrorism and other threats.	Terrorism
State (Drinking Water) Revolving Loan Fund Maryland Department of the Environment	Low-interest loan assistance for projects that provide safe drinking water and protect the quality of a community's drinking water supply.	Drought Reportable Disease Epidemic (possible waterborne illnesses)

STATE PROGRAMS WITH POTENTIAL FINANCIAL SUPPORT FOR MITIGATION ACTIVITIES		
Program	*Notes*	*Relevant Hazard(s)*
Sewerage Facilities Supplemental Assistance Program Maryland Department of the Environment	Grants to supplement water quality loan funds to correct public health or water quality problems; typically helps to plan, design, and construct wastewater facilities.	Hazardous Materials Reportable Disease Epidemic (possible waterborne illnesses)
Water Supply Program Maryland Department of the Environment	Grant funds to local governments or water supply systems for wellhead protection projects or direct loans for land acquisition for source water protection.	Drought Reportable Disease Epidemic (possible waterborne illnesses)

Federal programs which may provide financial support for mitigation activities include, but are not limited to the following.

FEDERAL PROGRAMS WITH POTENTIAL FINANCIAL SUPPORT FOR MITIGATION ACTIVITIES		
Program	*Notes*	*Relevant Hazard(s)*
Building Resilient Infrastructure and Communities (BRIC) Federal Emergency Management Agency	Grant funds (via a competitive program) for research-supported, data-driven and proactive investment in community resilience and risk reduction.	Natural Hazards
Community Development Block Grant (CDBG) U.S. Dept. of Housing & Urban Development	CDBG-MIT grant funds enable communities to carry out strategic and high-impact activities to mitigate disaster risks and reduce future losses.	Natural Hazards
Emergency Conservation Program U.S. Department of Agriculture	Matching grant funds to repair damage to farmlands and to put in place water conversation measures during severe drought.	Drought Flooding Severe Summer Weather
Emergency Watershed Protection Program USDA Natural Resources Conversation Service	Technical assistance and grant funds to help relieve imminent threats to life and property that impair a watershed. Eligible activities can include debris removal from streams channels, culverts, and bridges; streambank protection; correct damaged drainage facilities; establish vegetative cover on eroded lands; repair levees and structures; repair certain conservation practices; or EWP buyouts.	Flooding Severe Summer Weather Severe Winter Weather Tornadoes Wildfires
Flood Mitigation Assistance (FMA) Program Federal Emergency Management Agency	Grant funds (via a competitive program) to states and local governments to eliminate or reduce the risk of repetitive flood damage to buildings insured by the NFIP.	Flooding
Hazard Mitigation Grant Program (HMGP) Federal Emergency Management Agency	Grant funds to state, local, tribal, and territorial governments to develop hazard mitigation plans or rebuild in a way that reduces future losses. Available after a Presidentially-declared disaster, HMGP funds also often fund mitigation projects such as acquisition, elevation, etc.	Natural Hazards
High-Hazard Potential Dams (HHPD) Program Federal Emergency Management Agency	Grant funds for technical, planning, design, and construction assistance to rehabilitate eligible high-hazard potential dams.	Dam Failure

FEDERAL PROGRAMS WITH POTENTIAL FINANCIAL SUPPORT FOR MITIGATION ACTIVITIES		
Program	*Notes*	*Relevant Hazard(s)*
Individuals and Households Program (IHP) Federal Emergency Management Agency	Financial assistance and direct services to eligible individuals and households affected by a disaster; regarding mitigation, IHP can help eligible homeowners repair or rebuild stronger, more durable homes.	Natural Hazards
Non-Insured Crop Disaster Assistance Program (NAP) U.S. Department of Agriculture	Grant funds to producers of non-insurable crops when low yields, loss of inventory, or prevented planning occur due to natural disasters.	Natural Hazards
Repetitive Flood Claims (RFC) Program Federal Emergency Management Agency	Grant funds to reduce flood damages to insured properties that have had one or more claims with the NFIP.	Flooding
Section 108 Loan Guarantee Programs U.S. Dept. of Housing & Urban Development	Loan program that allows CDBG recipients to leverage grant allocations to access low-cost, flexible financing for economic development, housing, public facility, and infrastructure projects.	Natural Hazards (for purposes of the mitigation plan)
Severe Repetitive Loss (SRL) Program Federal Emergency Management Agency	Grant funds to states, territories, and local governments to reduce or eliminate the long-term risk of flood damage to severe repetitive loss properties insured under the NFIP.	Flooding
Weatherization Assistance Program (WAP) U.S. Department of Energy	Administered at the state level (through the Maryland Department of Housing and Community Development); assists income-eligible homeowners and renters reduce heating and cooling costs through energy conservation measures.	Extreme Temperatures Severe Summer Weather Severe Winter Weather

Political Capability

One of the most challenging capabilities to evaluate involves the political will of a jurisdiction to enact meaningful policies and projects designed to mitigate hazard losses. Some officials may view adopting mitigation measures as an impediment to growth and economic development. Further, mitigation may not generate interest among local officials compared to competing priorities. The local political climate must be considered when designing mitigation strategies, as it could be the most difficult hurdle to overcome in accomplishing the adoption or implementation of specific actions.

The results of the self-assessment indicate 75% of the respondents with a moderate or high political capability, which is a positive response (though lower than reported for those same categories in 2018). It is important to exercise caution when categorizing mitigation projects with politically-sensitive topics or terms (e.g., climate change); by framing mitigation as risk reduction (from known risks), the willingness to engage in mitigation often improves.

Expanding and Improving Local Capacities

The jurisdictional capabilities summary table at the start of Section 1.3 (on p. 91 above) indicates the presence of numerous local and county-level capacities for supporting overall risk

reduction; however, there are opportunities to expand and improve upon those capacities. The following table quickly summarizes these opportunities. Importantly, the considerations listed in the table are just that – considerations. They are not requirements, nor are the meant to imply that existing capabilities are not effective. As local officials examine the changing nature of hazard risks, these considerations may serve as a roadmap for advancing proactive stances toward risk reduction.

OPPORTUNITIES FOR EXPANDING AND IMPROVING LOCAL CAPABILITIES		
Capability (and Jurisdictions)	*Capability in Place*	*Considerations for Expansion or Improvement*
PLANNING BODY / COMMISSION		
Washington County	Yes	Add a WCOEM or Washington County Department of Emergency Services representative; advocate for risk reduction to be included, as appropriate, as a "Vision"
Boonsboro	Yes	Periodically invite emergency services representatives to meetings; advocate for risk reduction to be included, as appropriate, as a "Vision"
Clear Spring	Yes	Oversee more frequent comprehensive plan updates
Funkstown	Yes	Periodically invite emergency services representatives to meetings; advocate for risk reduction to be included, as appropriate, as a "Vision"
Hagerstown	Yes	Include risk implications as a review criterion for plans submitted to the commission
Hancock	Yes	Periodically invite emergency services representatives to meetings; advocate for risk reduction to be included, as appropriate, as a "Vision"
Keedysville	Yes	Periodically invite emergency services representatives to meetings; advocate for risk reduction to be included, as appropriate, as a "Vision"
Sharpsburg	Yes	Periodically invite emergency services representatives to meetings; advocate for risk reduction to be included, as appropriate, as a "Vision"
Smithsburg	Yes	Periodically invite emergency services representatives to meetings; advocate for risk reduction to be included, as appropriate, as a "Vision"
Williamsport	Yes	Periodically invite emergency services representatives to meetings; advocate for risk reduction to be included, as appropriate, as a "Vision"
COMPREHENSIVE PLAN		
Washington County	2002	Complete the update that is underway; continue to support green infrastructure/low-impact development and ensure sustainment of naturalized areas
Boonsboro	2009	Ensure regular updates (e.g., every five years); add a chapter addressing risk/exposure reduction
Clear Spring	1995	Ensure regular updates (e.g., every five years)
Funkstown	2005	Ensure regular updates (e.g., every five years); add known risk areas to "Sensitive Areas Map" (p. 46)
Hagerstown	2018	Request WCOEM participation (as a representative of the hazard mitigation effort, to ensure consistency with mitigation goals)
Hancock	2010	Ensure regular updates (e.g., every five years); add a chapter addressing risk/exposure reduction
Keedysville	2009	Ensure regular updates (e.g., every five years); strategically elaborate on public recognition of improvements to "floodplain management facilities" (p. IN-3)
Sharpsburg	2016	Add consistency with the mitigation plan as an "Action for Planning" (pp. 7-8)
Smithsburg	2012	Ensure regular updates (e.g., every five years); add a chapter addressing risk/exposure reduction; incorporate risk reduction efforts within infrastructure systems (as per decisions made in this plan update)
Williamsport	2010	Ensure regular updates (e.g., every five years); add known risk areas to the Sensitive Areas chapter

OPPORTUNITIES FOR EXPANDING AND IMPROVING LOCAL CAPABILITIES		
Capability (and Jurisdictions)	*Capability in Place*	*Considerations for Expansion or Improvement*
NFIP		
Washington County	Yes	Add measures beyond minimum requirements
Boonsboro	Yes	Develop and adopt a locally-specific floodplain management ordinance
Clear Spring	Yes	Make the floodplain management ordinance more readily available (e.g., via the town's website)
Funkstown	Yes	Develop and adopt a locally-specific floodplain management ordinance; develop a local monitoring capability
Hagerstown	Yes	Add measures beyond minimum requirements
Hancock	Yes	Add measures beyond minimum requirements; develop a local monitoring capability: clarify SubI costs as being one-time or cumulative
Keedysville	Yes	Develop and adopt a locally-specific floodplain management ordinance; develop a local monitoring capability
Sharpsburg	Yes	Add measures beyond minimum requirements; clarify SubI costs as being one-time or cumulative
Smithsburg	Yes	Add measures beyond minimum requirements
Williamsport	Yes	Develop and adopt a locally-specific floodplain management ordinance; add a local in-construction inspection capability
BUILDING CODES		
Washington County	Yes	Review opportunities for codes to address high-potential impact hazards
Boonsboro	Yes	Review opportunities for codes to address high-potential impact hazards
Clear Spring	No	Create a locally-specific building code
Funkstown	No	Create a locally-specific building code
Hagerstown	Yes	Review opportunities for codes to address high-potential impact hazards
Hancock	Yes	Review opportunities for codes to address high-potential impact hazards
Keedysville	Yes	Review opportunities for codes to address high-potential impact hazards
Sharpsburg	Yes	Review opportunities for codes to address high-potential impact hazards
Smithsburg	Yes	Review opportunities for codes to address high-potential impact hazards
Williamsport	Yes	Review opportunities for codes to address high-potential impact hazards
ZONING CODES		
All Participating Jurisdictions	Yes	Add known natural hazard risk areas as restricted areas
SUBDIVISION & LAND DEVELOPMENT ORDINANCES		
While there are two jurisdictions that may consider the development of a SALDO (though their corporate areas are largely built-out), existing SALDOs work reasonably well with building and zoning codes to support a minimum of new risk exposure.		

Reflection on Potential Mitigation Strategies

The self-assessment survey also asked for respondents' opinions about six types of mitigation actions. Section 3.0: Mitigation Strategy presents a range of actions. Though these actions do not appear in the current mitigation strategy, they provide a platform for discussion as the 2023-2028 planning cycle begins. The percentages in the following table are the percent of the eight responses in the denoted category.

SELF-ASSESSMENT: EXAMPLE MITIGATION STRATEGIES					
Strategy	*Very Much Unwilling*	*Unwilling*	*Neutral*	*Willing*	*Very Willing*
XYZ community guides development away from known hazard areas.	**0.0%** (2018-0%)	**0.0%** (2018-0%)	**12.5%** (2018-22%)	**62.5%** (2018-56%)	**25.0%** (2018-22%)
XYZ community restricts public investments or public sector capital improvements within hazard areas.	**0.0%** (2018-0%)	**12.5%** (2018-11%)	**12.5%** (2018-56%)	**50.0%** (2018-22%)	**25.0%** (2018-11%)
XYZ community enforces local development standards (e.g., building codes, floodplain management ordinances, etc.) that go beyond minimum state or federal requirements.	**12.5%** (2018-0%)	**0.0%** (2018-22%)	**50.0%** (2018-44%)	**25.0%** (2018-33%)	**12.5%** (2018-0%)
XYZ community offers financial incentives (e.g., through property tax credits) to individuals and businesses that employ resilient construction techniques (e.g., voluntarily elevating structures, using landscape designs to establish buffers, exceeding recommended building code standards, etc.).	**25.0%** (2018-0%)	**25.0%** (2018-0%)	**37.5%** (2018-67%)	**12.5%** (2018-33%)	**0.0%** (2018-0%)
XYZ community offers financial incentives (e.g., through property tax credits) to individuals and businesses that employ green infrastructure techniques (e.g., pave sidewalks and driveways utilizing permeable materials, install drought tolerant plants to capture, clean, and filtrate rainwater, increase green space in urbanized areas, etc.).	**12.5%** (2018-N/A)	**25.0%** (2018-N/A)	**25.0%** (2018-N/A)	**25.0%** (2018-N/A)	**12.5%** (2018-N/A)
XYZ community establishes a microgrant program to help individuals and businesses install fixed auxiliary power at their location(s).	**12.5%** (2018-N/A)	**25.0%** (2018-N/A)	**37.5%** (2018-N/A)	**25.0%** (2018-N/A)	**0.0%** (2018-N/A)

2.0 RISK ASSESSMENT

A risk assessment analyzes "the potential for damage, loss, or other impacts created by the interaction of hazards with community assets" (FEMA, 2013b, p. 5-1). This risk assessment section contains information on identified hazards that threaten Washington County and the area's vulnerability as it relates to the county's assets.

The steering committee made one significant change to the hazards list for this update, adding dam failure. Emergency action planning surrounding potential dam failures is ongoing in Washington County, and there is awareness of these issues following an incident at the Volvo Hagerstown Stormwater Management Dam. Within the profiles, planners reorganized the presentation of data and added substantial discussion of future occurrences. The risk assessment includes a new subsection that ranks the hazards based on a "risk ranking" score. This ranking enables a comparison with data from sources such as the National Risk Index (FEMA, n.d.B).

2.0 RISK ASSESSMENT

2.1 Identify Hazards

§201.6(c)(2)(i)	[The risk assessment shall include a] description of the…location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.

This section notes the hazards included in the *Washington County Hazard Mitigation Plan (2023 Update)*. Planners used several research methods to identify the hazards to which the county is susceptible. The steering committee validated the research with the members' experiences living and working in the area. This process led to the inclusion of the following hazards.

- Dam failure
- Drought
- Extreme temperatures
- Fire (structural/industrial)
- Flooding
- Hazardous materials
- Land subsidence
- Opioid epidemic
- Reportable disease epidemic
- Severe summer weather
- Severe winter weather
- Tornado
- Transportation accident
- Wildfire

The following table illustrates the hazards to which the county and its local governments are not susceptible. This chart intends to justify the exclusion of these hazards (which appear in FEMA's National Risk Index [FEMA, n.d.B] and the state's hazard mitigation plan [MDEM, 2021]) from this plan. The table also discloses the hazards whose labels may appear differently in this plan (as compared to what appears in the National Risk Index and the state's plan.

HAZARD EXCLUSIONS (OR LABEL MODIFICATIONS)	
Hazard	*Justification for Omission*
Active Shooter	Though active assailant incidents could be quite disruptive, prevention and mitigation are often at the facility or entity level.
Avalanche	FEMA's National Risk Index (n.d.B) notes that this hazard does not apply to any county in Maryland.
Civil Unrest	Much like terrorism, law enforcement and other stakeholders coordinate preparedness efforts for civil unrest, often in connection to specific events, instances, or threats.

HAZARD EXCLUSIONS (OR LABEL MODIFICATIONS)	
Hazard	*Justification for Omission*
Coastal	Washington County does not contain any coastlines. The closest coastline is the western Chesapeake Bay coast, which is roughly 56 miles to the east of Washington County.
Cold Wave	This discussion appears under the "Extreme Temperatures" label.
Cyber-Attack	Preparedness for cyber incidents is rapidly increasing, and it may appear in future versions of this plan. However, much of the current prevention effort is coordinated at the entity level.
Hail	This discussion appears under the "Severe Summer Weather" label.
Heat Wave	This discussion appears under the "Extreme Temperatures" label.
Hurricane	Hurricanes, along with tropical storms and nor'easters may impact Washington County; however, their impacts would most likely be felt as a severe summer or, depending on the timing of the storm, winter weather. The review of historic disaster declarations (see the table below) and emerging data regarding potential elevated risks due to climate change suggests that this hazard may (generally) become more problematic for the county. As such, "Hurricane, Tropical Storm, Nor'easter" is not profiled individually, but it does appear in a call-out box within the severe summer weather profile.
Ice Storm	This discussion appears under the "Severe Winter Weather" label.
Landslide	Though landslides could occur in Washington County, particularly in the mountainous areas, the more probable and damaging geologic hazard for the county and the jurisdictions therein is land subsidence.
Lightning	This discussion appears under the "Severe Summer Weather" label.
Nuclear Incidents	The Peach Bottom (Pennsylvania) and North Anna (Virginia) nuclear power plants are the closest active plants to Washington County. None of the county's area lies within an emergency planning zone (EPZ) for those plants.
Public Health Emergencies	This discussion appears under the "Reportable Disease Epidemic" label.
Riverine Flooding	This discussion appears under the "Flooding" label.
Soil Movement	This discussion appears under the "Land Subsidence" label.
Strong Wind	This discussion appears under the "Severe Summer Weather" label.
Terrorism	Terrorism, particularly domestic terrorism, could impact Washington County; however, law enforcement and emergency management stakeholders prepare for those incidents under other arrangements separate from the hazard mitigation planning process.
Thunderstorm	This discussion appears under the "Severe Summer Weather" label.
Tsunami	Though FEMA's National Risk Index (n.d.B) suggests that tsunami's could potentially impact Maryland's shore counties, Washington County does not include coastlines and it is inland and mountainous enough to be buffered from tsunami impacts.
Volcanic Activity	FEMA's National Risk Index (n.d.B) notes that this hazard does not apply to any county in Maryland.
Wind	This discussion appears under the "Severe Summer Weather" label.

Reviewing disaster declarations for the county serves as a first step in validating the appropriateness of the identified hazards. The following table denotes the disaster declarations for Washington County (n= 21). References to these declarations appear, as appropriate, in the profiles below.

HISTORIC DISASTER DECLARATIONS				
Incident Name & Date	*Incident Type*	*FEMA[1] (w/ Identifier)*	*SBA[2] (w/ Identifier)*	*USDA[3] (w/ Identifier)*
Tropical Storm Agnes (1972)	Flood	DR-341-MD	N/A	N/A
Heavy Rains & Flooding (1975)	Flood	DR-489-MD	N/A	N/A
Severe Snowfall and Winter Storm (1993)	Snowstorm	EM-3100-MD	N/A	N/A
Blizzard of '96 (1996)	Snowstorm	DR-1081-MD	N/A	N/A
Severe Storms and Flooding (1996)	Flood	DR-1094-MD	N/A	N/A
Snow (2003)	Severe Storm	EM-3179-MD	N/A	N/A
Hurricane Isabel (2003)	Hurricane	DR-1492-MD	N/A	N/A
Hurricane Katrina Evacuation (2005)	Hurricane	EM-3251-MD	N/A	N/A
Severe Winter Storms and Snowstorms (2010)	Snowstorm	DR-1910-MD	N/A	N/A
Hurricane Irene (2011)	Hurricane	EM-3335-MD	N/A	N/A
Hurricane Sandy (2013)	Hurricane	EM-3349-MD	N/A	N/A
Hurricane Sandy (2013)	Hurricane	DR-4091-MD	N/A	N/A
Severe Winter Storm and Snowstorm (2016)	Snowstorm	DR-4261-MD	N/A	N/A
Drought (2016)	Drought	N/A	N/A	S4165 (Washington = Contiguous)
Severe Storms and Flooding (2018)	Severe Storm	DR-4374-MD	MD-00035 (Washington = Contiguous) MD-00036 (Washington = Primary) MD-00039 (Washington = Contiguous)	S4356 (Washington = Primary)
Excessive Rain, Flash Flooding, and Flooding (2018)	Flood, Flash Flood, Excessive Rain, Moisture, Humidity	N/A	PA-00097 (Washington = Contiguous)	S4465 (Washington = Primary)
Drought (2019)	Drought	N/A	VA-00085 (Washington = Contiguous)	S4606 (Washington = Primary)
COVID-19 (2020)	Biological	EM-3430-MD	N/A	N/A
COVID-19 Pandemic (2020)	Biological	DR-4491-MD	N/A	N/A
Drought and Excessive Heat (2021)	Drought, Heat, Excessive Heat, High Temp.	N/A	MD-00045 (Washington = Primary)	S5122 (Washington = Primary)
Drought (2021)	Drought	N/A	VA-00098 (Washington = Contiguous)	S5142 (Washington = Contiguous)

[1] FEMA (2023a)
[2] SBA (n.d.)
[3] USDA FSA (n.d.)

The list of disaster declarations suggests that the hazards identified by the steering committee are appropriate; all incident types resulting in declarations appear in the hazard list.

2.0 RISK ASSESSMENT

2.2 Profile Hazards

The following profiles detail each hazard considered by this plan, which includes a discussion on how the hazard impacts the area. Within each profile, research and historical data inform the following elements.

- **Hazard Overview:** Defines and presents a summary table of the hazard.
- **Location and Extent:** Identifies the physical places in the county that are vulnerable to the hazard and the severity of a hazard in a given area.

§201.6(c)(2)(i)	A description of the type, location, and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.

- **Impact and Vulnerability:** Describes impacts on different topics such as health, the environment, or infrastructure that may result from the hazard as well as socially-vulnerable populations.

§201.6(c)(2)(ii)	A description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community. All plans approved after October 1, 2008, must also address NFIP-insured structures that have been repetitively damaged by floods.

- **Historical Occurrences:** Summarizes significant past events related to the hazard.

§201.6(c)(2)(i)	A description of the type, location, and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.

- **Loss and Damages:** Outlines the methods used for loss amounts (of deaths, injury, and property damage depending on available information) and estimates based on historical data and vulnerable populations, structures, and infrastructure.

§201.6 (c)(2)(ii)(B)	An estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(ii)(A) of this section and a description of the methodology used to prepare the estimate.

- **Future Occurrences:** Describes the probability of future occurrence of the hazard under consideration. Where applicable, this section discusses the potential impacts of a changing climate.

§201.6(c)(2)(ii)(A)	The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas.

- **Risk Assessment:** Details methods for quantifying vulnerability to the hazard.

§201.6(c)(2)(ii)(A)	The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas.
§201.6(c)(2)(iii)	For multi-jurisdictional plans, the risk assessment section must assess each jurisdiction's risks where they vary from the risks facing the entire planning area.

One of the components of the risk assessment is to determine the risk of and vulnerability to hazards, determined by the probability of occurrence and the potential severity of those occurrences. This process helps identify which hazards pose the most significant concerns to Washington County and the municipalities therein. It is essential to recognize the value of implementing several categories to determine the overall risk and vulnerability. The following narrative and tables describe the categories utilized by this plan and how they relate to the available data. Historical occurrences inform all calculations, not worst-case scenarios. In cases with zero events, other available data (which varies across the hazards and is outlined in each profile) support determinations.

"Frequency" refers to the number of times a hazard occurs in a specific period (based on available historical data). In most instances, the total occurrences (e.g., three occurrences) are divided by the length of time (in years) that data is available (e.g.,

FREQUENCY CATEGORIES			
Value	*Score*	*Description*	*Definition*
0.76 - >1.0	5	Excessive	Will occur during a year
0.51 – 0.75	4	High	Likely to occur in a year
0.26 – 0.50	3	Medium	May (or may not) occur in a year
0 – 0.25	2	Low	Unlikely to occur in a year
0	1	None	So unlikely that it can be assumed it will not occur in a year

10 years). Thus, in the example, three occurrences divided by 10 years equals 0.3. The table above translates the resultant numeric values into a narrative frequency description. The hazard would have a "low" frequency in the example described here. At times, no historical data is available; in these cases, the hazard receives the lowest possible points for the category (i.e., one).

Other qualitative vulnerability categories enable a clearer understanding of a hazard's potential impacts. The table below depicts the variables used in this plan. Planners assigned values to these categories based on available research (cited, as appropriate, in the profiles), and each profile includes a very brief description to contextualize the selection of the proper variable. Notably, the qualitative nature of these variables enables planners to consider potential future impacts, which is helpful when considering the nexus of risk and future development as well as the potential impacts of climate change. These variables should be considered as a set. For instance, in the following profiles, a hazard like severe summer weather would receive a *Magnitude* score of “catastrophic” simply because the entire county (i.e., well over 50% of the land area) is at risk. A catastrophic score, though, could mislead a reader without the context provided by the other vulnerability variables that would receive a much lower score (such as *Onset* and *Human*, which would both receive the lowest scores available).

VULNERABILITY CATEGORIES						
	Response	*Onset*	*Magnitude*	*Business*	*Human*	*Property*
1	Less than half a day	Over 24 hours	Localized (less than 10% of land area affected)	Less than 24 hours	Minimum (minor injuries)	Less than 10% of property affected
2	One day	12-24 hours	Limited (10-25% of land area affected)	One week	Low (some injuries)	10-25% of property affected
3	One week	6-12 hours	Critical (25-50% of land area affected)	At least two weeks	Medium (multiple severe injuries)	25-50% of property affected
4	One month	Less than 6 hours	Catastrophic (more than 50% of land area affected)	More than 30 days	High (multiple deaths)	More than 50% of property affected
5	More than one month	N/A	N/A	N/A	N/A	N/A

All hazards receive a score for each category corresponding to the number in the far-left column. Hazards receive scores of between 7 (i.e., all seven categories receive a value of one) and 30 points (i.e., all seven categories receive a value of four or five). The list below represents a broad range by which planners ranked all of the hazards in this plan.

Range of Points (Score)	*Hazard Ranking*
7 – 10	Lowest
11 – 15	Low
16 – 20	Medium
21 – 25	High
26 – 30	Highest

Section 2.0: Risk Assessment concludes with a “risk ranking” table that summarizes the scores for all the hazards. Profiles appear in the following order.

- 2.2.1: Dam Failure
- 2.2.2: Drought
- 2.2.3: Extreme Temperatures
- 2.2.4: Fire (Structural/Industrial)
- 2.2.5: Flooding
- 2.2.6: Hazardous Materials
- 2.2.7: Land Subsidence
- 2.2.8: Opioid Epidemic
- 2.2.9: Reportable Disease Epidemic
- 2.2.10: Severe Summer Weather
- 2.2.11: Severe Winter Weather
- 2.2.12: Tornado
- 2.2.13: Transportation Accident
- 2.2.14: Wildfire

2.2.1 Dam Failure[1]

A dam is an artificial barrier or obstruction that impounds, or will impound water. A dam failure is a failure of that structure, which occurs when the barrier does not obstruct/restrain water as designed. Dam failures can rapidly result in large areas of completely-inundated land.				
Vulnerability  HIGHEST HIGH MEDIUM LOW LOWEST	**Period of Occurrence:**	At any time, but typically following a period of prolonged precipitation	**Washington County Risk Ranking:**	Low
	Warning Time:	6-12 hours	**State Risk Ranking:**	Medium
	Probability:	Low (unlikely to occur in a year)	**Impact:**	Localized (less than 10% of land area affected)
	Type of Hazard:	Technological	**Disaster Declarations:**	N/A

Hazard Overview

The three leading causes of dam failure in the United States include overtopping, foundation defects and slope instability, and piping.

- **Overtopping** occurs when water spills over the top of the dam. Overtopping due to inadequate spillway design, debris blockage of spillways, or settlement of the dam crest account for approximately 34% of all dam failures in the U.S.
- **Foundation defects and slope instability**, including settlement, cause approximately 30% of all dam failures.
- **Piping** is the internal erosion caused by seepage. Seepage occurs around hydraulic structures, such as pipes and spillways, through animal burrows, around roots of vegetation, and through cracks in the dam. Piping accounts for another 20% of dam failures in the U.S.

These types of failures are often interrelated in a complex manner. For example, uncontrolled seepage may weaken the soil and lead to structural failure. A structural failure may shorten the seepage path and lead to a piping failure. Surface erosion may result in structural failure, and so on. Minor defects, such as cracks in the embankment, could be the first visual sign of a significant problem, which could lead to the failure of the structure. Someone experienced in

[1] Often, this profile will include measures for "levee failure" in addition to dam failure. Per the U.S. Army Corps of Engineers' National Levee Database (n.d.), however, there are no levees in Washington County. Note, however, that the COMAR definition of a dam could include levee-like structures.

dam design and construction should evaluate the seriousness of all deficiencies as soon as they are detected.

Dam failures can be no-notice failures that occur during non-flooding situations when reservoirs are at normal levels. No-notice failures are generally more hazardous because of their unexpected nature and little warning time for evacuation. Other failures occur during periods of excessive rainfall or flooding and can exacerbate inadequate spillway capacity. Dam failures can be a cascading event following a large wildland fire, where heavy rains may rapidly runoff of burnt areas unable to absorb the excess water into an impoundment that subsequently cannot handle the additional water. Finally, though improbable and likely low-impact, seismic events could destabilize a dam just enough to prompt deterioration or failure.

Location and Extent

The Code of Maryland Regulations (COMAR) defines a dam as any obstruction, wall, or embankment with its abutments and appurtenant works built to store or divert water. The seemingly simple act of impounding water for various uses creates an inherent risk of flooding, downstream property damage, and the potential for loss of life (MDE, n.d.B). MDE reports the presence of over 600 dams in Maryland, ranging in height from six to 296 feet (n.d.B). The U.S. Army Corps of Engineers National Inventory of Dams (NID) (2020) reports a slightly different figure for Maryland, 425 dams, with an average age of 56 years.

For Washington County, the NID lists 20 dams (USACE, 2020). The KMZ layer available for download from the MDE website includes 37 dams in Washington County. Dam information maintained by the Washington County Office of Emergency Management (WCOEM) lists 38 dams in Washington County. However, the Trovinger Mill Dam listing does not contain a hazard classification. Thus, the WCOEM's list includes 37 dams with a hazard classification (thereby matching the MDE data). For the remainder of this profile, the analysis will be based on these 37 facilities, as noted in the following table.

WASHINGTON COUNTY DAMS												
State ID	*National ID*	*Dam Name*	*Hazard Class*	*River/Stream*	*Dam Type*	*Purpose*	*Year Completed*	*Year Dam Modified*	*EAP (w/ Rev. Date)*	*Dam Height (ft.)*	*Normal Pool Depth (ft.)*	*Dam Length (ft.)*
61	MD00061	Blairs Valley Dam	HIGH	Little Conococheague Creek	Earth	Recreation	1968	1983	Y, 04/30/2021	34	25	670
304	MD00278	Charles Mill	LOW	Little Conococheague Creek	Masonry	Recreation	1800 Est.		NR	16	8	89
429	MD00387	Cortland Manor SWM Dam	LOW	Antietam Creek-TR	Earth	Flood Control, Stormwater Management	2006	2006	NR	14.5	0	320
271	MD00256	Devils Backbone Dam	LOW	Antietam Creek	Gravity	Recreation	1910	2012	NR	8	8.1	186
272	MD00257	Doubs Mill	LOW	Beaver Creek	Gravity	Recreation	1815	1984	NR	10	9	100
42	MD00042	Greenbrier State Park Dam & Dike	HIGH	Little Beaver Creek-TR	Earth	Recreation	1965	1996	Y, 05/01/2020	64	50.5	445
289	MD00266	Hagerstown City Park Lake (Key Street)	LOW	Antietam Creek-TR	Earth	Recreation	1920	1920	NR	10	3	450
285	MD00264	Hagerstown Municipal Power Plant Dam	LOW	Antietam Creek	Gravity	Water Supply	1950	2015	NR	10	10	250
96	MD00096	Hancock Sewage Lagoon	LOW	Offstream-Tonoloway Creek	Earth	Wastewater	1963	1963	NR	8	7	2000
280	MD00262	Keedysville Dam	LOW	Little Antietam Creek	Masonry	Recreation	1900 Est.	1900	NR	11	11	120
303	MD00277	Kemps Mill	LOW	Conococheague Creek	Gravity	Recreation, Other	1746	2007	NR	13	9	150

WASHINGTON COUNTY DAMS												
State ID	*National ID*	*Dam Name*	*Hazard Class*	*River/Stream*	*Dam Type*	*Purpose*	*Year Completed*	*Year Dam Modified*	*EAP (w/ Rev. Date)*	*Dam Height (ft.)*	*Normal Pool Depth (ft.)*	*Dam Length (ft.)*
360	MD00318	Kurt Sherman Dam (Upper Pond)	HIGH	Offstream-Dry Run	Earth	Recreation, Irrigation	1957	1957	Y, 05/09/2021	28	17.7	1060
153	MD00153	Lake Jenkins	LOW	Potomac River-TR	Arch, Masonry	Recreation	1936	1936	NR	35	22.3	170
152	MD00152	Lake Lanahan	LOW	Potomac River-TR	Earth	Recreation	1930	1930	N/A	26		316
62	MD00062	Little Tonoloway Dam	LOW	Little Tonoloway Creek	Earth	Recreation	1953	1953	NR	17	13.9	423
283	N/A	Long Hollow Dam	LOW	Potomac River-TR	Other	Recreation	1940	2000	NR	25	4	200
70	MD00070	Lower Lake Royer	HIGH	Falls Creek-TR	Earth, RCC	Water Supply, Recreation	1898	1995	Y, 04/22/2022	19	15.5	900
629	MD00629	MKS Stormwater Pond	LOW	Antietam Creek-TR	Earth	Stormwater Management - Dry	1991	2002	NR	9.5	0	175
188	MD00188	Oliver Company (Lower Pond)	SIGNIFICANT	Offstream-Dry Run	Earth	Recreation	1957	1957	Y, 10/10/2013	14	17.7	1060
281	N/A	Poffenberger Dam	LOW	Antietam Creek	Gravity, Other	Other	1700	N/A	N/A	4	N/A	100
137	MD00137	Potomac River Dam #3	LOW	Potomac River	Other	Recreation	1870	1991	N/A	15	N/A	1500
78	MD00078	Potomac River Dam #4	LOW	Potomac River	Masonry, Gravity	Hydro Electric, Recreation	1869	1994	NR	20	7	715
138	MD00138	Potomac River Dam #5	LOW	Potomac River	Masonry, Gravity	Hydro Electric, Recreation	1850	1993	NR	20	17	811

WASHINGTON COUNTY DAMS												
State ID	*National ID*	*Dam Name*	*Hazard Class*	*River/Stream*	*Dam Type*	*Purpose*	*Year Completed*	*Year Dam Modified*	*EAP (w/ Rev. Date)*	*Dam Height (ft.)*	*Normal Pool Depth (ft.)*	*Dam Length (ft.)*
274	N/A	Potomac River Dam #6	LOW	Potomac River	Masonry	Other	1840	N/A	N/A	N/A	N/A	0
119	MD00119	R. Paul Smith Dam	LOW	Potomac River	Gravity	Other	1923	1923	NR	6	7.5	700
287	N/A	Rose Mill Dam	LOW	Antietam Creek	Gravity, Other	Other	1700	N/A	N/A	3	N/A	50
288	N/A	Roxbury Mill Dam	LOW	Antietam Creek	Rockfill	Other	1700	N/A	N/A	N/A	N/A	0
240	MD00235	Security Mill Dam	LOW	Antietam Creek	Gravity, Other	Recreation	1900 Est.	1900	NR	8	8	137
7	MD00007	Smithsburg Reservoir	SIGNIFICANT	Beaver Creek-OS	Earth	Water Supply	1881	2010	Y, 04/30/2022	16	14	2000
157	MD00157	Upper Lake Royer	LOW	Falls Creek-TR	Earth	Water Supply, Recreation	1898	1993	NR	12	11.5	550
525	MD00525	Valley Mall Expansion SWM Dam	LOW	Conococheague-TR-Semple Run	Earth	Storm Water Management	1987	1987	NR	19	0	1900
616	MD00616	Vista Business Park	HIGH	West Branch Marsh Run-TR	Concrete	Stormwater Management, Flood Control	2020	N/A	Y, 05/05/2021	12.5	0	275
581	MD00581	Volvo Hagerstown SWM	SIGNIFICANT	Antietam Creek-TR	Earth	Recreation	1961	N/A	Y, 04/07/2022	6.5	0	253
6	MD00006	Warner Gap Hollow Dam	HIGH	Warner Gap Hollow Creek	Earth	Water Supply	1902	1993	Y, 04/30/2022	65	51	700
417	MD00375	Widmyer Park (Town of Hancock)	LOW	Little Tonoloway Creek	Gravity	Recreation	1900 Est.	1900	NR	4	3	100
573	MD00573	Widmyer Park Upper	LOW	Little Tonoloway Creek	Gravity	Water Supply	1900 Est.	1900	NR	7	N/A	100

WASHINGTON COUNTY DAMS												
State ID	*National ID*	*Dam Name*	*Hazard Class*	*River/Stream*	*Dam Type*	*Purpose*	*Year Completed*	*Year Dam Modified*	*EAP (w/ Rev. Date)*	*Dam Height (ft.)*	*Normal Pool Depth (ft.)*	*Dam Length (ft.)*
479	MD00434	Willson Water Treatment Plant Levee	SIGNIFICANT	Offstream-Potomac River	Earth	Flood Control	1927	1955	Y, 04/28/2022	30	0	N/A

The average height of the dams in Washington County is 17.71', while the average length is 558.09'. The oldest dams, estimated to have been constructed in 1700, are the Rose Mill and Roxbury Mill Dams, while the most recently-constructed dam (i.e., 2020) is the Vista Business Park Dam on West Branch Marsh Run. Maryland Department of the Environment, Dam Safety is the state regulatory entity, and 30 of the 37 (80.08%) dams under consideration are state-regulated.

The hazard classification breakdown is as follows: six facilities are HIGH hazard (16.22%), four facilities are SIGNIFICANT hazard (10.81%), and the remaining 27 facilities are LOW hazard (72.97%). Of the six high-hazard facilities, the average age (per original construction) is 70.33 years. The Vista Business Park structure was built in 2020, while the Lower Lake Royer structure was initially constructed in 1898 (though it received a modification in 1995). The Warner Gap Hollow Dam was built in 1902 (with a 1993 modification).

The average height of the high hazard structures is 37.08' (with a range of 12.5' to 65'), and the average length is 675' (with a range of 275' to 1,060'). The pool depth behind the structure ranges from 0' to 51' (with an average of 26.62'). The Blairs Valley, Greenbrier State Park, Kurt Sherman, and Lower Lake Royer facilities are for recreational purposes. Lower Lake Royer is also a water supply dam, as is the Warner Gap Hollow Dam. The Kurt Sherman Dam also provides irrigation. The Vista Business Park structure is a stormwater management/flood control dam. See the "Loss and Damages" section below for an estimate of the size of populations, number of at-risk structures, etc., at risk of a failure of the dams for which Washington County has an on-file emergency action plan (EAP). The inundation maps in these EAPs estimates the location of potential impact areas.

The following map shows the locations of the dams in Washington County (with the hazard classifications denoted).

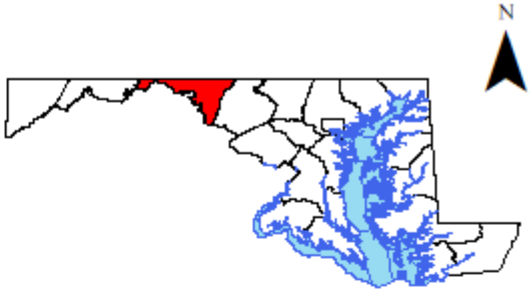
WASHINGTON COUNTY HAZARD MITIGATION PLAN

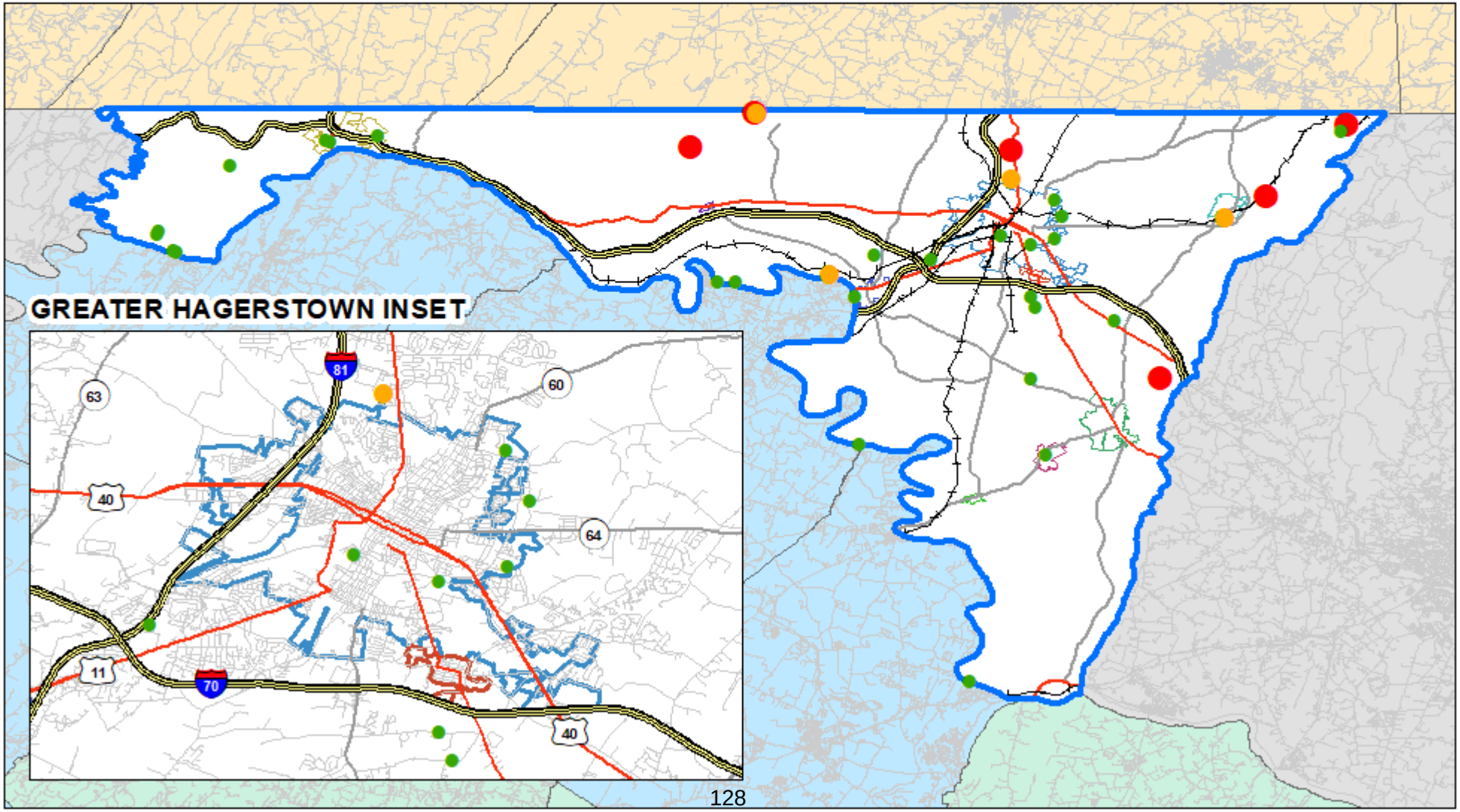
Dams by Hazard Classification

Data Source(s):
MDE Dam Safety, Washington County OEM

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

- High Hazard
- Significant Hazard
- Low Hazard





As noted, the Maryland Department of the Environment (MDE) oversees the state's dam safety program. As overseer, MDE works with dam owners and engineers to ensure design, construction, operation, and maintenance to prevent failures and the resulting consequences to the extent possible. The MDE is also responsible for inspecting dams for safety based on the "hazard classification, downstream hazard conditions, issuing permits for new constructions and repairs to existing structures" (n.d.B).

MDE also coordinates with dam owners and emergency management professionals to develop an EAP for high and significant hazard structures. MDE makes an MS Word template available on its website (https://mde.maryland.gov/programs/water/DamSafety/Pages/model_eap.aspx) for reference and to ensure that EAPs meet a minimum set of requirements. EAPs must include data on event detection, emergency level determination, notifications and communications, expected actions, and plan termination. They should include inundation maps. In Washington County, 10 dams require EAPs, nine of which are on file with the WCOEM. Of the 10 required EAPs, nine had been updated since 2020 (at the time of this plan's update in 2023). Washington County officials participate in exercises with dam owners, often in concert with MDE efforts. Sometimes, a single exercise can address multiple facilities (e.g., when owners or inspectors are consistent).

The EAPs are important in mitigating risk for two primary reasons. First, and most obviously, the plans outline the emergency response guidelines should an incident occur. Part of an EAP discusses how dam owners would notify emergency response personnel and warn those downstream from a dam. During EAP preparation, dam owners should coordinate with local authorities to determine the capabilities and limitations of emergency response agencies. Secondly, EAPs for high-hazard dams identify a potential inundation area that allows responders to work directly with potentially-impacted communities and facilities. Current and accurate inundation areas also identify areas where property owners can consider mitigation actions. The following map shows the dams listed by the age of their EAP.

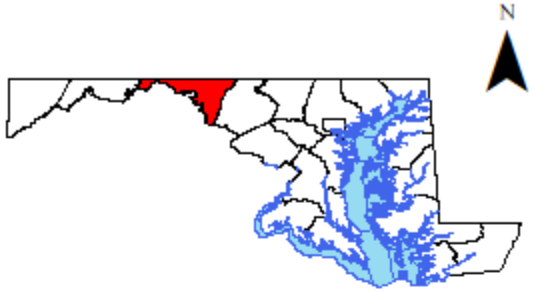
WASHINGTON COUNTY HAZARD MITIGATION PLAN

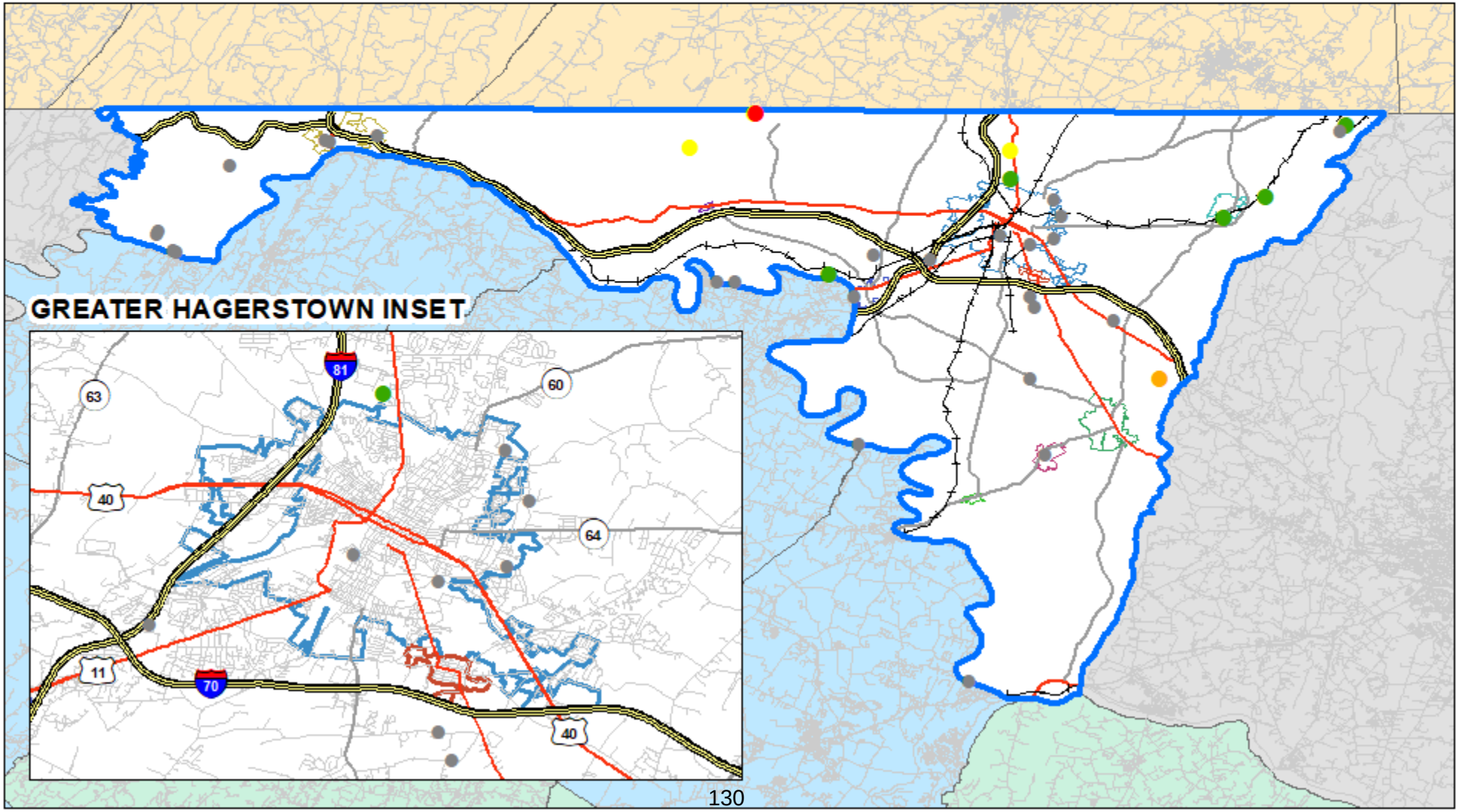
Dams by Most Recent Date on EAP

Data Source(s):
MDE Dam Safety, Washington County OEM

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

- Updated in 2022
- Updated in 2021
- Updated in 2020
- Updated before 2020
- EAP Not Required





The WCOEM distributed a survey to the owners of the dams in the county (for which the on-file EAPs included specific contact information). The response rate was 50% (*n=2*; the county recognizes a need to obtain additional points of contact to survey with a larger sample). Still, the survey did yield insights about monitoring dams during significant rain events (the owner inspects the dam per the EAP in the event of severe weather) and potential projects (the respondent noted a project for inclusion in the mitigation plan).

Dams located outside of Washington County could impact areas within the county. The Waynesboro Borough Authority's Antietam Dam in Hamiltonban Township, Pennsylvania, is one such structure. The inundation area resulting from a sudden failure of that structure is along the east branch of Antietam Creek, and the EAP for the facility indicates that minor flooding could extend into Washington County (i.e., most likely the Ringgold and Leitersburg areas). A failure of the Jennings Randolph Lake Dam (located on the state line in Garrett County, Maryland, and Mineral County, West Virginia) could impact areas along the Potomac River through Shepherdstown, West Virginia (including much of southern Washington County). Additionally, a failure of the Meadow Grounds Lake Dam in Fulton County, Pennsylvania, could impact western Washington County along Licking Creek between Hancock and Clear Spring.

Impacts and Vulnerability

The hazard classification of a dam (referenced above) corresponds to the potential for downstream flooding, not the structural integrity of a dam. The table below describes the downstream effects of a dam failure based on the hazard class.

DAM HAZARD CLASSIFICATIONS			
Dam Hazard Potential Classification	*Low Hazard Potential*	*Significant Hazard Potential*	*High Hazard Potential*
Loss of Human Life	None expected	None expected	Probable
Economic Loss	Low and generally limited to owner	Yes	Yes (but not necessary for this classification)
Environmental Damages	Low and generally limited to owner	Yes	Yes (but not necessary for this classification)
Lifeline Interest Impacted	No	Yes	Yes (but not necessary for this classification)

Further, there are generally three types of risks associated with dams: incremental risk, non-break risk, and residual risk.

- **Incremental Risk:** The risk (likelihood and consequences) to the pool area and downstream floodplain occupants attributed to the presence of the dam should the dam breach prior to or after overtopping or undergo component malfunction or misoperation, where the consequences considered are over and above those that would occur without dam breach. The consequences typically are due to downstream inundation, but a loss of the pool can result in significant impacts in the pool area upstream of the dam.
- **Non-Breach Risk:** The risk in the reservoir pool area and affected downstream floodplain due to 'normal' operation of the dam (e.g., large spillway flows within the design capacity that exceeds channel capacity) or 'overtopping of the dam without breaching' scenarios.
- **Residual Risk:** The risk remaining after completing all mitigation and risk reduction actions. Concerning dams, FEMA defines residual risk as "risk remaining at any time" (FEMA, 2018). It is the risk that remains after decisions related to a specific dam safety issue are made and prudent actions have been taken to address the risk. It is the remote risk associated with the condition that was judged not to be a credible dam safety issue.

Social Vulnerability Considerations

There may be social vulnerability variables at play with respect to both dam failure risk and impacts. When constructing dams, locations are typically those where should the structure fail, resultant damage would be minimal (e.g., farmland or wildland). There are instances, though, where large infrastructure projects like highway projects displaced socially vulnerable populations thanks to a perception of lower property values (Norwood, 2021). Examples of similar dam projects are much fewer than roadways (and there is no evidence of this having been the case with the construction of dams in Washington County), and with the benefit of this hindsight, future dam projects can avoid those mistakes, thereby minimizing risks and some impacts exclusively to socially vulnerable populations.

Regarding impacts, imminent dam failure necessitates rapid notification of potentially-impacted populations. Those with low English proficiency may not understand immediate warnings to evacuate. Further, they may be caught off guard by imminent warnings because of similar effects surrounding awareness messages about deteriorating conditions associated with nearby dams. Further, upon receiving an evacuation notice, households with no vehicle can experience difficulty evacuating. The following maps show, first, areas with higher ratios of people speaking English “less than well,” and second, households with no vehicle available.

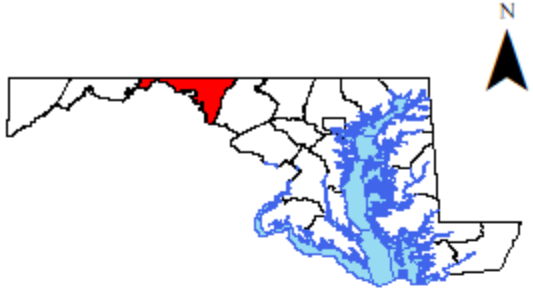
WASHINGTON COUNTY HAZARD MITIGATION PLAN

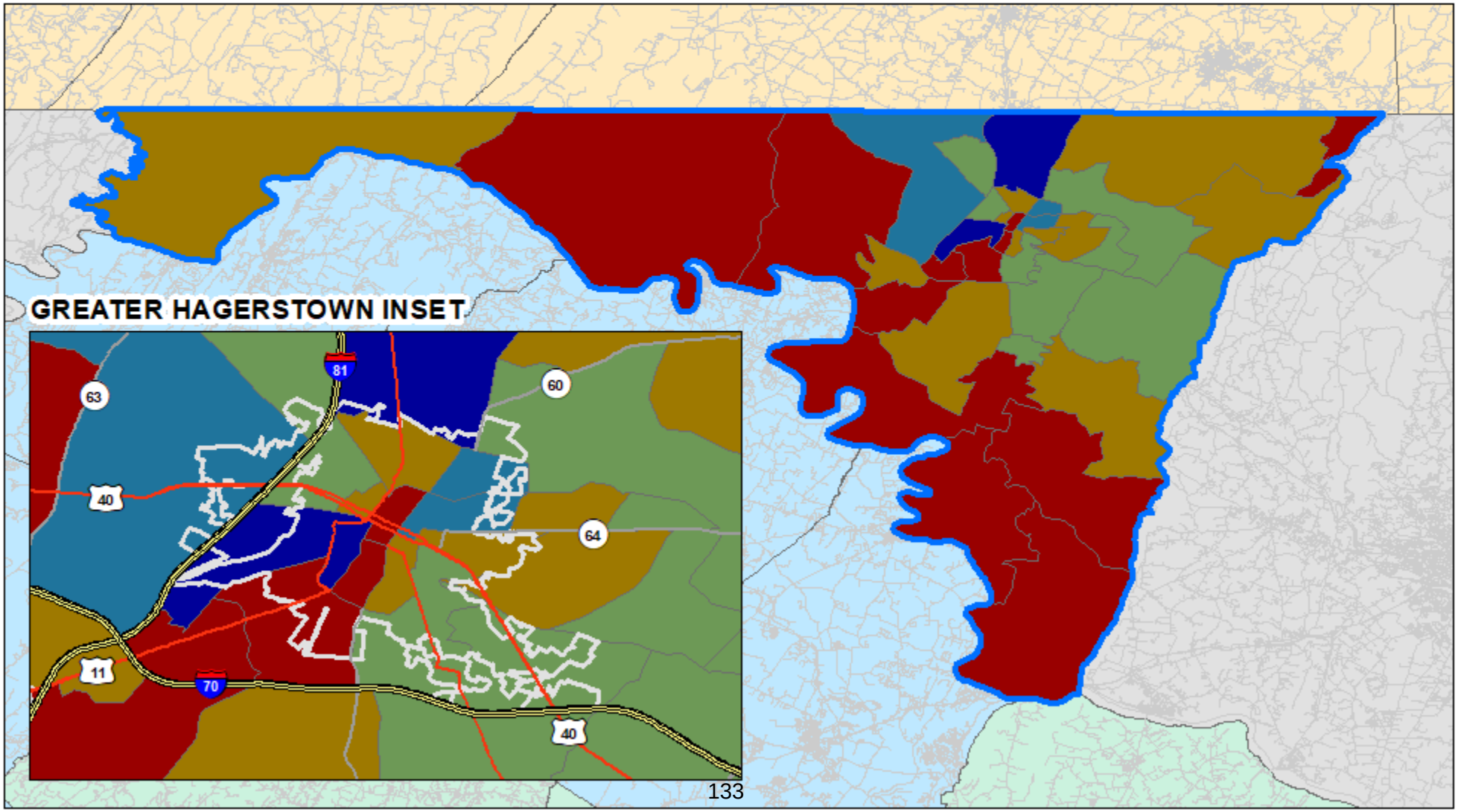
Persons Speaking English Less than Well

Data Source(s):
CDC SVI Index (2020)

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

- 0 - 10 persons
- 11 - 36 persons
- 37 - 75 persons
- 76 - 127 persons
- 128 - 235 persons





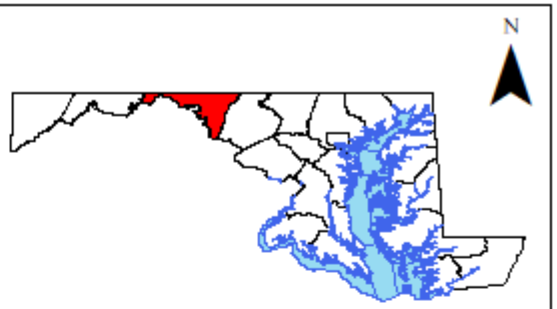
WASHINGTON COUNTY HAZARD MITIGATION PLAN

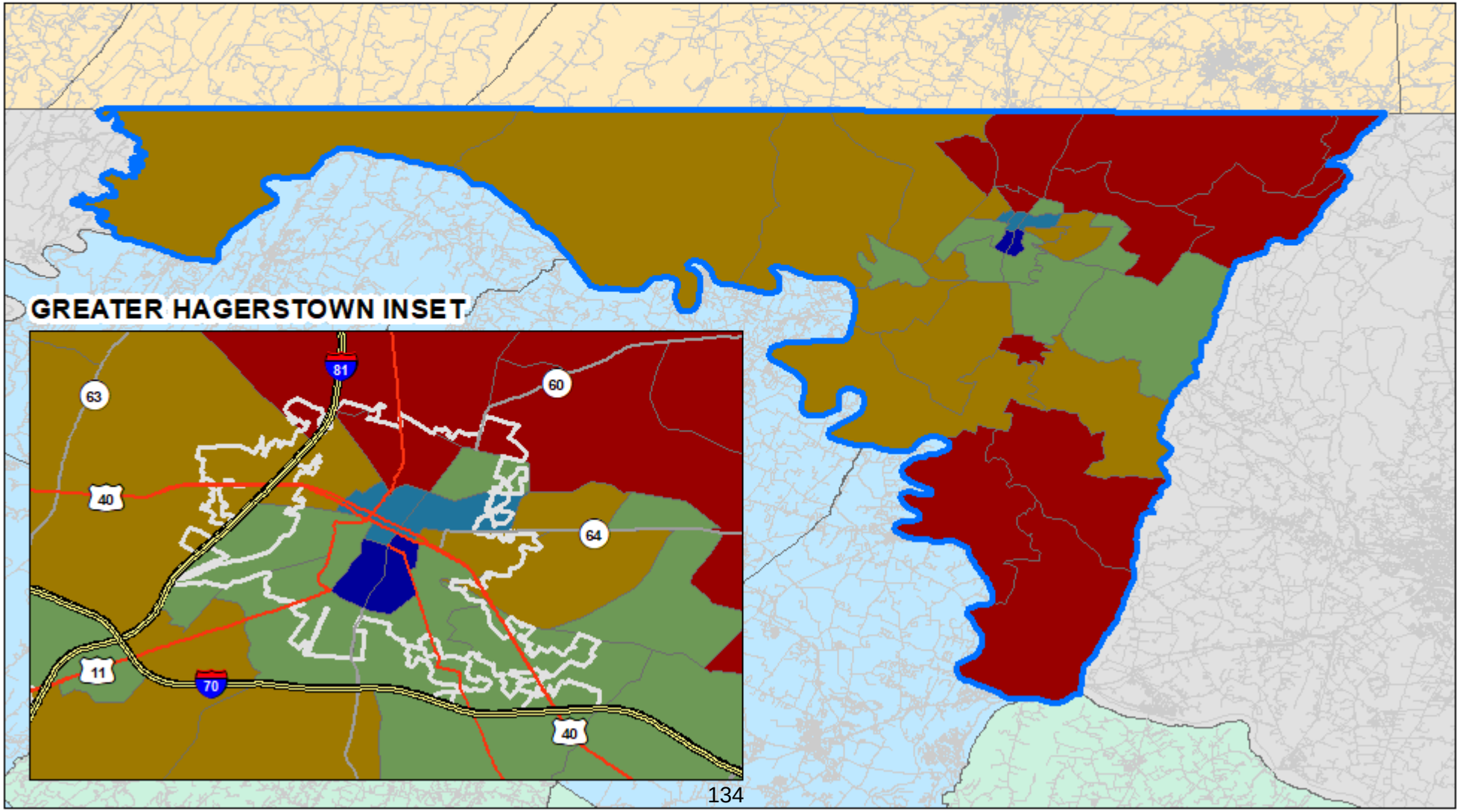
Households w/ No Vehicle Available

Data Source(s):
CDC SVI Index (2020)

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

- 0 - 45 households
- 46 - 103 households
- 104 - 202 households
- 203 - 405 households
- 406 - 681 households





Historical Occurrences

The National Performance of Dams Program (NPDP) at Stanford University maintains records on modifications, repairs, incidents and their consequences, and inspections for dams in the United States and worldwide. According to the NPDP, since 1929, there have been two incidents, both occurring on the same day, in Washington County (NPDP, 2022). On May 7, 1999, the Lake Lanahan Dam overtopped and breached during an intense rainfall event. The breach went to the bottom of the structure, emptying the reservoir and damaging the Lake Jenkins Dam below it. (This inflow flood event at Lake Jenkins was the NPDP's second reported incident.) As a result, the Lake Lanahan structure was not rebuilt, with a channel created through the embankment designed to carry flood flows.

The state's hazard mitigation plan also lists dam failures in Maryland (MDEM, 2021, pp. 79-81). It reports four incidents at Washington County dams (including the aforementioned Lake Lanahan incident). In 1936, Potomac River flooding caused Potomac River Dam #4 to fail. In 1979 following Tropical Storm David, the Lower Lake Royer Dam overtopped and needed sandbagging, prompting the evacuation of Rouzerville, Pennsylvania. Heavy rains in 2014 caused a flood of record at the Blairs Valley Dam to within two feet of the emergency spillway, resulting in the evacuation of Clear Spring.

More recently, the owner activated the emergency action plan for the Volvo Hagerstown SWM structure when heavy rains in the remnants of Hurricane Ida overwhelmed the dam's drainage system in 2021. Firefighters pumped water from the reservoir to avoid a dam breach or overflow. A safety check during the storm identified leaks on the side of the dam. Nearby St. Maria Goretti High School closed for one day while the emergency operation was underway (Greene, 2021).

Loss and Damages

Planners can calculate dam failure losses in several ways. Generally, the *2021 State Hazard Mitigation Plan* lists 26 critical facilities at risk of dam failure in Washington County, with an aggregated building value of $105,835,300 and a contents value of $22,200,500 (total loss = $128,035,800) (MDEM, 2021, pp. 83-84). Further, the U.S. Army Corps of Engineer's National Inventory of Dams website (https://nid.sec.usace.army.mil/#/) will soon include inundation area mapping, which will allow communities to see individual structures potentially at risk (that could serve as the basis of a loss estimate). Similarly, the Maryland Department of the Environment is preparing to finalize and share inundation mapping for all Maryland dams in its inventory using

the Decision Support System for Water Infrastructure Security (DSS-WISE)-Lite flood modeling software.

For Washington County, the available EAPs include structures potentially at risk of a dam failure. The following table summarizes those structures and estimates losses by summing the at-risk structure totals in the EAPs.

LOSS ESTIMATE – DAM FAILURE					
Dam Facility	*Structures at Risk*	*Residences at Risk*	*Businesses at Risk*	*Quantifiable Loss Estimate*[2]	*Additional Risks (unable to be estimated)*
Blairs Valley Dam	72	N/A	N/A	$16,545,600	N/A
Lower Lake Royer Dam	---	75	6	$19,329,000	14 highways
Greenbrier State Park Dam	---	61	1	$14,366,800	N/A
Kurt Sherman Dam	---	7	0	$1,608,600	1 street
Oliver Company Dam	---	12	0	$2,757,600	1 street
Smithsburg Dam #7	39	N/A	N/A	$8,962,200	One church, four unimproved properties, one private road, four public roads
Vista Business Park Dam	---	31	0	$7,123,800	N/A
Volvo Hagerstown SWM	---	0	2	$698,000	1 highway, 1 of the businesses is a private school
Warner Gap Hollow Dam	---	50	1	$11,839,000	12 unimproved properties, 11 highways, one railroad track
Totals	**111**	**236**	**10**	**$83,230,600**	

Future Occurrences

The state of dam infrastructure in Maryland is a concern. As dams age, they become susceptible to issues related to that age (concerning the life span of materials used in construction). The average age of dams in Washington County is 123.81 years. However, seven modification projects have occurred since (and including) 2000, and another seven occurred in the 1990s. The communities around dams, particularly upstream along the waterways they impound, also change. While some changes, such as declining population in those upstream

[2] To calculate losses, planners used the following as a base for calculations.
- $229,800 per residential structure, which is the median value of owner-occupied housing units in Washington County, per the U.S. Census Bureau (2020)
- $349,000 per business, which is the total sales/receipts/revenue for the available economic classifications in U.S. Census (2020) data (i.e., "accommodation and food services," "health care and social assistance," "transportation and warehousing," and "retail") divided by the total number of business (i.e., employer + non-employer) establishments
- Because the number of residences far exceeds the number of businesses, the residential estimate formed the basis of the calculation for the two facilities without estimates by structure type.

areas, might not alter the risk profile in measurable ways, other changes, such as increased development (leading to increased runoff) upstream, can strain dams.

The American Society of Civil Engineers (ASCE) regularly issues a "report card" on America's infrastructure with state-by-state breakdowns. The ASCE's 2020 grade for Maryland's dams was a "C-." The ASCE notes that 45% of the state's dams are classified as high-hazard potential. Maryland performs better than many other states, but funding for repairing dams and ponds, as well as staffing the MDE's dam safety division, is lacking).

Future Climate Considerations

Maryland's state hazard mitigation calls attention to more intense precipitation events, a finding consistent with Washington County's steering committee's experiences. Though not firm conclusions, the Maryland Commission on Climate Change (2008) predicts changes to precipitation patterns (consistent with many other sources) to include increased precipitation in the spring and winter. The *National Climate Assessment* (USGCRP, 2018) predicts increases in the frequency and intensity of heavy precipitation in the northeast United States (including Maryland). These (and other) types of climate change variables may impact dams, particularly those that are aging and otherwise ranked as "high-potential loss" facilities.

Vulnerability Assessment

This section summarizes the vulnerability of Washington County to dam failure. The steering committee conducted an online survey for the public to share its thoughts on the hazards listed in this plan. The following table presents the results of that survey, specifically regarding dam failure.

PUBLIC SENTIMENT, DAM FAILURE					
Hazard	*Level of Concern*				*Total Responses*
	Not at All	*Somewhat*	*Concerned*	*Very*	
Dam Failure	89 (70.63%)	28 (22.22%)	9 (7.14%)	0 (0.00%)	126
In the past ten years, do you remember this hazard occurring in your community?				1 (0.80%)	126
Have you noticed an increase in the occurrences or intensity of this hazard?				0 (0.00%)	126
Have you noticed a decrease in the occurrences or intensity of this hazard?				0 (0.00%)	126

The following table assigns point totals based on the methodology identified in Section 2.2: Profile Hazards above.

DAM FAILURE RISK RANKING			
Category	*Points*	*Description*	*Notes*
Frequency	2	Unlikely to occur in a year	Washington County experienced six incidents between 1936 and 2022, for an average of 0.07 incidents per year.
Response	2	One day	Though recovery operations may extend past a single day, the initial response to a dam failure would likely be one day.
Onset	3	6-12 hours	The available EAPs include monitoring for potential emergency incidents, and with tracking in place, some warning would be available. While a catastrophic failure could occur without notice, planners used a more plausible scenario as the basis of this estimate.
Magnitude	1	Localized (less than 10% of land area affected)	A catastrophic failure of the largest structure in the county would not impact more than 10% of the county's total land area.
Business	4	More than 30 days	A catastrophic dam failure that impacted a business would likely necessitate rebuilding that business.
Human	1	Minimum (minor injuries)	There are no injuries on record from the six dam-related incidents.
Property	1	Less than 10% of property affected	A catastrophic failure of the largest structure in the county would not impact more than 10% of the properties in the county.
Totals	**14**	**LOW**	

FEMA's *Local Mitigation Planning Handbook* (2023c) directs entities compiling multi-jurisdictional plans to identify any jurisdictions within the planning area for which the identified risks or vulnerabilities are more or less prevalent as compared to the other participating jurisdictions. The following table quickly synthesizes the data to capture the jurisdiction-specific aspects of risks and vulnerabilities for each city or town.

MULTI-JURISDICTIONAL CONSIDERATIONS, DAM FAILURE		
Jurisdiction	*Comparison*	*Notes*
Washington County	**More**	**The high-hazard dams in the county are in unincorporated areas.**
Boonsboro	Less	There are no dams within or near (relatively speaking) Boonsboro's corporate limits.
Clear Spring	Less	Though the Blairs Valley Lake is nearby, Clear Spring is not downstream of its outflowing stream. There are otherwise no dams within the town's corporate limits.
Funkstown	Same	Though there are no dams within Funkstown's corporate limits, the failure of nearby structures, under the right conditions, could impact portions of the town.
Hagerstown	Same	Hagerstown includes several small impoundments, but they are minimal-risk structures.
Hancock	Same	Hancock includes three small impoundments, but they are minimal-risk structures.
Keedysville	Same	Keedysville includes one small impoundment, but it is a minimal-risk structure.
Sharpsburg	Less	There are no dams within or near (relatively-speaking) Sharpsburg's corporate limits.
Smithsburg	More	The town's water supply reservoir sits just south of its corporate limits. The associated dam is a "significant hazard" structure, and its failure could impact nearby structures (mostly residential).
Williamsport	Same	There are dams near to Williamsport's corporate limits, but a failure of any of them would not likely impact structures in the town.

2.2.2 Drought

A drought is a period of abnormally dry weather that persists long enough to produce a severe hydrological imbalance.				
Vulnerability  HIGHEST HIGH MEDIUM LOW LOWEST	**Period of Occurrence:**	At any time, typically after a period of prolonged absence of precipitation	**Washington County Risk Ranking:**	Medium
	Warning Time:	Over 24 hours	**State Risk Ranking:**	Medium
	Probability:	Remote (unlikely to occur on an annual basis)	**Impact:**	Critical (25-50% of land area affected)
	Type of Hazard:	Natural	**Disaster Declarations:**	USDA FSA S4165 (2016) USDA FSA S4606 (2019) USDA FSA S5122 (2021) USDA FSA S5142 (2021)

Hazard Overview

"Drought" is a period of abnormally dry weather which persists long enough to produce a severe hydrological imbalance. Drought is a term used in relation to who or what is affected by the lack of moisture. Drought can result from multiple causes, including global weather patterns that produce persistent, upper-level high-pressure systems with warm, dry air, resulting in less precipitation. Droughts develop slowly; typically, they are already underway when officially identified. There are several types of droughts (Sears, 2017, p. 138).

- **Meteorological Drought:** Differences from the normal precipitation amounts. Because not every area receives the same amount of rainfall, a drought in one place might not be considered a drought in another.
- **Agricultural Drought:** Moisture deficiency seriously detrimental to crops, livestock, or other agricultural commodities. Parched crops may wither and die. Pastures may become insufficient to support livestock. The effects of agricultural droughts are difficult to measure because many other variables may impact production during the same growing season.
- **Hydrological Drought:** Reduction in stream flow, lake and reservoir levels, depletion of soil moisture, and a lowering of the groundwater table. Consequently, there is a decrease in groundwater discharge to streams and lakes. Prolonged hydrological drought will affect the water supply.
- **Socioeconomic Drought:** A lack of water that begins to affect people's daily lives.

Precipitation falls in uneven patterns across the country; the amount of precipitation at a particular location varies from year to year, but over the years, the average amount is reasonably constant. The amount of rain and snow also varies with the seasons. Even if the total amount of

rainfall for a year is about average, rainfall shortages can occur when moisture is critically necessary for plant growth, such as in early summer. When little to no rain falls, soils can dry out, and plants can die. When rainfall is less than normal for several weeks, months, or years, the water in wells decreases. If dry weather persists and water-supply problems develop, the dry period can become a drought.

Location and Extent

Droughts occur throughout North America, and in any given year, at least one region will experience drought conditions. Droughts are countywide phenomena, and as such, within Washington County, the effects of drought would be nearly equal throughout the county. The severity of drought can vary throughout the year; what begins as a mild drought can become severe or extreme, then subside to a mild incident. This process can take weeks or months, and the effects linger after drought conditions end.

The Palmer Drought Severity Index (PDSI) is a well-known measure of drought used to track moisture conditions. The PDSI is "an interval of time, generally in months or years in duration, during which the actual moisture supply at a given place rather consistently falls short of the climatically appropriate moisture supply." The range of the PDSI is from -4.0 (extremely dry) to +4.0 (excessively wet), with the central half (-0.5 to +0.5) representing the normal or near-normal conditions. In the United States, the USDA, National Drought Mitigation Center at the University of Nebraska-Lincoln, U.S. Department of Commerce, and National Oceanic and Atmospheric Administration (NOAA) developed another measurement of droughts named the U.S. Drought Monitor (USDM). The table above shows the two scales and how they compare.

USDM AND PDSI COMPARISON

U.S. Drought Monitor		*Palmer Drought Severity Index*	
N/A		> 4.0	Extreme moist spell
		3.0 to 3.99	Very moist spell
		2.0 to 2.99	Unusual moist spell
		1.0 to 1.99	Moist spell
		0.50 to 0.99	Incipient moist spell
		-0.49 to 0.49	Near normal
		-0.5 to -0.99	Incipient dry spell
D0	Abnormally dry	-1.0 to -1.99	Mild drought
D1	Moderate drought	-2.0 to -2.99	Moderate drought
D2	Severe drought	-3.0 to -3.99	Severe drought
D3	Extreme drought	< -4.0	Extreme drought
D4	Exceptional drought	N/A	

In addition to the PDSI, the Crop Moisture Index (CMI) calculates the change in moisture available from week to week, which gives a short-term status of agricultural moisture (NOAA NIDIS, n.d.). The table at right describes the Crop Moisture Index.

CROP MOISTURE INDEX	
Crop Moisture Index Value	*Drought Condition*
3.0 and up	Excessively Wet
2.0 to 2.9	Wet
1.0 to 1.9	Moist
-0.9 to 0.9	Slightly Dry/Favorable Moist
-1.0 to -1.9	Abnormally Dry
-2.0 to -2.9	Excessively Dry
-3.0 or less	Severely Dry

A growing population, with individual and commercial demands upon water supplies, coupled with industrial and agricultural uses, will combine to affect water use during both normal and drought conditions. Most municipalities in Washington County rely on surface water for their water supply, primarily from the Potomac River. Both the Bloomington Dam and Savage River Dam regulate the river's flow; therefore, this water supply should remain adequate during drought conditions for the next several decades. The communities using wells and springs, which have access to limestone or sandstone aquifers, typically have a good supply of water through periods of drought.

Impacts and Vulnerability

Droughts can impact drinking water both in terms of availability and demand. According to the U.S. Environmental Protection Agency (EPA), as temperatures rise, people and animals need more water to maintain health. Additionally, a large number of economic activities require abundant water sources, such as energy production and growing food crops. As droughts reduce available water sources, local officials will need to monitor water usage closely to maintain enough for critical uses. An extreme drought would harm the large agricultural sector of Washington County, which makes up approximately 45 percent (45%) of the land cover, or about 131,904 acres. In 2017, Washington County had 877 farms in operation, with an average size of 136 acres per farm. These farms produced nearly $154 million of crops and livestock (USDA NASS, 2023).

Water supplies in Washington County are a mix of public and private systems. Public systems include Highfield, Boonsboro-Keedysville, the Town of Funkstown, the City of Hagerstown, the Town of Hancock, Mount Aetna, the Town of Sharpsburg, the Town of Smithsburg, and the Town of Williamsport. A small percentage of Washington County relies on private water wells. Many of these private wells can become dry during a drought before the public systems show significant loss depending on the use, size, and depth of the wells.

Prolonged droughts can affect the municipal ability to provide adequate water supplies, as water storage may become critically low. Local officials may enact and enforce mandatory

water conservation measures and water use priorities. The Maryland Department of Health (MDH) may have to conduct water quality sampling of numerous private water wells throughout the region as a buildup of contaminants in these wells is common during extreme drought conditions. Local clinics and hospitals may see a significant increase in respiratory infections (i.e., asthma, bronchitis, and pneumonia) resulting from the extremely dry and windy conditions affecting air quality.

The significant lowering of the groundwater table and a decrease in groundwater discharge to streams and lakes may affect tourism and recreational attractions at parks and lakes. The Maryland Department of the Environment, Water Resources, in coordination with the Maryland Department of Natural Resources (MDNR), may post no boating and no swimming signs at lakes and streams where water quality standards are not met due to stagnant and contaminated water. Stagnant water from reduced levels can provide a breeding ground for disease-carrying mosquitoes.

The effects of drought would negatively impact the following business types throughout Washington County: farms, local water utilities, restaurants, the tourism industry (recreation at parks and lakes, golfing, boating, fishing, etc.), laundry mats, community swimming pools, and car washes. The following table (MDEM, 2021) describes the effects of drought on demographics, infrastructure and buildings, the environment, delivery of services, the economy, and public confidence in governance.

DROUGHT CONSEQUENCE ANALYSIS	
Impact Type	*Impact Description*
Public/Responder Health & Safety	Impacts on the public during a drought take the form of crop damage, water rationing and other water source impacts, and wildfires. First responders would be most concerned with the secondary effects of drought, such as wildfires. As such, first responders would be called to incident areas to evacuate people from the fire area, close roads, create fire breaks, and attend to injuries.
Continuity of Operations (Delivery of Services)	The impacts on continuity of operations due to drought are typically minimal. Generally, buildings and infrastructure, which are essential to the continuity of operations and delivery of services, are not impacted by drought.
Property, Facilities & Infrastructure	Property and infrastructure are typically not vulnerable to drought; however, the water supply infrastructure may be impacted by long-term drought.
Economic Condition	A significant drought would draw upon state, county, and local resources. Some of the costs could be recouped through federal grant reimbursements, but local governments would feel the fiscal impact.
Environment	Impacts on the environment would result from wildfires, overloading water and wastewater treatment plants, creating dust storms, and disturbing wildlife and natural areas.

Severe drought conditions can negatively affect human health (CDC, 2020). Some effects are experienced short term and can be observed and measured. In contrast, others are indirect and are not easy to anticipate or monitor. The possible health implications of drought include:

- Compromised quantity and quality of drinking water;
- Increased recreational risks;
- Effects on air quality;
- Diminished living conditions related to energy, air quality, sanitation, and hygiene;
- Compromised food and nutrition; and
- Increased incidence of illness and disease.

The following table revisits the U.S. Drought Monitor mentioned above and details possible impacts associated with the USDM levels.

U.S. DROUGHT MONITOR CLASSIFICATION			
Category	*Description*	*Possible Impacts*	*PDSI*
D0	Abnormally Dry	Going into drought: • Short-term dryness slows planting, growth of crops or pastures Coming out of drought • Some lingering water deficits • Pastures or crops not fully recovered	-1.0 to -1.9
D1	Moderate Drought	• Some damage to crops, pastures • Streams, reservoirs, or wells are low; some water shortages are developing or imminent • Voluntary water-use restrictions requested	-2.0 to -2.9
D2	Severe Drought	• Crop or pasture losses likely • Water shortages common • Water restrictions imposed	-3.0 to -3.9
D3	Extreme Drought	• Major crop/pasture losses • Widespread shortages or restrictions	-4.0 to -4.9
D4	Exceptional Drought	• Exceptional and widespread crop/pasture losses • Shortages of water in reservoirs, streams, and wells create water emergencies	-5.0 or less

Social Vulnerability Considerations

Drought vulnerability has generally been linked to poverty and drought-related health outcomes have been associated with air quality. The reliance on small or poorly-maintained water distribution systems puts populations at increased risk of morbidity due to exposure to contaminated drinking water or issues resulting from reduced use of water resources for hygiene and food washing. Finally, children and the elderly are vulnerable to various drought-related

health outcomes, such as air and waterborne diseases (Fard, Puvvula, & Bell, 2022). The following images show (a) Census tracts where more than 25% of the tract's population is below 150% of the poverty level, and (b) Census tracts showing the highest percentages of vulnerable populations (i.e., those under 18 and 65+) as a function of the total population.

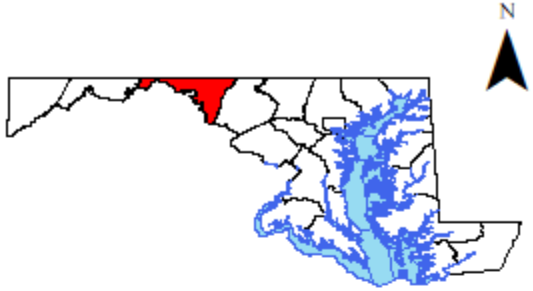
WASHINGTON COUNTY HAZARD MITIGATION PLAN

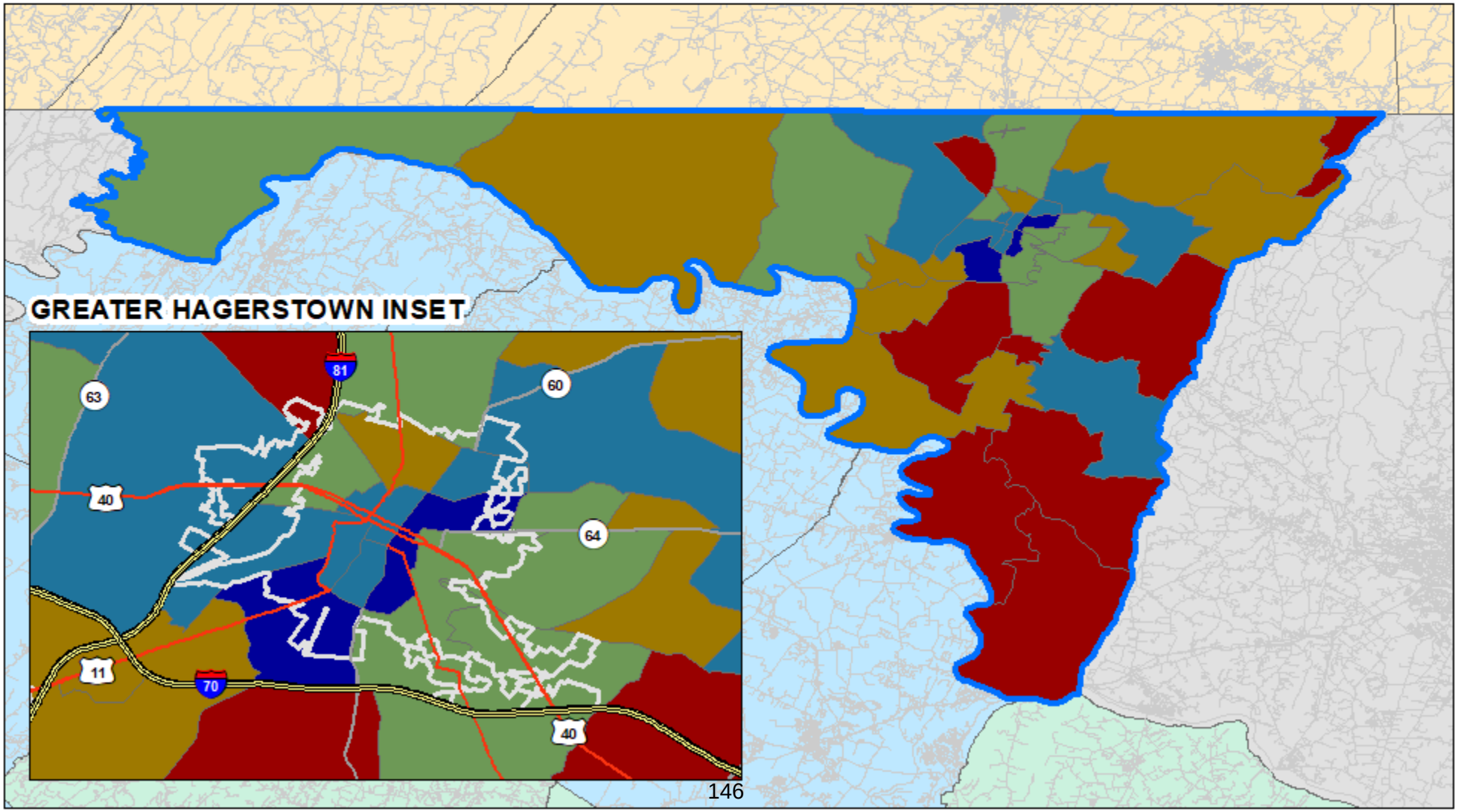
Persons below 150% of the Poverty Rate

Data Source(s):
CDC SVI Index (2020)

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

- 0 - 344 persons
- 345 - 605 persons
- 606 - 902 persons
- 903 - 1312 persons
- 1313 - 2396 persons





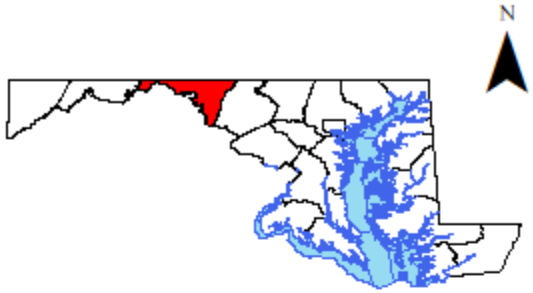
WASHINGTON COUNTY HAZARD MITIGATION PLAN

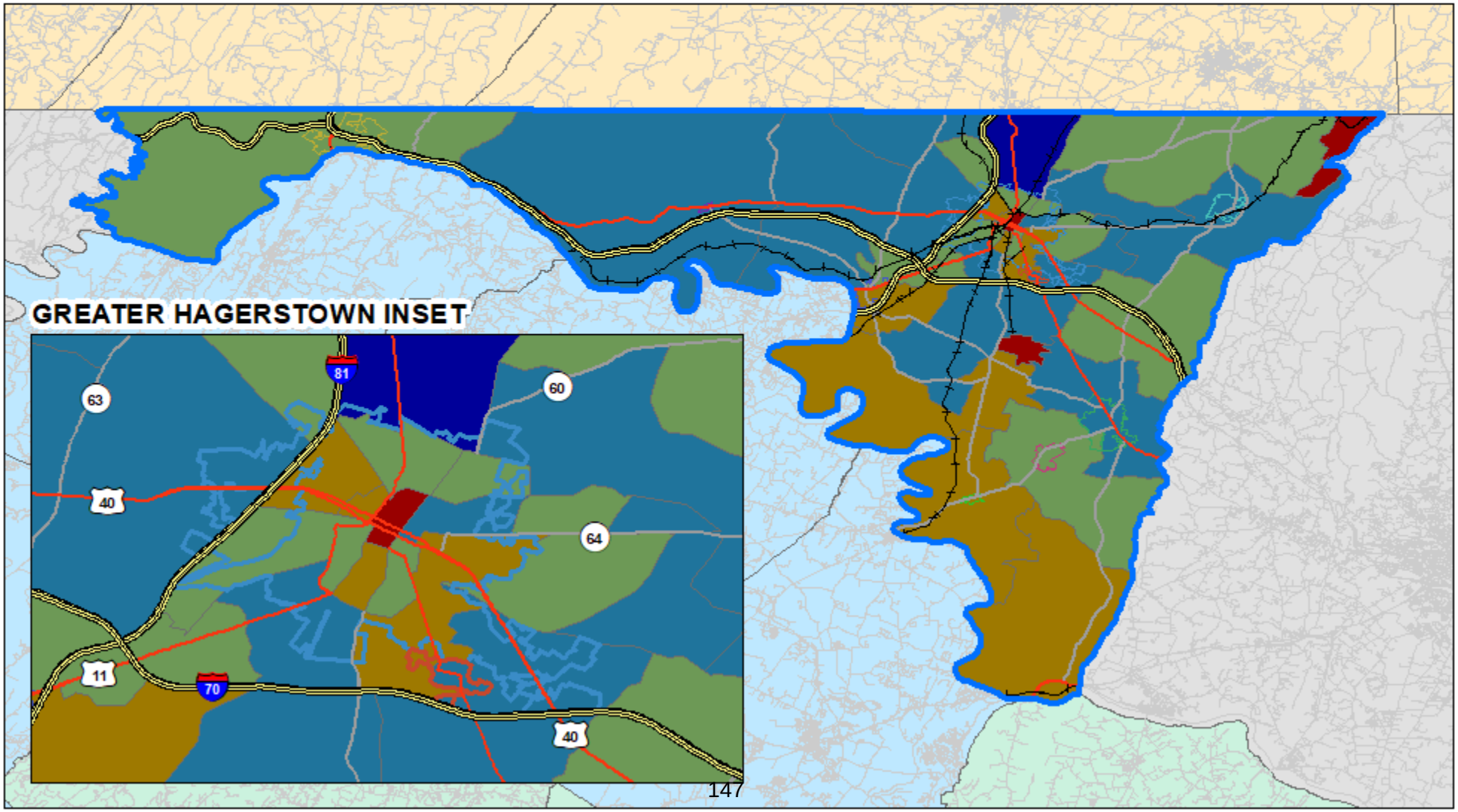
Vulnerable Populations (i.e., Under 17 and 65+)

Data Source(s):
CDC SVI Index (2020)

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

- 182 - 678 persons
- 679 - 1256 persons
- 1257 - 1834 persons
- 1835 - 2893 persons
- 2894 - 3822 persons



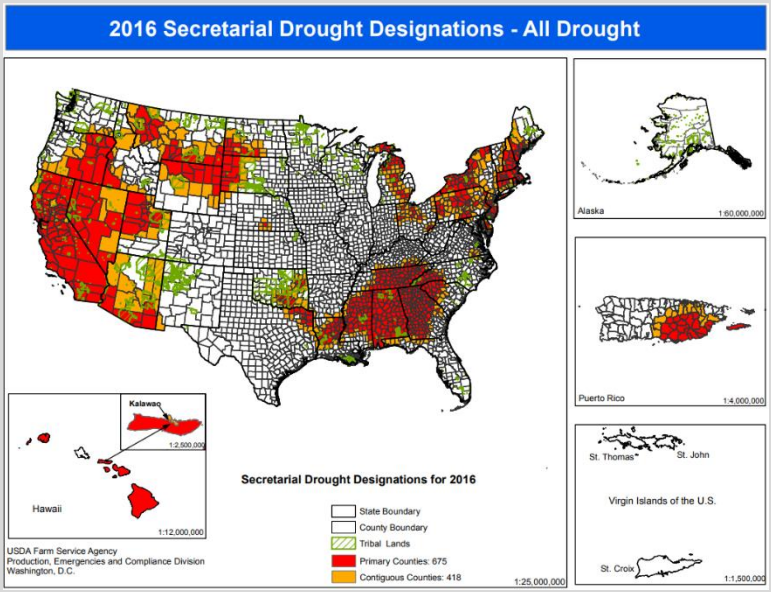


Historical Occurrences

Data sources suggest that seven significant droughts have impacted Washington County, occurring in 1997, 1998, 1999, 2007, 2016, 2019, and 2021. Washington County has received four drought-related disaster declarations from the U.S. Department of Agriculture Secretary: one (each) in 2016 and 2019 and two in 2021.

2016 DROUGHT

USDA FSA Designation: S4165
An intense drought across much of Maryland remains a concern as it fuels wildfires. A burst of wet weather to end November did not ease a severe drought that continued to develop across much of Maryland. Approximately 42 percent (42%) of the state was in a moderate drought, according to the U.S. Drought Monitor. The drought stretched from Prince George's County to the south, Washington County to the west, and Cecil County to the east. The area included Baltimore City, all of Baltimore, Carroll, Harford, and Howard Counties, and the northern half of Anne Arundel County.



The National Centers for Environmental Information (NCEI) Storm Events Database records instances of drought from 1950 to 2022 (2023c). The following table presents the NCEI droughts that have affected Washington County.

HISTORICAL DROUGHT OCCURRENCES – WASHINGTON COUNTY					
Location	*Date*	*Injuries*	*Deaths*	*Property Damage*	*Crop Damage*
Washington (Zone)	7/01/1997	0	0	$0	$9.5 Million
Washington (Zone)	12/01/1998	0	0	$0	$1.7 Million
Washington (Zone)	10/01/1999	0	0	$0	$10 Million
Washington (Zone)	8/01/2007	0	0	$0	$0

Countywide Drought – July 1997

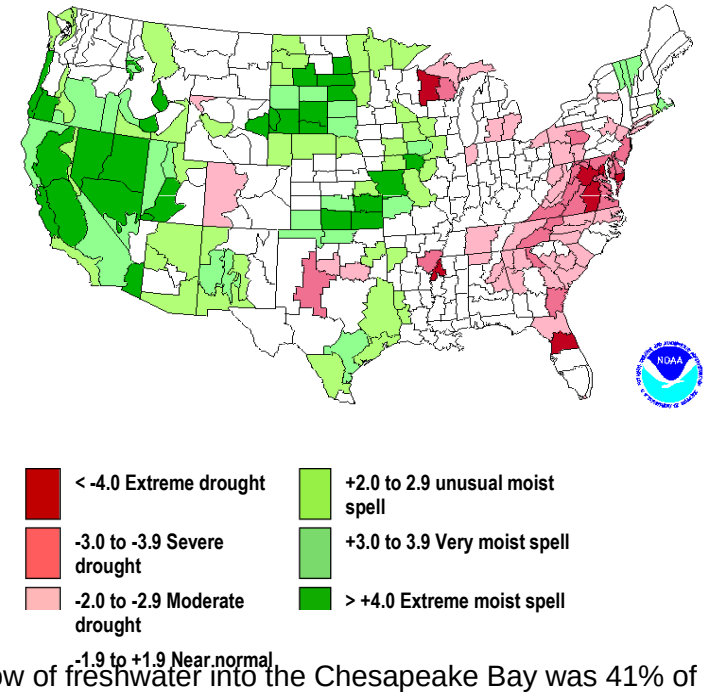
A very dry month, containing a seven-day heat wave, exacerbated drought conditions across much of the fertile farmland of Maryland. The weather in July proved to be the death knell

for much of the crop yields, including corn, hay, alfalfa, and soybeans. Agricultural states of emergency were declared in many areas west of the Chesapeake Bay. Hardest-hit counties included Carroll, Frederick, Howard, Montgomery, and Washington. This drought resulted in approximately $8.6 million in losses to grain and silage corn (a 70% loss) in Washington County.

Other impressive damage estimates resulting from this drought included: nearly $9 million in losses to corn crops and an additional $5.5 million in corn for silage and soybean in Frederick County. In Montgomery County, there were $2.5 million in grain corn and $2.1 million in soybeans losses. Counties on the mid and upper eastern shore, known for extensive corn production, reported losses above $10 million in grain corn alone (NOAA NCEI, 2023c).

Countywide Drought – October through December 1998

Persistent high pressure over the Southeast U.S. forced most rain-producing low-pressure centers to steer north of the region through December. This condition resulted in unusually dry conditions across central and northern Maryland, creating the fourth straight month of drought conditions. Just 1.06 inches of rain fell at the Baltimore/Washington International Airport (BWI) in Anne Arundel County during October. To put the severity of the drought in perspective, only one other year on record (1930) had come close to the lack of rainfall the Baltimore area saw from July 1 to October 31. According to records at the airport, October 1998 was the fifth driest since 1871. The U.S. Geological Survey (USGS) reported the flow of freshwater into the Chesapeake Bay was 41% of normal during October. Groundwater levels across central and northern Maryland were also below average during the month.



The agricultural community continued to be hard hit by the persistent drought. By October 31, 82% of topsoil moisture across the state was rated short or very short. Some farmers fed livestock at mid-winter levels during October. The USDA declared six counties in south-central Maryland federal disaster areas to help compensate for crop yield losses and pasture land damage.

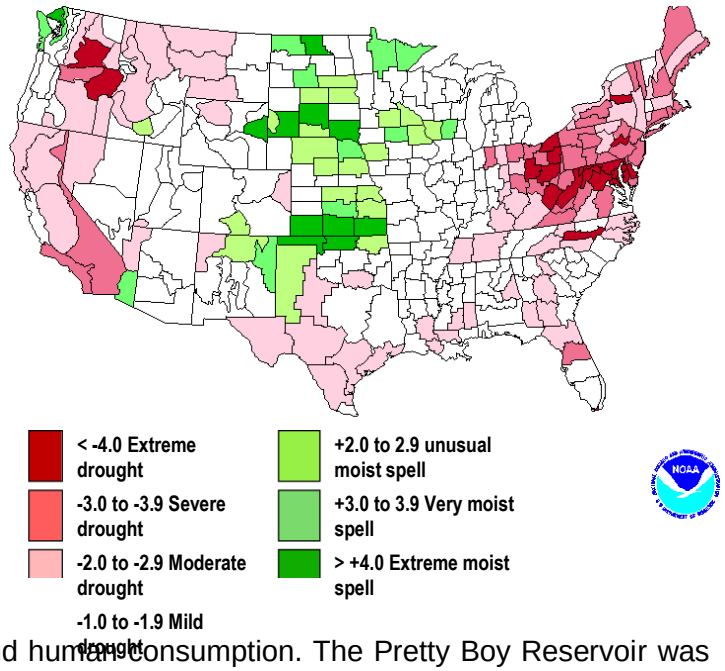
The persistent drought greatly affected water levels and reservoirs. In Washington County, the Pretty Boy Reservoir level dropped 12% during November. The USGS reported the flow of the Potomac River through Little Falls, MD (near Washington D.C.) was 39% of the median flow during November. Stream flows on all rivers within the Potomac and Shenandoah River basins averaged 85% below normal during December. The North Branch of the Potomac River at Cumberland in Allegany County was near record low flow.

The drought also contributed to a sixfold increase in the number of brush fires across Maryland during November; officials reported 173 fires, burning a total of 490 acres. One of the three largest fires was west of Hancock in Washington County. The Governor declared a statewide ban on outdoor burning on November 26, hoping to reduce the number of fires being accidentally set by campers and residential leaf burning. The burn ban remained in effect through December, and the Maryland Department of Environment declared a drought warning on December 16, citing south central Maryland as the driest area in the state (NOAA NCEI, 2023c).

Countywide Drought – May through December 1999

High pressure was the dominant weather feature directing rain-producing low-pressure systems north of the region, which sustained the climatological, meteorological, and hydrological drought that plagued the area since the previous summer. The Maryland Department of the Environment issued a drought warning in December, and it remained in effect through May. The Governor issued a satellite drought emergency on July 29 and later issued statewide mandatory water restrictions on August 5.

From August 1998 through July 1999, precipitation was a staggering 16 inches below average, the second-driest 12-month period on record. Over that period, only two inches of rain fell in Washington County. Officials recorded below-normal water levels in the Potomac watershed over the nine months, and stream flows averaged around 38% of normal, with several record low daily flows recorded. A popular swimming beach at Greenbriar State Park near Hagerstown was closed for the summer as the 50-acre reservoir was extremely low. For the first time, officials released water from the Randolph and Little Seneca Reservoirs near the Potomac headwaters to help maintain a safe water level for wildlife and human consumption. The Pretty Boy Reservoir was down 18 feet.



Approximately 60 communities across the state instituted mandatory or voluntary water restrictions to reduce the strain on reservoirs and wells. Washington County reported the lowest groundwater levels in history on August 4, 1999. The USDA declared 19 Maryland counties as federal drought disaster areas on August 11.

The lack of precipitation played havoc with spring planting and livestock. Corn stalks normally knee-high were only two to six inches tall. Hay and pasture land wilted, soybean planting slowed or halted, and watering holes and irrigation systems slowly dried up. Approximately 68% of pasture land, 45% of corn, and 40% of soybeans across the state were in poor or very poor condition. Washington County reported 80% of the county's cropland was under moderate to severe drought stress. Washington County later reported a corn crop loss of 60% and $10 million in lost revenue.

Rainfall from two land-falling hurricanes in September of 1999 impacted the drought. Most of the rain from these systems fell east of Frederick, and the water shortage ended by mid-September in all but Allegany and Washington Counties. The average pumpkin in the fall harvest was, on average, three to five pounds smaller than usual. In December 1999, the drought finally ended in Allegany and Washington Counties (NOAA NCEI, 2023c).

Loss and Damages

The USDA maintains data regarding agricultural activities through five-year censuses. The following table provides an overview of the 2007, 2012, and 2017 censuses (USDA NASS, 2023).

CENSUS OF AGRICULTURAL DATA – WASHINGTON COUNTY					
Year	*Farms*	*Land in Farms (acres)*	*Harvested Cropland (acres)*	*Average Harvested Cropland per Farm (acres)*	*Market Value of Agricultural Products Sold*
2007	844	114,065	71,537	113	$83,691,000
2012	860	129,600	79,840	134	$107,688,000
2017	877	119,248	74,609	125	$153,725,000

Although there is no direct correlation between the presence of farms and drought risk, the market value of agricultural products sold provides evidence of total economic activity exposed to losses from drought. On average, $115 million in agricultural products in Washington County are vulnerable to drought conditions in any given year.

For planning purposes, utilizing research on average crop yield losses provides the basis for a mathematical loss calculation. Kuwayama (2019) focused on corn and soybeans and found that a week of drought in non-irrigating counties results in average crop yield reductions ranging from 0.1% to 1.2%. The average market value of agricultural products sold annually (i.e., across 52 weeks) in Washington County suggests an average weekly value of approximately $2,212,205 (for a potential exposure ranging from $2,212 to $26,546).

The incident cited above indicated the length of the 1999 drought as being from May through December (eight months). The average length of historical droughts (receiving a secretarial designation) in Washington County is thus eight months (or 32 weeks). Combining these calculations suggests a range of exposure of $70,784 to $849,472 per drought.

Future Occurrences

Though it is difficult to anticipate precisely where drought conditions will occur in the future, Washington County can estimate the chances of experiencing drought conditions generally. NOAA's Earth System Research Laboratory (ESRL) has divided the U.S. into "climate divisions." ESRL further maintains data for each of these areas, including the historical Palmer Drought Severity Index (PDSI) values for all months between 1895 and 2022. Washington County's climate division, Appalachian Mountains, experienced severe or extreme drought conditions in 115 of the 1,536 (7.49%) of the months comprising the 1895-2022 period. The map below displays

ESRL Climate Divisions' months spent in severe or extreme drought in Washington County (NOAA NCEI, 2023a).

WASHINGTON COUNTY HAZARD MITIGATION PLAN

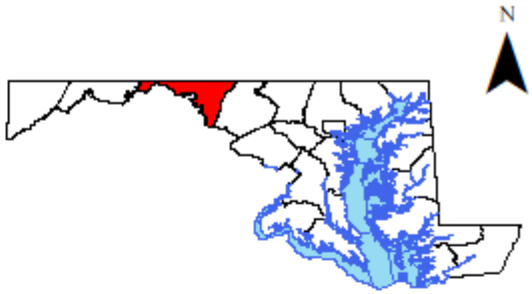
Months in Severe/Extreme Drought, 1895 to 2022

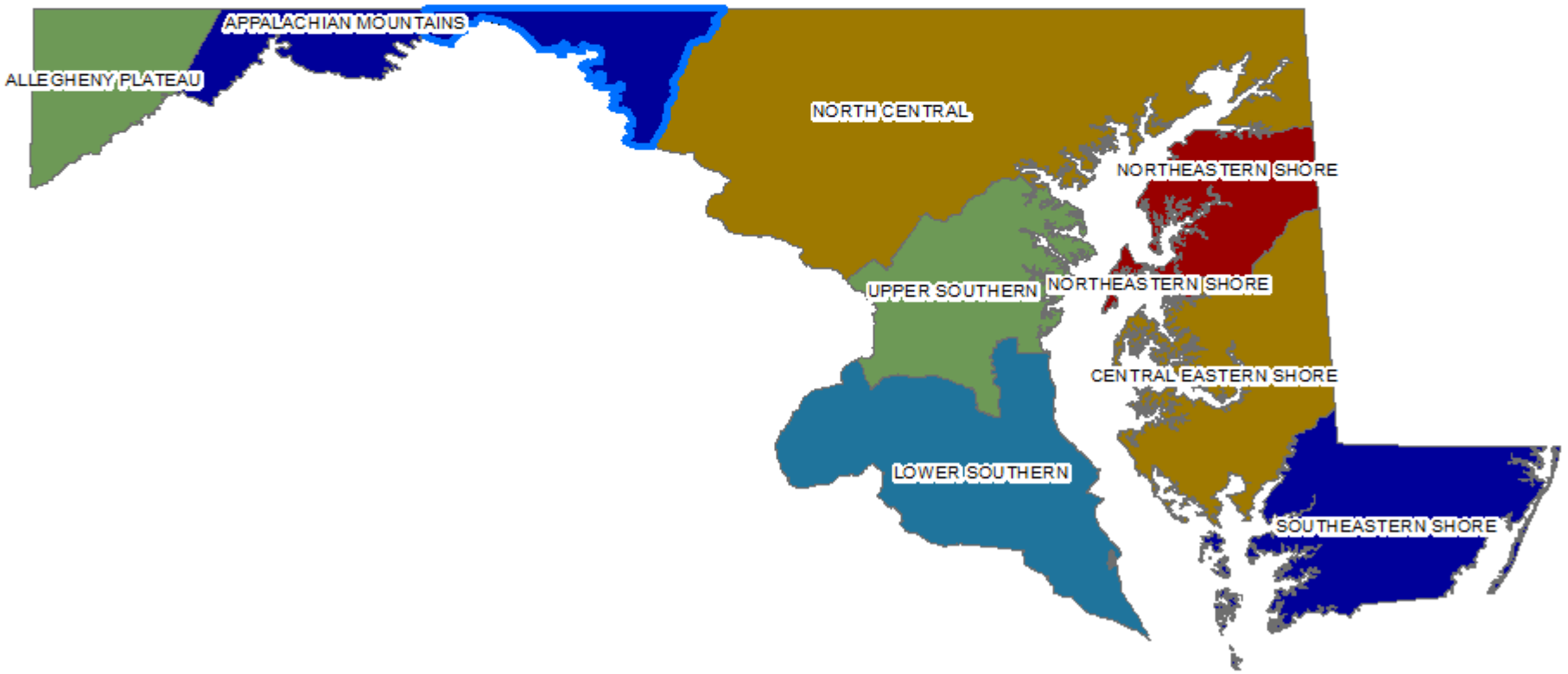
Data Source(s):
NOAA Earth System Research Lab.

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

Severe/Extreme Drought

- 5.86% or Less of Months
- 5.87% - 6.18% of Months
- 6.19% - 6.64% of Months
- 6.65% - 6.84% of Months
- More than 6.85% of Months

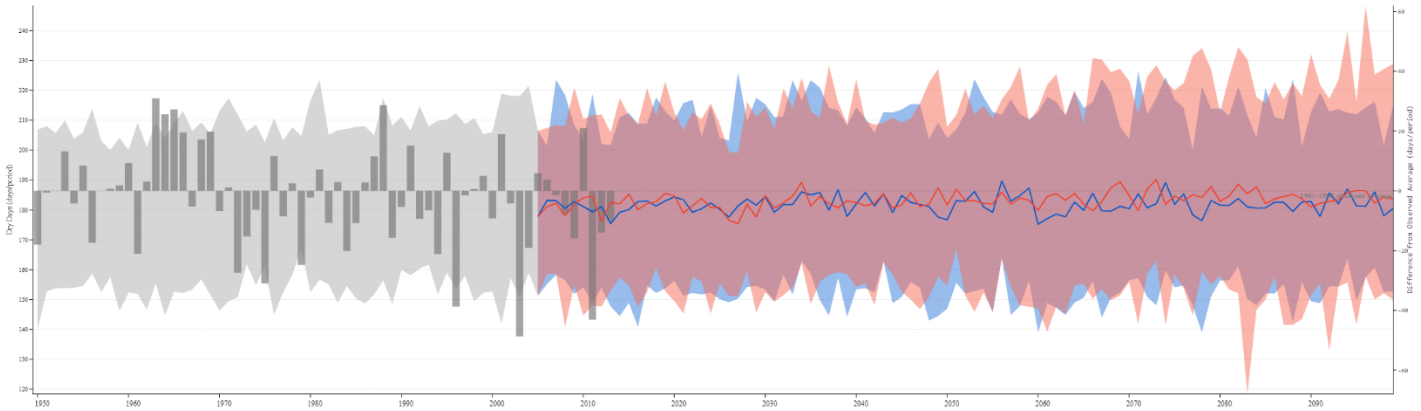




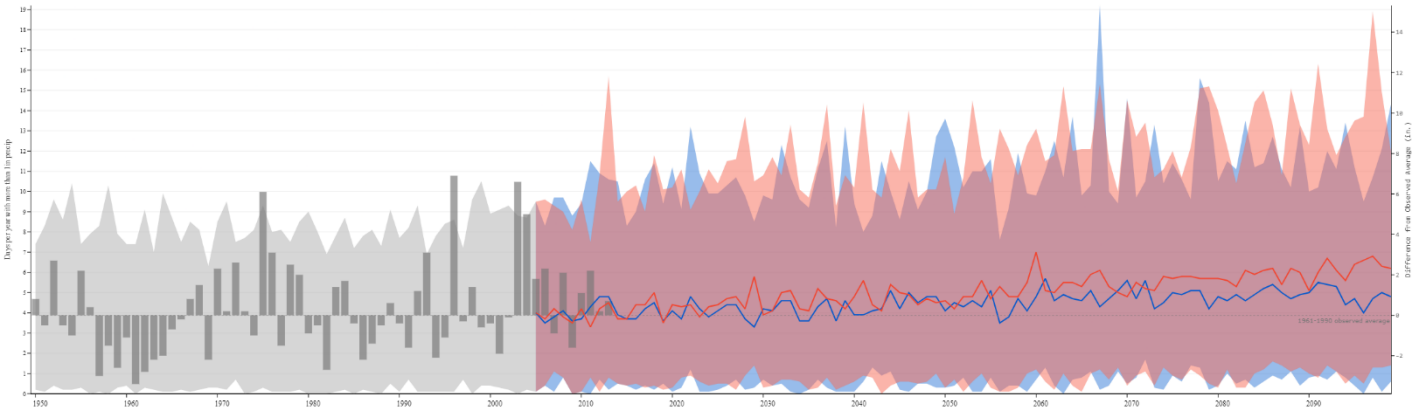
In Washington County, preserving the rural nature of much of the county's land area is important to local officials and residents, which is why growth largely occurs in designated growth areas (see Section 1.2 above). The preservation of rural areas features in not only county comprehensive plans, but municipal plans as well. Many of areas not designated as growth areas are either forested or agricultural. As such, future changes in land use and development will not alter the discussion of drought impacts as presented in this profile. Similarly, changes in population patterns will not likely affect drought's impact on the county and the participating municipalities. The areas outside of designated growth areas feature low-density, mostly residential growth. The growth areas may see changes in the composition of the population (i.e., density, the locations and composition of socially-vulnerable groups, etc.), but those areas are not currently impacted significantly by drought conditions. In a worst-case scenario, a prolonged drought could impact densely-populated areas if the availability of source water became a concern.

Future Climate Considerations

The following image, taken from The Climate Explorer (NEMAC, n.d.), shows the numbers and ranges of dry days experienced and anticipated (by year) in Washington County. The image shows data (as gray bars) above and believe the mean for 1950 through 2013. The blue and red bands from the center of the image through the right model conditions under lower greenhouse gas emissions (the blue line and band) and increasing emissions (the red line and band). Per this graphic, the number of dry days shows minimal fluctuation.



Similar data depicting days with less than one inch of precipitation, though, show a slight increase above the mean (NEMAC, n.d.).



Vulnerability Assessment

This section summarizes the vulnerability of Washington County to drought. The steering committee conducted an online survey for the public to share its thoughts on the hazards listed in this plan. The following table presents the results of that survey, specifically regarding drought.

PUBLIC SENTIMENT, DROUGHT					
Hazard	*Level of Concern*				*Total Responses*
	Not at All	*Somewhat*	*Concerned*	*Very*	
Drought	34 (26.98%)	54 (42.86%)	30 (23.81%)	8 (6.35%)	126
In the past ten years, do you remember this hazard occurring in your community?				42 (33.33%)	126
Have you noticed an increase in the occurrences or intensity of this hazard?				40 (31.75%)	126
Have you noticed a decrease in the occurrences or intensity of this hazard?				6 (4.76%)	126

The following map graphically depicts potential risk areas in Washington County. Risk areas correspond to those with land uses of “cultivated crops” and “hay/pasture.”

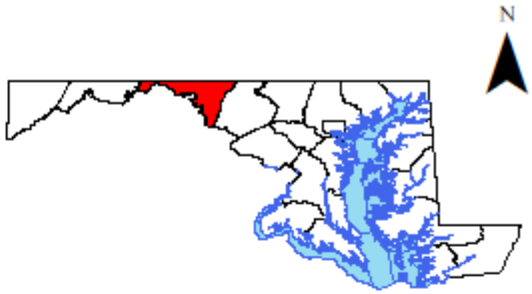
WASHINGTON COUNTY HAZARD MITIGATION PLAN

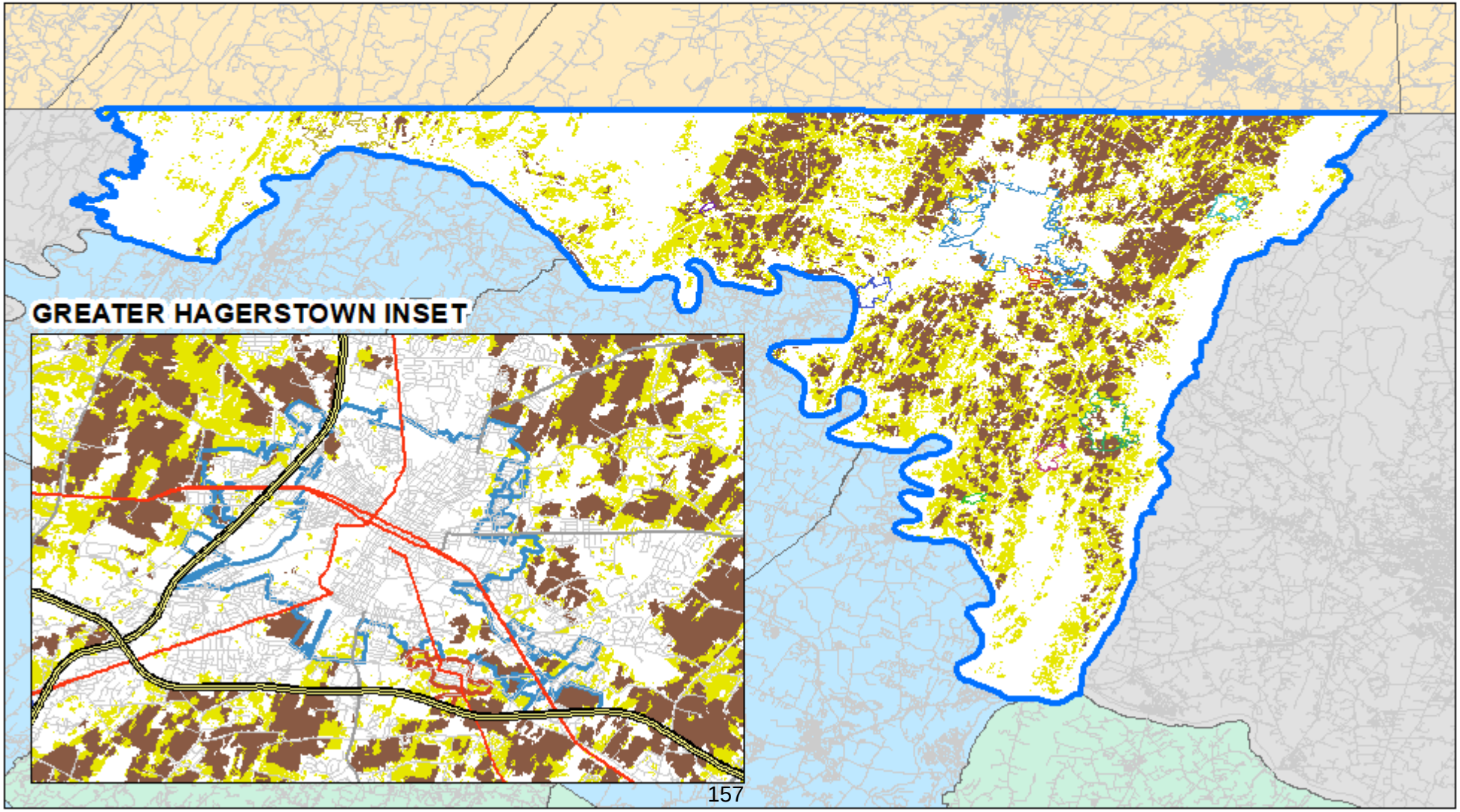
Agricultural Land Uses

Data Source(s):
USGS National Land Cover Dataset (2019)

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

Hay/Pasture
Cultivated Crops





The following table assigns point totals based on the methodology identified in Section 2.2: Profile Hazards above.

DROUGHT RISK RANKING			
Category	*Points*	*Description*	*Notes*
Frequency	2	Low	Seven events in 25 years (i.e., 1997 to 2022) yields an estimated 0.28 incidents per annum.
Response	4	One month	Though the agricultural response may be extensive and much longer; it is a response that is not as acute as many other emergency responses.
Onset	1	Over 24 hours	Drought conditions occur following an extended period of specific hydrological conditions.
Magnitude	3	Critical (25-50% of land area affected)	Washington County has a land area of [458 mi^2] (Census 2020) (or 293,120 acres). Given 131,904 acres of farmland (USDA NASS, 2023), approximately 45% of the county's land area is agriculture.
Business	2	One week	Drought is not likely to necessitate widespread business closures for extended periods.
Human	3	Medium (multiple illnesses)	Drought is not likely to result in injuries; however, it can increase respiratory infections such as bronchitis and pneumonia.
Property	2	10-25% of property affected	Though a significant amount of the land area could be impacted, drought conditions do not affect personal property as severely.
Totals	**17**	**MEDIUM**	

FEMA's *Local Mitigation Planning Handbook* (2023c) directs entities compiling multi-jurisdictional plans to identify any jurisdictions within the planning area for which the identified risks or vulnerabilities are more or less prevalent as compared to the other participating jurisdictions. The following table quickly synthesizes the data to capture the jurisdiction-specific aspects of risks and vulnerabilities for each city or town.

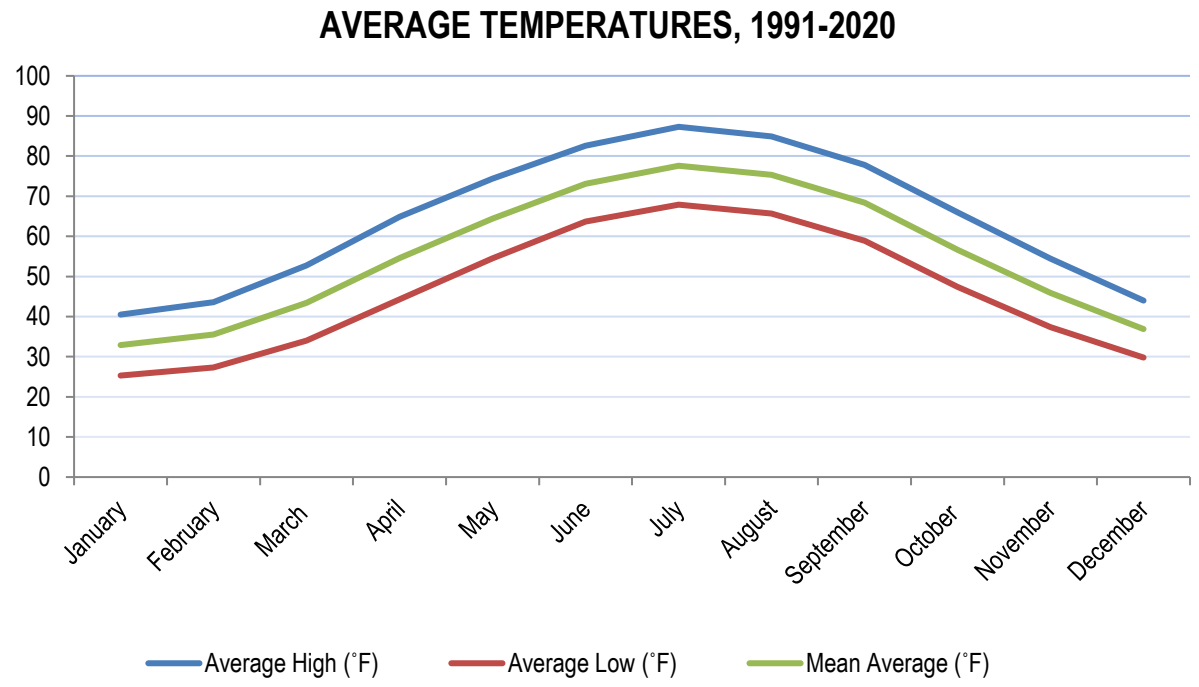
MULTI-JURISDICTIONAL CONSIDERATIONS, DROUGHT		
Jurisdiction	*Comparison*	*Notes*
Washington County	**More**	**Areas relying on agriculture are predominantly in unincorporated areas. Further, rural, unincorporated areas are more likely to rely on private wells for water.**
Boonsboro	Same	Land uses in the town are mostly residential and commercial (as opposed to agricultural).
Clear Spring	Same	Land uses in the town are mostly residential and commercial (as opposed to agricultural).
Funkstown	Same	Land uses in the town are mostly residential and commercial (as opposed to agricultural).
Hagerstown	Same	Land uses in the town are mostly residential and commercial (as opposed to agricultural).
Hancock	Same	Land uses in the town are mostly residential and commercial (as opposed to agricultural).
Keedysville	Same	Land uses in the town are mostly residential and commercial (as opposed to agricultural).
Sharpsburg	Same	Land uses in the town are mostly residential and commercial (as opposed to agricultural).
Smithsburg	Same	Land uses in the town are mostly residential and commercial (as opposed to agricultural).
Williamsport	Same	Land uses in the town are mostly residential and commercial (as opposed to agricultural).

2.2.3 Extreme Temperatures

Extreme temperatures are those 10° F or more above the average high or below the average low for an area.				
Vulnerability HIGHEST HIGH MEDIUM LOW LOWEST	**Period of Occurrence:**	At any time, typically during the middle summer and middle winter months	**Washington County Risk Ranking:**	Low
	Warning Time:	Over 24 hours	**State Risk Ranking:**	Medium-Low
	Probability:	Excessive (will occur during a year)	**Impact:**	Localized (less than 10% of land area affected)
	Type of Hazard:	Natural	**Disaster Declarations:**	USDA FSA S5122 (2021)

Hazard Overview

Temperatures vary widely over a year, but each season has an average temperature range. The National Oceanic and Atmospheric Administration (NOAA) generates monthly "normal" reports from its different stations. The data below shows the average minimum and maximum temperatures from 1991 to 2020, using the NWS Baltimore/Washington Forecast Office data.



Extreme temperatures are those 10 degrees above or below the average high or low temperature. For example, an *extremely* cold temperature for Washington County would be below 15.3° F in January (per the average minimum), and above 97.3° F in July (per the average maximum) would constitute an *extremely* hot temperature. Ready.gov uses a slightly different definition for extreme heat, identifying it as "a period of high heat *and humidity* with temperatures above 90 degrees *for at least two to three days*" (https://www.ready.gov/heat, emphasis added). Significantly, this definition adds a time element and the moderating variable of humidity. Duration can be significant in that inability to get relief from the extreme temperatures contributes to the impact.

Location and Extent

Extreme temperatures affect each jurisdiction in Washington County. Although the temperatures may vary slightly across the region, the average of the temperatures and the extent of extremes are very similar. The National Weather Service, in collaboration with local partners, issues several heat-related products as conditions warrant. Descriptions of those products are in the table below.

NWS, HEAT-RELATED PRODUCTS	
Product	*Description*
Excessive Heat Warning	Issued within 12 hours of extremely dangerous heat conditions. Issued when the maximum heat index temperature is expected to be 105°F or higher for at least two days and nighttime air temperatures will not drop below 75°.
Excessive Heat Watch	Issued when conditions are favorable for an excessive heat event in the next 24 to 72 hours. A watch is used when the risk of a heatwave has increased, but its occurrence and timing are still uncertain.
Heat Advisory	Issued within 12 hours of the onset of extremely dangerous heat conditions. This advisory is issued when the maximum heat index temperature is expected to be 100°F or higher for at least two days, and nighttime temperatures will not drop below 75°.
Excessive Heat Outlook	Issued when the potential exists for an excessive heat event in the next 3-7 days. Provides information to those who need considerable lead time to prepare for an event.

The National Weather Service also issues products regarding extremely cold temperatures. Such products include frost advisories, freeze watches and warnings, and hard freeze watches and warnings. The descriptions are in the table below.

NWS, PRODUCTS RELATED TO EXTREME COLD	
Product	*Description*
Frost Advisory	Issued when temperatures, winds, and sky cover are favorable for frost development, most likely when temperatures are less than or equal to 36 degrees.
Freeze Watch	Freeze watches are issued a few days ahead of a cold front in which temperatures are expected to be 29-32 degrees.
Freeze Warning	Freeze warnings are issued when low temperatures are expected to be 29-32 degrees.
Hard Freeze Watch	Issued days ahead of a cold front in which temperatures are expected to be 28 degrees or less.
Hard Freeze Warning	Issued when temperatures are expected to be 28 degrees or less.

A potential variable to consider is the urban heat island. Urban heat islands occur when cities replace the natural land cover with dense concentrations of pavement, buildings, and other surfaces that absorb and retain heat. Urbanized areas experience higher temperatures than outlying rural areas as these buildings, infrastructure, etc., absorb and re-emit the sun's heat. Daytime temperatures in urban areas can be approximately 1° to 1.7° F higher than temperatures in more rural areas, and nighttime temperatures can be between 2° and 5° F higher (USEPA, 2023b). Thus, these conditions exacerbate heat events.

The following graphic estimates the areas susceptible to the urban heat island effect in Washington County. Planners conducted an optimized hot spot analysis on Washington County Geographic Information Systems (GIS) building data. This denser concentration of structures serves as a proxy for “urbanized areas.”

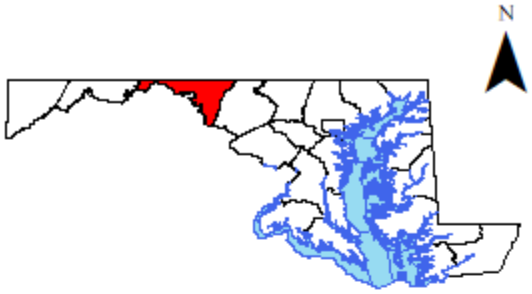
WASHINGTON COUNTY HAZARD MITIGATION PLAN

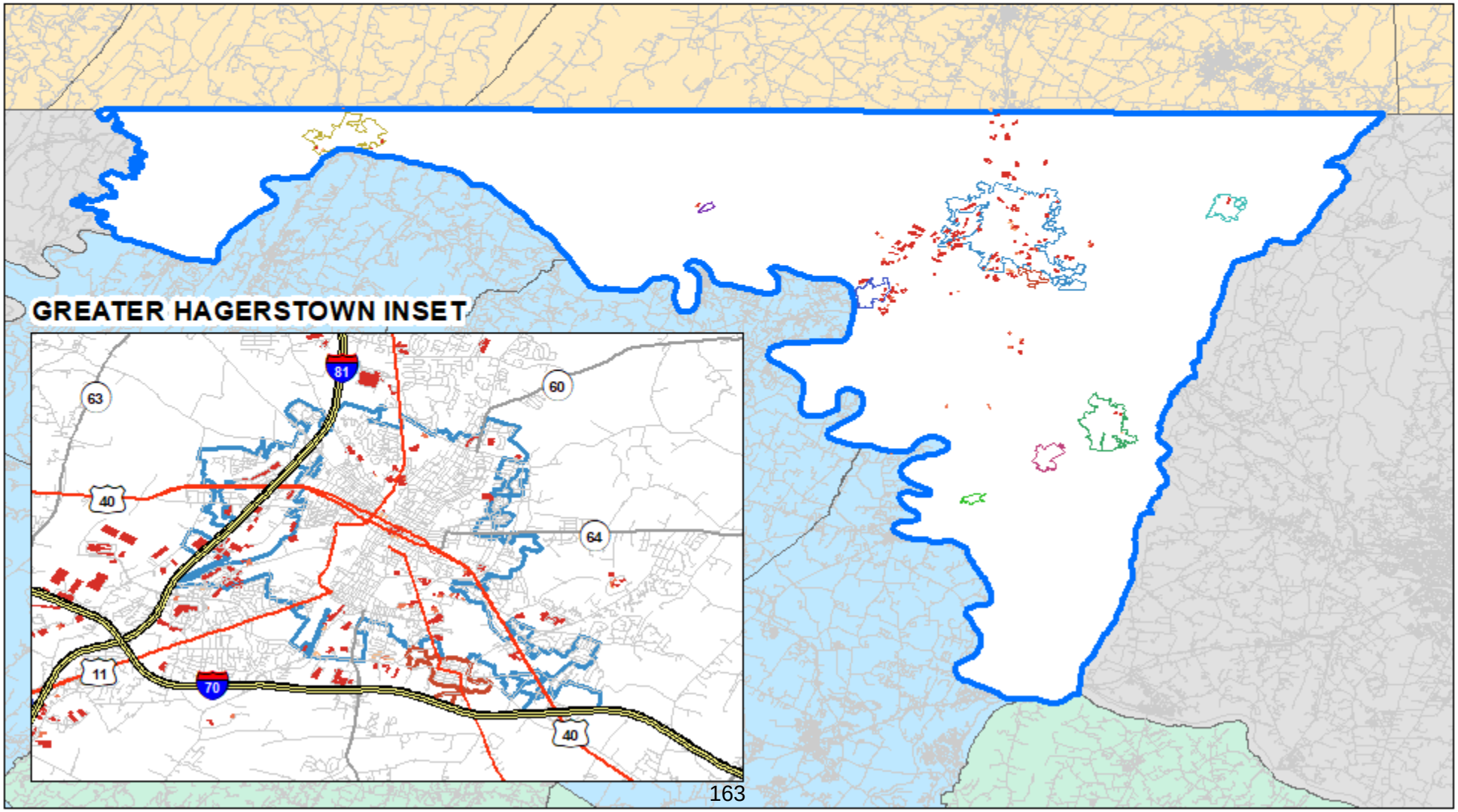
Estimated Urban Heat Island Effect

Data Source(s):
Washington County GIS

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

- Cold Spot - 99% Confidence
- Cold Spot - 95% Confidence
- Cold Spot - 90% Confidence
- Not Significant
- Hot Spot - 90% Confidence
- Hot Spot - 95% Confidence
- Hot Spot - 99% Confidence





Impacts and Vulnerability

The impacts of extreme temperatures affect the population's health rather than structures. The extent of damage to infrastructure would consist of broken pipes, cracks in the pavement due to expansion/contraction, and power outages.

Extreme heat can impact health in a variety of ways. High temperatures can trigger various heat stress conditions, such as heat stroke, heat exhaustion, heat cramps, and heat rash. High relative humidity exacerbates these conditions. High humidity also reduces the ability of sweat to evaporate from the skin, reducing the body's ability to cool itself. Prolonged exposure to heat can necessitate medical intervention; in extreme cases, prolonged exposure could cause death. The table below outlines the possible heat disorders for people in high-risk groups (i.e., children, elderly, etc.).

HEAT RISKS	
Heat Index	*Possible Heat Disorders for People in High-Risk Groups*
80°F-90°F	Fatigue possible with prolonged exposure to physical activity
90°F -105°F	Sunstroke, heat cramps, or heat exhaustion possible with prolonged exposure or physical activity
105°F -130°F	Sunstroke, heat cramps, or heat exhaustion likely, and heatstroke possible with prolonged exposure or physical activity
130°F +	Heat/Sunstroke highly likely with continued exposure

Source: https://nws.weather.gov/blog/nwsdesmoines/2014/06/06/iowa-heat-awareness-day-june-5-2014-2/

Extreme cold conditions also impact human health in several ways. Cold weather acts as a vasoconstrictor, constricting blood vessels and raising the risk of a heart attack. Prolonged exposure to cold weather can cause cold-related illnesses, which include hypothermia, frostbite, trench foot/immersion foot, and chilblains.

Social Vulnerability Considerations

Extreme temperatures of either type, heat or cold, appear to impact children and the elderly more severely than other population groups. The following map shows concentrations of older adults (i.e., 65 and over) as well as children (i.e., under 18) in Washington County.

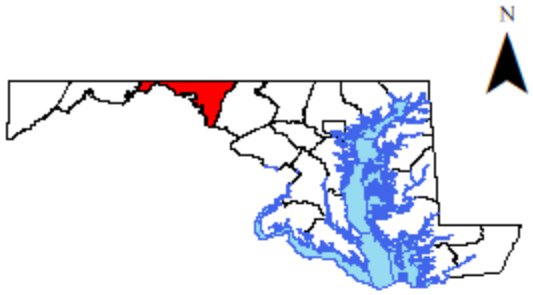
WASHINGTON COUNTY HAZARD MITIGATION PLAN

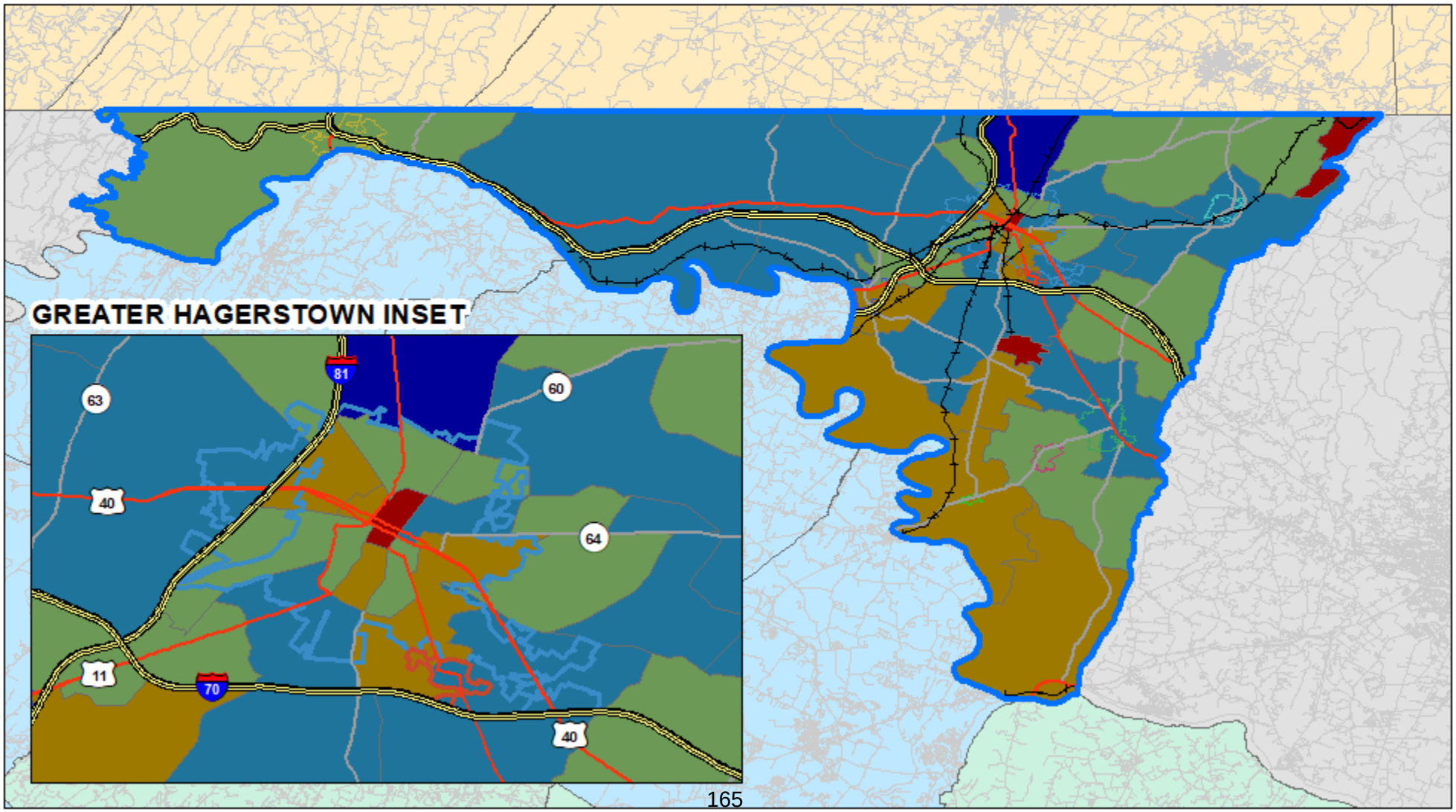
Vulnerable Populations (i.e., Under 17 and 65+)

Data Source(s):
CDC SVI Index (2020)

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

- 182 - 678 persons
- 679 - 1256 persons
- 1257 - 1834 persons
- 1835 - 2893 persons
- 2894 - 3822 persons





Many seniors live alone, isolated from children and other younger family members who established careers and lives in other areas. It is difficult to map areas with high concentrations of socially-isolated senior citizens, though connections need to be limited to family. Areas with active senior citizens centers, congregate living areas with programs serving seniors, etc., foster community and social capital. Even in areas with high concentrations of elderly populations, this social capital can mitigate the effects of extreme temperatures (Klinenberg, 2015).

Further, elderly populations often live in more urban areas subject to an urban heat island effect, thus exacerbating severe heat illnesses in this vulnerable population. Similarly, those living in poverty may find themselves in areas more impacted by the urban heat island effect, and these individuals may not have the resources to contribute toward medical care if suffering from heat-related illnesses. The following map shows areas with high concentrations of persons aged 65 and over, populations living at or below 150% of the poverty level, and areas with estimated urban heat island impacts.

Taken together, these data suggest that those areas where estimated urban heat island effects and high concentrations of young/elderly populations and persons living in poverty overlap are most at-risk of extreme impacts. As an example, the Census tract in southern Hagerstown bordering I-70 contains the highest poverty concentration indicator, the second-highest age indicator, and several red areas denoting the presence of the estimated urban heat island.

WASHINGTON COUNTY HAZARD MITIGATION PLAN

Urban Heat Islands and Social Vulnerability

Data Source(s):
CDC SVI Index (2020), Washington County GIS

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

Cold Spot - 99% Confidence
Cold Spot - 95% Confidence
Cold Spot - 90% Confidence
Not Significant
Hot Spot - 90% Confidence
Hot Spot - 95% Confidence
Hot Spot - 99% Confidence
Pov: Less than 903 (not labeled)
Pov: 903 - 1312
Pov: 1313 - 2396
Age: Less than 1835 (not labeled)
Age: 1835 - 2893
Age: 2894 - 3822

N

GREATER HAGERSTOWN INSET

Historical Occurrences

According to the NOAA National Centers for Environmental Information, there have been 57 extreme temperature events in Washington County since 1996 (2023c). These totals suggest an average of 2.19 incidents per year.

HISTORICAL EXTREME TEMPERATURE EVENTS

Location	*Date*	*Event Type*	*Deaths*	*Injuries*	*Property Damage*	*Crop Damage*
Washington (Zone)	5/18/1996	Heat	0	2	$0.00	$0.00
Washington (Zone)	7/13/1997	Heat	0	0	$0.00	$0.00
Washington (Zone)	8/16/1997	Heat	0	0	$0.00	$0.00
Washington (Zone)	1/6/1998	Heat	0	0	$0.00	$0.00
Washington (Zone)	3/11/1998	Cold/Wind Chill	0	0	$0.00	$0.00
Washington (Zone)	3/27/1998	Heat	0	0	$0.00	$0.00
Washington (Zone)	7/21/1998	Heat	0	0	$0.00	$0.00
Washington (Zone)	6/7/1999	Heat	0	0	$0.00	$0.00
Washington (Zone)	7/4/1999	Heat	0	2	$0.00	$0.00
Washington (Zone)	1/2/2000	Excessive Heat	0	0	$0.00	$0.00
Washington (Zone)	1/21/2000	Extreme Cold/Wind Chill	0	0	$0.00	$0.00
Washington (Zone)	1/22/2000	Extreme Cold/Wind Chill	0	0	$0.00	$0.00
Washington (Zone)	1/27/2000	Extreme Cold/Wind Chill	0	0	$0.00	$0.00
Washington (Zone)	3/8/2000	Heat	0	0	$0.00	$0.00
Washington (Zone)	5/6/2000	Heat	0	0	$0.00	$0.00
Washington (Zone)	6/10/2000	Heat	0	0	$0.00	$0.00
Washington (Zone)	6/25/2000	Heat	0	0	$0.00	$0.00
Washington (Zone)	12/22/2000	Extreme Cold/Wind Chill	0	0	$0.00	$0.00
Washington (Zone)	4/19/2001	Extreme Cold/Wind Chill	0	0	$0.00	$0.00
Washington (Zone)	6/12/2001	Heat	0	0	$0.00	$0.00
Washington (Zone)	6/27/2001	Heat	0	0	$0.00	$0.00
Washington (Zone)	8/6/2001	Heat	0	0	$0.00	$0.00
Washington (Zone)	7/2/2002	Heat	0	0	$0.00	$0.00
Washington (Zone)	7/28/2002	Heat	0	0	$0.00	$0.00
Washington (Zone)	8/1/2002	Heat	0	0	$0.00	$0.00
Washington (Zone)	8/12/2002	Heat	0	0	$0.00	$0.00
Washington (Zone)	8/22/2002	Heat	0	0	$0.00	$0.00
Washington (Zone)	12/7/2002	Cold/Wind Chill	0	0	$0.00	$0.00
Washington (Zone)	1/10/2004	Cold/Wind Chill	0	0	$0.00	$0.00
Washington (Zone)	1/15/2004	Cold/Wind Chill	0	0	$0.00	$0.00
Washington (Zone)	1/23/2004	Cold/Wind Chill	0	0	$0.00	$0.00
Washington (Zone)	1/31/2004	Cold/Wind Chill	0	0	$0.00	$0.00
Washington (Zone)	7/17/2006	Heat	0	0	$0.00	$0.00
Washington (Zone)	8/1/2006	Heat	0	0	$0.00	$0.00
Washington (Zone)	7/22/2011	Excessive Heat	0	0	$0.00	$0.00
Washington (Zone)	6/29/2012	Heat	0	0	$0.00	$0.00
Washington (Zone)	7/7/2012	Heat	0	0	$0.00	$0.00
Washington (Zone)	1/7/2014	Extreme Cold/Wind Chill	0	0	$0.00	$0.00
Washington (Zone)	7/25/2016	Heat	0	0	$0.00	$0.00
Washington (Zone)	8/13/2016	Heat	0	0	$0.00	$0.00
Washington (Zone)	7/20/2017	Heat	0	0	$0.00	$0.00

HISTORICAL EXTREME TEMPERATURE EVENTS						
Location	*Date*	*Event Type*	*Deaths*	*Injuries*	*Property Damage*	*Crop Damage*
Washington (Zone)	1/5/2018	Cold/Wind Chill	0	0	$0.00	$0.00
Washington (Zone)	6/18/2018	Heat	0	0	$0.00	$0.00
Washington (Zone)	7/1/2018	Heat	0	0	$0.00	$0.00
Washington (Zone)	7/2/2018	Heat	0	0	$0.00	$0.00
Washington (Zone)	7/3/2018	Heat	0	0	$0.00	$0.00
Washington (Zone)	7/4/2018	Heat	0	0	$0.00	$0.00
Washington (Zone)	9/4/2018	Heat	0	0	$0.00	$0.00
Washington (Zone)	1/21/2019	Cold/Wind Chill	0	0	$0.00	$0.00
Washington (Zone)	1/30/2019	Cold/Wind Chill	0	0	$0.00	$0.00
Washington (Zone)	7/19/2019	Excessive Heat	0	0	$0.00	$0.00
Washington (Zone)	7/20/2019	Excessive Heat	0	0	$0.00	$0.00
Washington (Zone)	7/21/2019	Excessive Heat	0	0	$0.00	$0.00
Washington (Zone)	7/19/2020	Heat	0	0	$0.00	$0.00
Washington (Zone)	7/20/2020	Heat	0	0	$0.00	$0.00
Washington (Zone)	8/12/2021	Heat	0	0	$0.00	$0.00
Washington (Zone)	12/23/2022	Cold/Wind Chill	0	0	$0.00	$0.00
		Totals	**0**	**4**	**$0.00**	**$0.00**

July 1999 Extreme Heat Event

High temperatures from the 4th included 101 degrees at Bryans Road, 100 degrees at Ridge, 99 degrees at Williamsport, Smithsburg, and Oxon Hill, and 98 degrees at Hagerstown and Olney. On July 5, temperatures soared to 101 degrees at Smithsburg and 98 degrees at Gaithersburg, Rockville, Sharpsburg, and Hagerstown. Highs on July 6 included 100 degrees at Forest Glen and Hagerstown. The number of people treated for heat-related illnesses included two in Washington County. Road surfaces and cars also fell victim to the heat. Interstate 70 in western Maryland was littered with tractor-trailer tire caps as the heat caused the rubber to fly off the tire casings (NOAA NCEI, 2023c).

January 2000 Extreme Cold Event

High pressure settled directly over the Mid-Atlantic region on January 28 and 29. The combination of clear skies, calm winds, and a snowpack led to frigid temperatures. Low temperatures on the 28th included 9° F at the Baltimore/Washington International Airport, 11° F in Mechanicsville, 7° F in Frederick, -1° F degree in Sharpsburg, 8° F in Hagerstown, and 4° F in Frostburg. On January 29, low temperatures included 8° F at Baltimore/Washington International Airport, 6° F in Mechanicsville, 12° F in Frederick, -2° F in Sharpsburg, 4° F in Hagerstown, and 7° F in Frostburg (NOAA NCEI, 2023c).

Loss and Damages

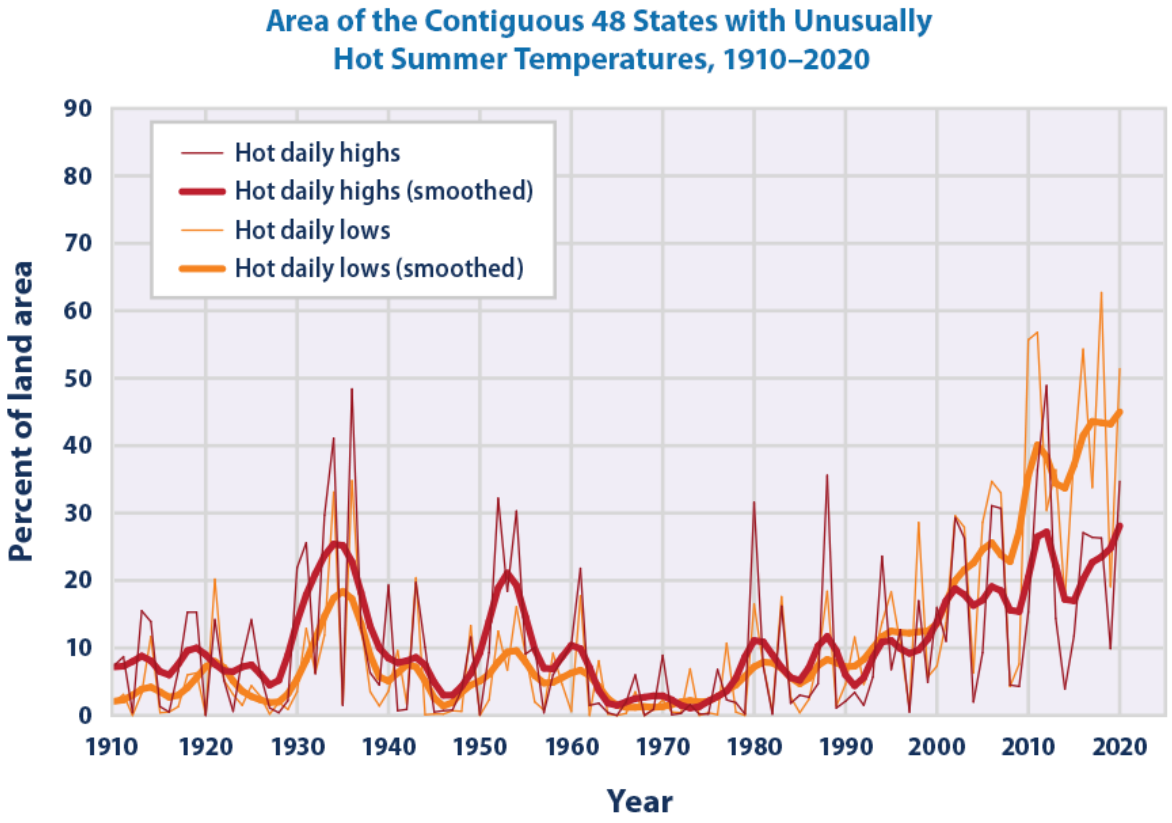
As evident from the table above, per the NCEI, there have been no reported property or crop damages. Unfortunately, there is no resource available to determine healthcare costs for injuries and illnesses related to extreme temperatures.

Future Occurrences

Washington County has experienced an average of 2.19 extreme temperature events per year, which are expected to continue in the summer (June to September) and winter (December to February) months. Even though the risk of temperature extremes will likely remain, future impacts stemming from those events may change. For instance, the central portion of the county along the Interstate 81 corridor is the most urban area of the county. As development occurs, emerging pockets of populations exhibiting social vulnerability variables may exacerbate the felt effects of these weather phenomena (see below). Since these impacts mostly affect the population; anticipated changes in land use and development will not significantly alter them.

Future Climate Considerations

The following graphic shows an upward trend in the hot daily lows in the contiguous 48 states (USEPA, 2022a). The smoothed line of the hot daily highs is not trending upward as much, but it appears as though the Nation is not getting the relief on those hot days that it once did.

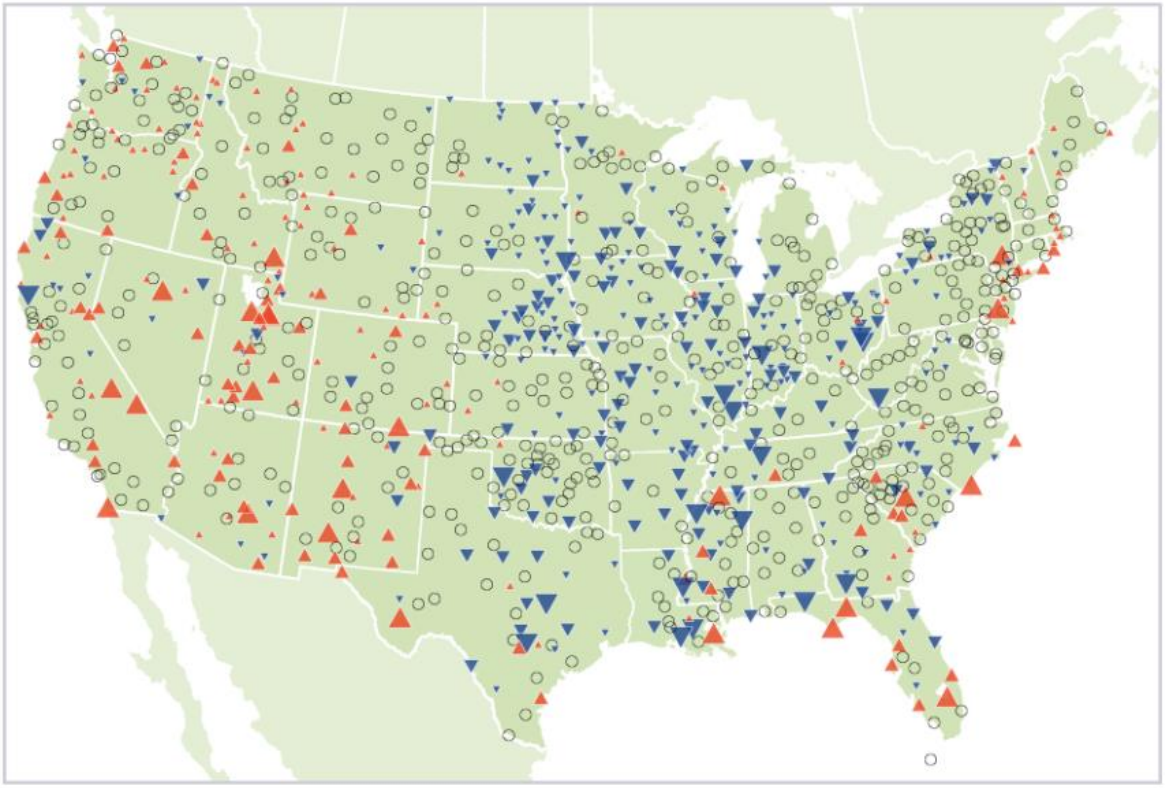


Data source: NOAA (National Oceanic and Atmospheric Administration). 2021. U.S. Climate Extremes Index. Accessed March 2021. www.ncdc.noaa.gov/extremes/cei.

For more information, visit U.S. EPA's "Climate Change Indicators in the United States" at www.epa.gov/climate-indicators.

Washington County is an outlier in this trend, as shown in the graphic below (USEPA, 2022a). While the county may continue to experience pockets of extreme heat, this graphic shows the heat trends to be more pronounced in the western states, small areas of the south, and along the eastern coast. Maryland is mainly within the five-day change (+/-).

Change in Unusually Hot Temperatures in the Contiguous 48 States, 1948–2020

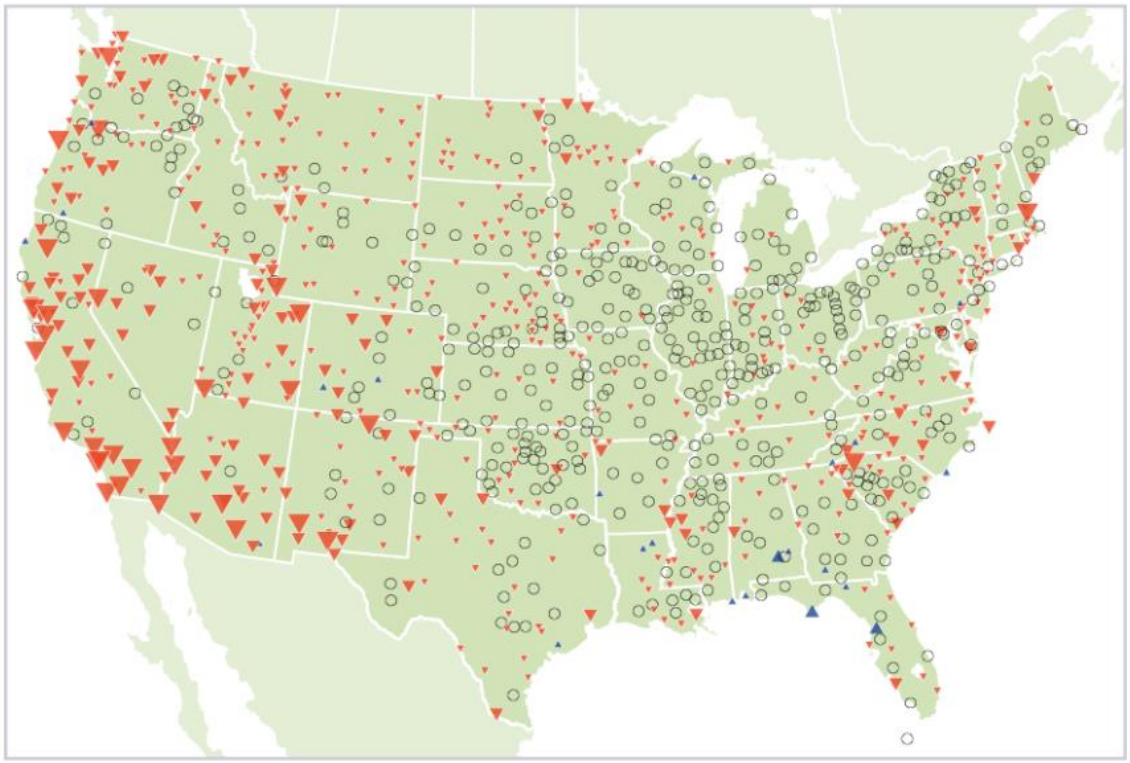


Data source: NOAA (National Oceanic and Atmospheric Administration). 2021. National Centers for Environmental Information. Accessed March 2021. www.ncdc.noaa.gov.

For more information, visit U.S. EPA's "Climate Change Indicators in the United States" at www.epa.gov/climate-indicators.

Similarly, Maryland has seen little change concerning the number of days colder than the fifth percentile (USEPA, 2022a).

Change in Unusually Cold Temperatures in the Contiguous 48 States, 1948–2020



Change in number of days colder than 5th percentile:

More than 25	15 to 25	5 to 15	5 fewer to 5 more	5 to 15	15 to 25	More than 25
▼	▼	▾	○	▴	▲	▲

Decrease ← → Increase

Data source: NOAA (National Oceanic and Atmospheric Administration). 2021. National Centers for Environmental Information. Accessed March 2021. www.ncdc.noaa.gov.

For more information, visit U.S. EPA's "Climate Change Indicators in the United States" at www.epa.gov/climate-indicators.

While these graphics may suggest that Washington County should anticipate similar extreme conditions in the future, this data is purely climatological. It does not consider the interaction between fluctuations in temperatures and vulnerable populations. Regarding vulnerable populations, many of those groups reside in the designated growth areas surrounding the municipalities in the county, particularly in and near the City of Hagerstown. Further, the growth areas, given the types of development and changes that could occur, are the areas most likely to see fluctuation in population trends like density, the socio-economic composition of micro-communities, etc. As populations age in these areas, for example, the

impacts of extreme heat will remain significant, but may shift as the residents of one small neighborhood age. As noted in the mapping above, the intersection of vulnerable populations (by age) and potential urban heat islands is most pronounced in the areas along the I-81 corridor. Regarding extremely cold temperatures, Hagerstown and county officials have been active in developing response-centric plans for warming stations. These facilities can be of service to residents without adequate heating systems in their homes.

Vulnerability Assessment

This section summarizes the vulnerability of Washington County to extreme temperatures. The steering committee conducted an online survey for the public to share its thoughts on the hazards listed in this plan. The following table presents the results of that survey, specifically regarding extreme temperatures.

PUBLIC SENTIMENT, EXTREME TEMPERATURES					
Hazard	*Level of Concern*				*Total Responses*
	Not at All	*Somewhat*	*Concerned*	*Very*	
Extreme Temperatures	29 (23.02%)	52 (41.27%)	34 (26.98%)	11 (8.73%)	126
In the past ten years, do you remember this hazard occurring in your community?				62 (49.20%)	126
Have you noticed an increase in the occurrences or intensity of this hazard?				66 (51.56%)	128
Have you noticed a decrease in the occurrences or intensity of this hazard?				4 (3.12%)	128

The following table assigns point totals based on the methodology identified in Section 2.2: Profile Hazards above.

EXTREME TEMPERATURES RISK RANKING			
Category	*Points*	*Description*	*Notes*
Frequency	5	Excessive (Will occur during a year)	Fifty-seven events in 26 years (i.e., 1996-2022) yield an estimate of 2.19 incidents per annum.
Response	1	Less than half a day	Temperature extremes may necessitate increased medical calls for services like EMS or fire, and they may prompt the opening of warming/cooling centers, but extended responses are rare.
Onset	1	Over 24 hours	Extreme temperature events are forecasted well in advance of onset.
Magnitude	1	Localized (less than 10% of land area affected)	Though the entire county is susceptible to extreme temperatures, the impacts are often localized (sometimes to the individual household). As such, planners selected the lowest magnitude ranking for estimation purposes.
Business	1	Less than 24 hours	Though a business may close due to a heat-related power outage or a cold-related pipe failure, widespread business closure from temperature extremes is unlikely.
Human	2	Low (some injuries)	There are historical records of four injuries from heat or cold in the county and no deaths.
Property	1	Less than 10% of property affected	Most of the impacts from temperature extremes are human, resulting in minimal property damage.
Totals	**12**	**LOW**	

FEMA's *Local Mitigation Planning Handbook* (2023c) directs entities compiling multi-jurisdictional plans to identify any jurisdictions within the planning area for which the identified risks or vulnerabilities are more or less prevalent as compared to the other participating jurisdictions. The following table quickly synthesizes the data to capture the jurisdiction-specific aspects of risks and vulnerabilities for each city or town.

MULTI-JURISDICTIONAL CONSIDERATIONS, EXTREME TEMPERATURES		
Jurisdiction	*Comparison*	*Notes*
Washington County	**Same**	**Despite variance in social vulnerability effects, all areas of the county are at risk of extreme temperature events. Riskfactor.com (n.d.) lists the county's heat (only) risk as "Major."**
Boonsboro	Same	Given its population density, land use, and general exposure to extreme temperatures, the town's risk is comparable to that of the county. Riskfactor.com (n.d.) lists Boonsboro's heat (only) risk as "Major."
Clear Spring	Same	Given its population density, land use, and general exposure to extreme temperatures, the town's risk is comparable to that of the county. Riskfactor.com (n.d.) lists Clear Spring's heat (only) risk as "Major."
Funkstown	(Slightly) More	Building clusters suggest minimal urban heat island effects in Funkstown, but there are small concentrations of socially vulnerable populations in a tight geographic area. Riskfactor.com (n.d.) lists the town's heat (only) risk as "Major."
Hagerstown	More	Hagerstown, by virtual of its urban development patterns, has a higher density of urban heat island areas than anywhere else in the county. It also sees more densely concentrated socially vulnerable populations than other areas of the county. Also, Riskfactor.com (n.d.) lists Hagerstown's heat (only) risk as "Major."

MULTI-JURISDICTIONAL CONSIDERATIONS, EXTREME TEMPERATURES		
Jurisdiction	*Comparison*	*Notes*
Hancock	Same	Given its population density, land use, and general exposure to extreme temperatures, the town's risk is comparable to that of the county. Riskfactor.com (n.d.) lists Hancock's heat (only) risk as "Major."
Keedysville	Same	Given its population density, land use, and general exposure to extreme temperatures, the town's risk is comparable to that of the county. Riskfactor.com (n.d.) lists Keedysville's heat (only) risk as "Major."
Sharpsburg	Same	Given its population density, land use, and general exposure to extreme temperatures, the town's risk is comparable to that of the county. Riskfactor.com (n.d.) lists Sharpsburg's heat (only) risk as "Major."
Smithsburg	Same	Given its population density, land use, and general exposure to extreme temperatures, the town's risk is comparable to that of the county. Riskfactor.com (n.d.) lists Smithsburg's heat (only) risk as "Major."
Williamsport	(Slightly) More	Williamsport has enough building clustering to produce estimated urban heat island impacts. Riskfactor.com (n.d.) lists Williamsport's heat (only) risk as "Major."

2.2.4 Fire (Structural / Industrial)

A structure fire involves the structural components of various residential, commercial, or industrial buildings. For a discussion of wildland fires, see Section 2.2.14.				
Vulnerability  HIGHEST HIGH MEDIUM LOW LOWEST	**Period of Occurrence:**	Structural or industrial fires can occur at any time	**Washington County Risk Ranking:**	High
	Warning Time:	Less than 6 hours	**State Risk Ranking:**	N/A
	Probability:	Excessive (will occur during a year)	**Impact:**	Localized (less than 10% of land area affected)
	Type of Hazard:	Technological	**Disaster Declarations:**	N/A

Hazard Overview

Fire is the state, process, or instance of combustion in which fuel or other material is ignited, combines with oxygen, and gives off heat, light, and flame. A structure fire involves the structural components of various types of residential, commercial, or industrial buildings. Structural and industrial[1] fires can occur at any time of year.

According to the U.S. Fire Administration (USFA), structure fires comprise 37.41% of all fires in the United States, with residential structures making up 78.25% of those structure fires. Residential fires are also the leading property type for fire fatalities (70.6%), fire injuries (74.3%), and financial loss (34.7%) (USFA, 2023). According to the National Fire Protection Association (NFPA), failure time has decreased due to increased synthetic fuel loads and new construction materials, which can speed up the fire growth rate (Urban Fire Forum, 2014). There is also an increase in terrorists using fire as a weapon (Byrne, 2017). The potential for causing large-scale damage with little to no cost or technical expertise makes arson particularly appealing.

Location and Extent

All municipalities in Washington County share the threat of fire to residential, commercial, or other structures. Because forests cover more than 35% of Washington County's land surface and the rural areas of the county are not densely built-out, the structural exposures are largely within municipal boundaries. The following map shows the footprints of residential, commercial, industrial, and other building types, and the shading easily shows areas of building density.

[1] "Industrial fires" are structure fires, often large and out of control, at industrial facilities.

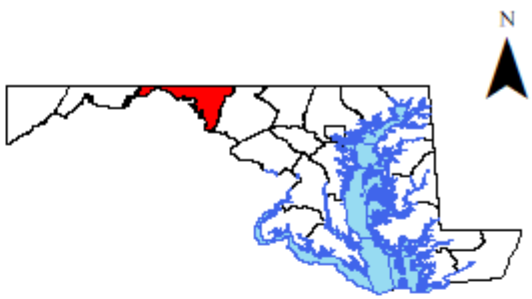
WASHINGTON COUNTY HAZARD MITIGATION PLAN

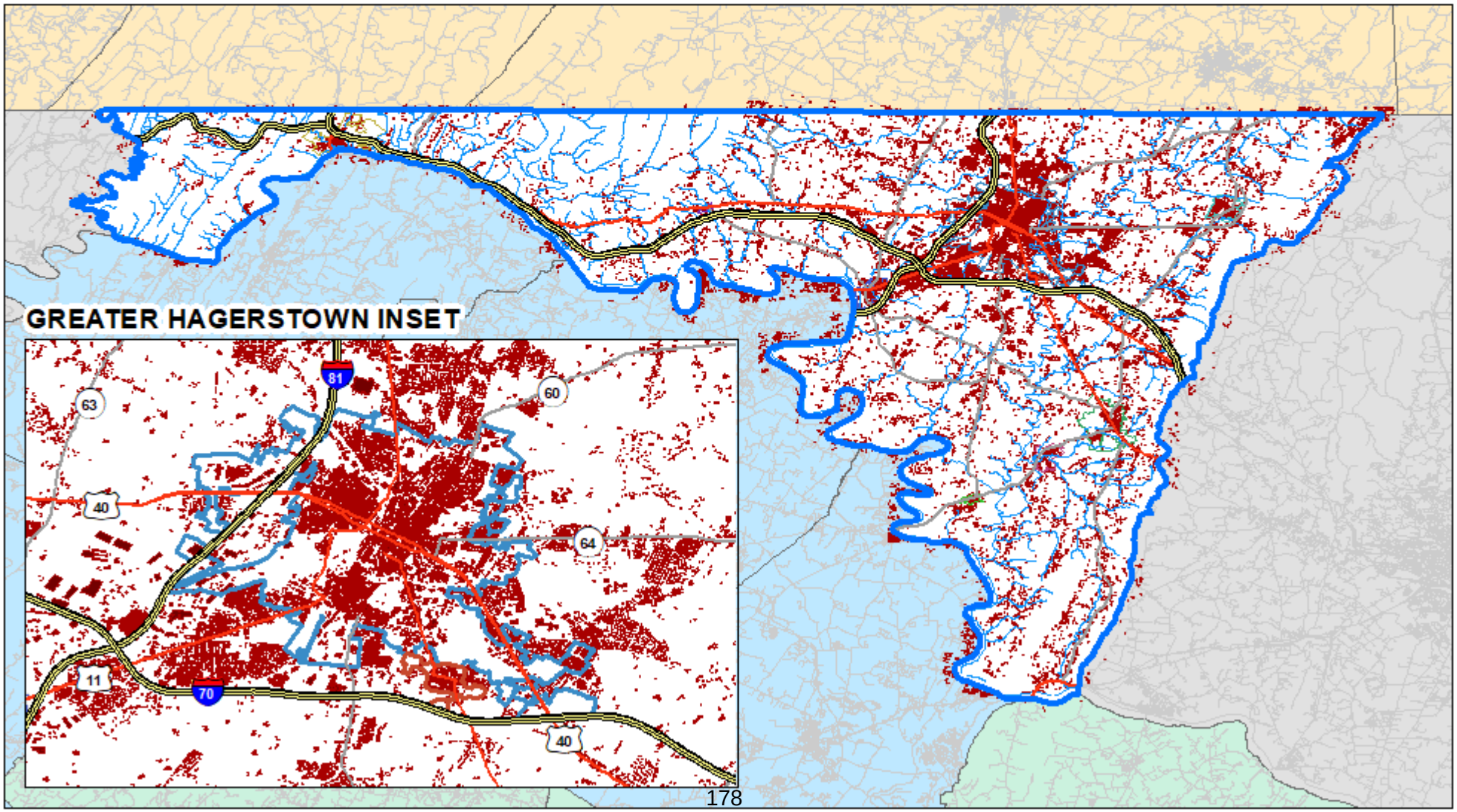
Building Footprints

Data Source(s):
Washington County GIS

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

Building Footprints





Perhaps intuitively, areas in which structures are more densely built (i.e., located closer together) are at a slightly higher risk of widespread impacts from a structure fire. Further, fires are a more significant threat in areas with a substantial number of buildings built before 1970. The table below shows the estimated number of residential structures built before 1970 (U.S. Census Bureau, American Community Survey, 2021).

ESTIMATED NUMBER OF PRE-1970 STRUCTURES				
Jurisdiction	*Built 1960-1969*	*Built 1950-1959*	*Built 1940-1949*	*Built 1939 or Earlier*
Washington County	**5,950**	**6,779**	**2,715**	**13,310**
Boonsboro	224	25	23	327
Clear Spring	6	14	19	133
Funkstown	20	54	33	231
Hagerstown	1,280	2,210	1,381	6,803
Hancock	80	105	64	281
Keedysville	4	2	0	88
Sharpsburg	9	15	20	258
Smithsburg	6	4	0	162
Williamsport	99	81	21	375

The fire risk in areas with higher numbers of mobile homes is unique. The construction of mobile homes adheres to different standards compared to homes built on-site. Residents of mobile homes often store flammable liquids such as gasoline or propane in the space beneath the home. In mobile home parks, structures are close to one another. As such, a mobile home fire can become catastrophic very quickly. Mobile homes are often reasonable options for residents on fixed incomes or otherwise socioeconomically distressed. When faced with a devastating fire, the recovery for these residents can be overwhelming. The following map shows the areas of Washington County with higher concentrations of mobile homes.

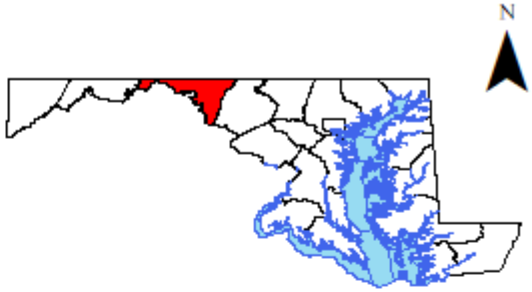
WASHINGTON COUNTY HAZARD MITIGATION PLAN

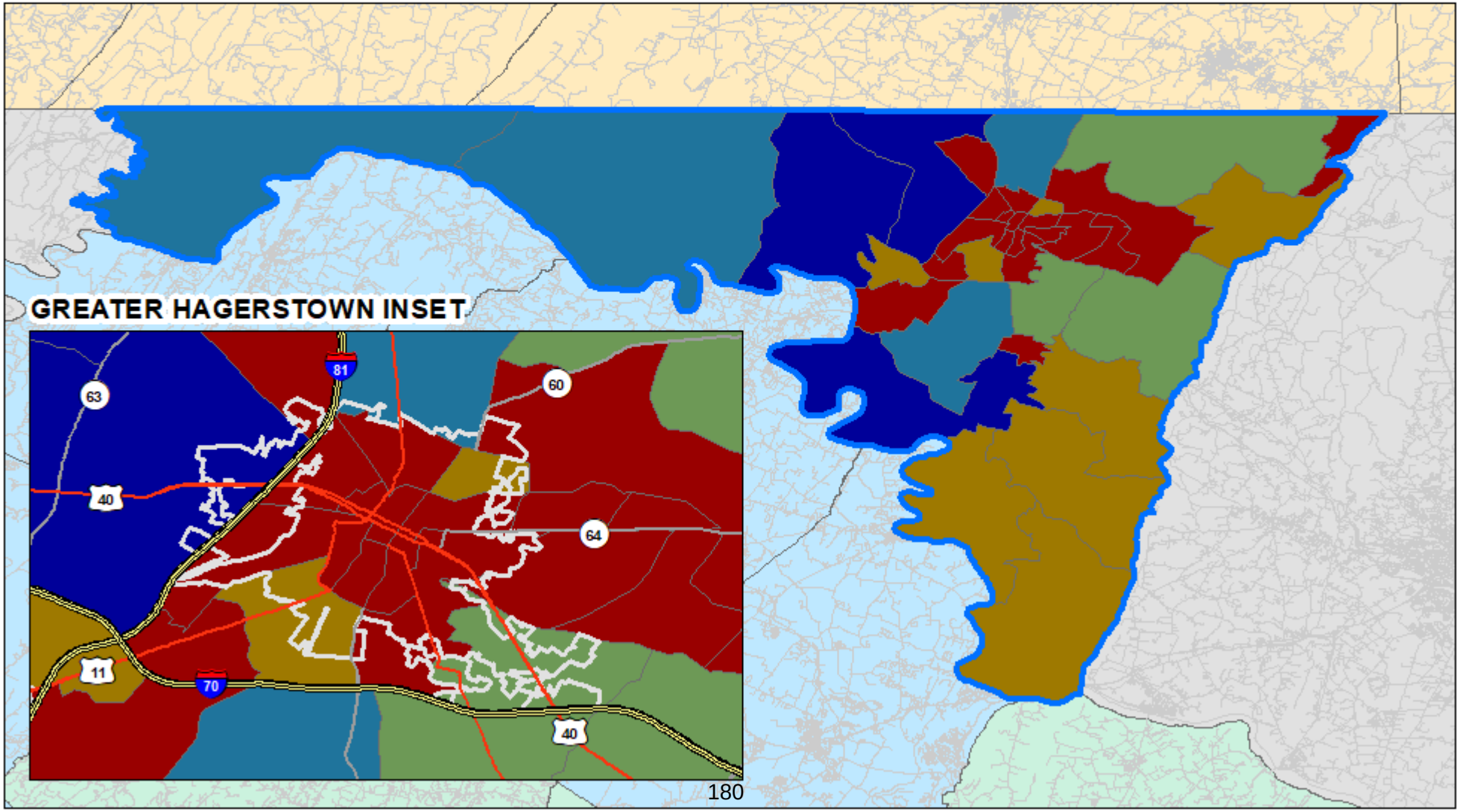
Mobile Homes in Washington County

Data Source(s):
CDC SVI Index (2020)

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

- 0 - 10 mobile homes
- 11 - 27 mobile homes
- 28 - 65 mobile homes
- 66 - 162 mobile homes
- 163 - 467 mobile homes





Washington County experiences several small fires each year, most of which are easily controlled by local fire departments. According to representatives of the Hagerstown Fire Department, they respond to an average of one structure fire a day. That is roughly 365 calls per year.

Of particular concern, per steering committee discussion and public comment during the 2023 update, is an industrial fire located at one of the extensive warehouse facilities near Hagerstown. Developers are taking advantage of the access to Interstates 70 and 81 (as well as rail). As a result, several new facilities have been constructed to accompany existing local structures (and similar development north on I-81 near Chambersburg, Pennsylvania). These structures are subject to building codes and include fire suppression systems. Due to their large size, fighting a fire in these structures would be challenging. Further, the build-up of potential fuels (e.g., storing large quantities of cardboard on-site, etc.) could exacerbate fire suppression challenges.

Impacts and Vulnerability

Structural and industrial fires are quite impactful. Residential structure fires may render a residence uninhabitable, spurring (at least temporary) homelessness. Commercial fires can be catastrophic for a business owner in a building that burns, destroying inventory and limiting the ability to re-open in a reasonable time. Industrial fires impact the local economy but may also affect the economy of a wider area (through cascading impacts within an industry) if a critical distribution facility burns. Resource expenditure for emergency services providers, particularly fire departments, is a concern during large industrial fires. While multiple fire companies converging on a large industrial or multi-structure fire is a positive action for controlling that fire (or keeping it from spreading), such a response runs the risk of leaving a mutual aid company's home area uncovered or inadequately covered for the duration of the response.

A structure fire may involve the destruction of plastics, foams, fabrics, carpets, wood, and asbestos-containing materials. Soot in smoke usually contains what burns and may also contain byproducts of items burned (e.g., hydrogen cyanide is a byproduct of burning wool). The Phoenix Fire Department studied the exposure of soot on firefighters after extinguishment. Their findings indicated that chlorinated products became attached to soot and could enter the lungs (Bolstad-Johnson et al., 2000). Breathing in this soot can cause acute issues, such as coronary artery disease, asthma, bronchitis, and other respiratory illnesses.

Local officials must also consider post-fire aid following a residential fire. A fire may displace a family (or families) with little to no belongings. Nonprofit, volunteer, faith-based groups,

and other organizations may assist displaced individuals with shelter, food and drink, clothing, and other human services.

Social Vulnerability Considerations

Often, socially vulnerable populations live in buildings built before the widespread adoption of fire codes (i.e., pre-1970). Those living in poverty may only be able to afford lower-priced (and subsequently higher-risk) accommodations. Elderly populations may live in older neighborhoods that may or may not have modernized with respect to the state of the building stock. Other sources have demonstrated socio-economic and racial disparities with respect to the quality of buildings in which persons live. See also the discussion above about mobile homes.

Historical Occurrences

As noted above, in Hagerstown, the fire department estimates approximately one structure fire per day. The probability of structure fire occurrence in other areas of the county (including the other municipalities) is lower. However, historical data provided by the county's Department of Emergency Services confirms past structural fires in all areas and municipalities of Washington County.

Explosions can be the source of fires, including industrial fires. It is more difficult to accurately quantify the number of explosions that have occurred in Washington County; however, various media outlets have reported instances of explosions.

- On February 19, 1990, a natural gas leak caused an explosion at a motel in Hagerstown. The explosion threw debris as far as 300 feet from the building, killed four people, and caused ten people to be treated for smoke inhalation and minor injuries.
- On August 25, 2016, a propane gas leak was to blame for a residential explosion where a $1.5M house was reduced to ashes near Hancock. The blast overturned various vehicles close to the structure. As many as 60 to 70 firefighters from 25 to 30 units in Maryland, Pennsylvania, and West Virginia responded to the call.
- Residents reported an explosion that shook their houses in Fairplay on January 29, 2017. A 911 supervisor said that fire departments and EMS searched the area and could not find the exact location.

Loss and Damages

U.S. Fire Administration (USFA) statistics show 372,000 residential building fires occurred in 2020, with an associated dollar loss of $8,604,400,000 (USFA, 2023). These figures suggest

an average loss of $23,000 per residential building fire. The USFA also reported 103,400 non-residential building fires in the United States in 2020, with a dollar loss of $3,289,600,000. The average non-residential building fire yields a loss of $31,800.

Future Occurrences[2]

Smaller events, like single-family residential fires, are more likely to occur than large fires and explosions. Industrial areas storing hazardous materials and chemicals that provide sustained fuel sources are potentially at higher risk, and as noted above, a higher concentration of warehouse facilities along and around the Interstate 81 corridor may create the risk for complex fires with the potential to severely constrain available resources.

Fire scientists have recently been calling attention to the increasing fire risk associated with new construction, a somewhat counter-intuitive argument. Though building and other fire codes help to manage risk, some building materials (including particle board and other human-made materials lighter and cheaper than real wood) and furnishings may not be as flame-resistant as those used before. Larger homes with more open layouts and flammable construction materials create environments where fires can burn more quickly, leaving less time for occupants to evacuate and for firefighters to respond before a structure is a complete loss. The tendency for families to live in larger homes, which enables the accumulation and storage of more things (i.e., more fuel), may also contribute to increased fire complexity (Safeco, 2017).

Vulnerability Assessment

This section summarizes the vulnerability of Washington County to structural and industrial fires. The steering committee conducted an online survey for the public to share its thoughts on the hazards listed in this plan. The following table presents the results of that survey, with structural and industrial fires combined with wildland fires.

PUBLIC SENTIMENT, FIRE (STRUCTURAL / INDUSTRIAL / WILDLAND)					
Hazard	*Level of Concern*				*Total Responses*
	Not at All	*Somewhat*	*Concerned*	*Very*	
Fire	28 (22.22%)	56 (44.44%)	24 (19.05%)	18 (14.29%)	126
In the past ten years, do you remember this hazard occurring in your community?				25 (19.84%)	126
Have you noticed an increase in the occurrences or intensity of this hazard?				15 (11.90%)	126
Have you noticed a decrease in the occurrences or intensity of this hazard?				5 (3.97%)	126

[2] Future climate considerations are not included because structural and industrial fires is a technological hazard.

The following table assigns point totals based on the methodology identified in Section 2.2: Profile Hazards above.

FIRE (STRUCTURAL / INDUSTRIAL) RISK RANKING			
Category	*Points*	*Description*	*Notes*
Frequency	5	Excessive (Will occur during a year)	Fire departments and the county dispatch center report structure fires occurring frequently, in some cases, nearly daily.
Response	2	One day	Though many structure fires are extinguished within a day, larger industrial fires may require a longer response. Planners selected the one-day option as an average of potential response durations.
Onset	4	Less than 6 hours	Fires typically occur with no notice.
Magnitude	1	Localized (Less than 10% of land area affected)	A structure fire at a single residence, a single industrial facility, or even a multi-structure fire impacts far less than 10% of the land area of the county (or any participating jurisdiction).
Business	4	More than 30 days	A fire impacting a specific business may create a business interruption of far greater than 30 days (to include potential permanent closure).
Human	2	Low (Some injuries)	Generally, the risk of injury or death due to structure fires is generally low thanks to more sprinkler systems, smoke detector availability, etc. First responders to the event may experience adverse health effects.
Property	4	More than 50% of property affected	For a major structure or industrial fire, property damage would likely be extensive (to include the potential for a total loss within and to the structure).
Totals	**22**	**HIGH**	

FEMA's *Local Mitigation Planning Handbook* (2023c) directs entities compiling multi-jurisdictional plans to identify any jurisdictions within the planning area for which the identified risks or vulnerabilities are more or less prevalent as compared to the other participating jurisdictions. The following table quickly synthesizes the data to capture the jurisdiction-specific aspects of risks and vulnerabilities for each city or town.

MULTI-JURISDICTIONAL CONSIDERATIONS, FIRE (STRUCTURAL / INDUSTRIAL)		
Jurisdiction	*Comparison*	*Notes*
Washington County	**Same**	**Though structure concentrations are less dense in the unincorporated areas of the county, the distance between them and the largely volunteer nature of the first-due fire departments contribute to risk and vulnerability.**
Boonsboro	Same	Buildings are more clustered, though fire suppression and the availability of water distribution systems are relevant variables.
Clear Spring	Same	Buildings are more clustered, though fire suppression and the availability of water distribution systems are relevant variables.
Funkstown	More	Like Williamsport, Funkstown is within the urban corridor of the county, which sees heavier traffic (potentially delaying a response), the potential for hazardous materials to be involved in an incident, and the presence of a greater number of industrial facilities within or near to corporate limits.
Hagerstown	More	Hagerstown includes the most densely-constructed built environment, a higher density of pre-1970 structures, heavier concentrations of socially-vulnerable populations, and the largest number of industrial facilities in its first-due response area. These variables contribute to risk. The presence of a well-resourced fire department is relevant to the vulnerability discussion.
Hancock	Same	Buildings are more clustered, though fire suppression and the availability of water distribution systems are relevant variables.
Keedysville	Same	Buildings are more clustered, though fire suppression and the availability of water distribution systems are relevant variables.
Sharpsburg	Same	Buildings are more clustered, though fire suppression and the availability of water distribution systems are relevant variables.
Smithsburg	(Slightly) More	Buildings are more clustered, though fire suppression and the availability of water distribution systems are relevant variables. Town officials, though, note inadequately pressure for fire flow on the water system in some areas of the town.
Williamsport	More	Like Funkstown, Williamsport is within the urban corridor of the county, which sees heavier traffic (potentially delaying a response), the potential for hazardous materials to be involved in an incident, and the presence of a greater number of industrial facilities within or near to corporate limits.

2.2.5 Flooding

A flood is a general or temporary condition of partial or complete inundation of normally dry land areas or the rapid accumulation of runoff surface water from any source. A flash flood is a sudden local flood, typically due to heavy rainfall.				
Vulnerability  HIGHEST HIGH MEDIUM LOW LOWEST	**Period of Occurrence:**	At any time, typically after prolonged periods of precipitation	**Washington County Risk Ranking:**	Medium
	Warning Time:	6-12 hours	**State Risk Ranking:**	Medium
	Probability:	Excessive (will occur in a year)	**Impact:**	Marginal (10-25% of land area affected)
	Type of Hazard:	Natural	**Disaster Declarations:**	DR-341-MD (1972) DR-489-MD (1975) DR-1094-MD (1996) USDA FSA S4465 (2018)

Hazard Overview

Flooding is the inundation of a normally dry area caused by an increased water level in an established watercourse or ponding of water that poses a threat to life or property. According to FEMA, inundation may stem from:

- The overflow of inland tidal waters;
- The unusual and rapid accumulation of runoff of surface waters from any source; or
- Mudslides are proximately caused by flooding and are akin to a river of liquid and slowing mud on the surfaces of normally dry areas, as when the earth is carried by a current of water and deposited along the path of that current.

Floods are one of the most frequent hazards in the United States, and flooding is among the most frequently-occurring natural disaster in Maryland. Floods impacted approximately 99% of U.S. counties between 1996 and 2019. Each year, floods cause more property damage in the U.S. than any other type of natural disaster, killing an average of 150 people. Types of flooding include the following.

- **River flooding** occurs when water levels rise over the top of river banks due to excessive rainfall from combined rain and snowmelt or an ice jam.
- **Ice/debris jams** occur when a stream's water level rises due to a buildup of ice or other debris. As the ice or debris moves downstream, it may catch on obstructions to the water flow. When this occurs, water can be held back, causing upstream flooding. When the jam breaks, flash flooding can occur downstream.

- **Snowmelt** can cause flooding when rapidly rising temperatures melt snow quickly. The water runs off the saturated ground into nearby streams or rivers, causing them to rise rapidly or overflow. Unlike rainfall, which can reach the soil almost immediately, the snowpack can store the water for an extended amount of time until temperatures rise above freezing and the snow melts.
- **Dam or levee failures** Dams and levees can overtop, have excessive seepage, or experience a structural failure, which results in flooding.

The history of flooding within Washington County indicates that it can occur at any time of the year. Nearly all significant floods, though, are from winter and spring rains falling on saturated, snow-covered, or frozen soil.

According to the National Flood Insurance Program (NFIP), flash floods are the most common severe weather emergency in the United States. Some storms drop large amounts of rain within brief periods. Flash floods occur with little or no warning and can reach a full peak in just a few minutes. Flash floods develop more quickly than river flooding, and they are harder to predict. Unlike river flooding, flash floods can occur in many places that river flooding does not. These areas are less prepared for flooding, leading to greater danger and potential for property damage.

Flash flooding is usually a widespread event, as small creeks and streams overfill banks and flood large areas of agricultural fields and rural roads. Flash flooding in or near urban areas often stems from failing storm sewers and poor drainage systems. Excessive amounts of paved areas or other impervious surfaces upstream can increase the water runoff rate. Development affects the runoff of stormwater and snowmelt. When rain falls in an undeveloped area, as much as 90 percent of it will infiltrate the ground; in a highly developed area, as much as 90 percent (90%) will run off.

Location and Extent

Floods occur in every state in the U.S., and, according to NOAA's National Severe Storms Laboratory, kill more people each year than tornados, hurricanes, or lightning (NSSL, n.d.). The local topography and the ground's capacity to hold water are variables that impact flooding in localized areas. Dense population centers and other heavily developed areas are at risk for flash flooding due to impervious surfaces (i.e., pavement, concrete, etc.). Roadways, parking lots, and other paved areas prevent the ground from absorbing rainfall, thereby increasing runoff and the possibility of flooding events.

Washington County is not only susceptible to widespread flooding along major streams and rivers in special flood hazard areas but is also subject to flash flooding along its smaller tributaries in the headwaters of steeply sloped drainage basins. These are found in the western portion of the county and along the Blue Ridge on the county's eastern flank. Of the nine municipalities in Washington County, Hancock and Williamsport are partially within the floodplain of the Potomac River, while Hagerstown and Funkstown are partially within the floodplain of Antietam Creek. Smithsburg and Boonsboro are also partially in the floodplain of smaller streams.

Historically, floods were referred to as a function of time (i.e., a "100-year" flood). A more accurate description would be that a "100-year" flood has a 1% chance of occurring in a year, a 50-year flood has a 2% chance of occurrence in a year, and a 500-year flood has a 0.2% chance of happening in any year. Any development within floodplains can impact the direction, flow, and level of a watercourse during periods of high water. If fill material or building construction is in a floodplain, it can alter the boundaries of that floodplain downstream. Not only does development in the floodplain increase dangers downstream, but developments within the floodplain are also at higher risk of damage due to flooding. This damage includes fill material and debris from destroyed structures upstream colliding with structures in the floodplain downstream of an affected area. Many bridges are washed out in floods because river-borne debris obstructs their free-flow area.

National Flood Insurance Program (NFIP)

The National Flood Insurance Program (NFIP) is a FEMA-managed program designed to provide flood insurance to property owners, renters, and businesses. The program intends to help those property owners recover more quickly following a flood event. The NFIP, though, is not *just* an insurance program. Program representatives work with communities to adopt and enforce floodplain management regulations to lessen damage exposure in flood-prone areas. All communities in Washington County participate in the NFIP (see Section 1.3: Capabilities for additional information, including current effective map dates, information on municipal floodplain management, etc.). The following table outlines the NFIP policies in force[1] throughout Washington County (FEMA, n.d.A).

[1] This table is a recreation of the spreadsheet available from the NFIP. Some policies are flagged for a county, but the community's name is unknown. In those cases, this table will report "Unknown."

NFIP POLICIES IN FORCE – WASHINGTON COUNTY			
Community Name (Number)	*Policies in Force*	*Total Coverage*	*Total Written Premium + FPF*
Washington County (240070)	**183**	**$47,001,000**	**$131,135**
Boonsboro, Town of (240071)	3	$980,000	$1,322
Clear Spring, Town of (240072)	3	$725,000	$1,750
Funkstown, Town of (240073)	10	$2,590,000	$10,834
Hagerstown, City of (240074)	33	$8,337,000	$24,025
Hancock, Town of (240109)	5	$1,004,000	$9,950
Keedysville, Town of (240075)	1	$228,000	$615
Sharpsburg, Town of (240076)	3	$843,000	$1,556
Smithsburg, Town of (240124)	2	$479,000	$901
Williamsport, Town of (240077)	6	$1,684,000	$7,684
Unknown (Unknown)	74	$17,977,000	$69,858

The NFIP has identified a subset of structures covered by flood insurance policies that are referred to as "repetitive loss" and "severe repetitive loss" properties. The following table lists the criteria for classification as a repetitive loss or severe repetitive loss property as defined by both the Flood Mitigation Assistance (FMA) Grant and the NFIP.

REPETITIVE LOSS AND SEVERE REPETITIVE LOSS DEFINITIONS		
Program	*Repetitive Loss*	*Severe Repetitive Loss*
Flood Mitigation Assistance (FMA) Grant	*A Repetitive Loss (RL) property is a structure covered by a contract for flood insurance made available under the NFIP that:* Has incurred flood-related damage on two occasions, in which the cost of the repair, on average, equaled or exceeded 25% of the market value at the time of each such flood event; At the time of the second incidence of flood-related damage, the contract for flood insurance contains the increased cost of compliance coverage.	(a) Is covered under a contract for flood insurance made available under the NFIP; and (b) Has incurred flood-related damage i. For which four or more separate claims payments (including building and contents) have been made under flood insurance coverage with the amount of each such claim exceeding $5,000 and with the cumulative amount of such claim's payments exceeding $20,000, or ii. For which at least two separate claims payments (including only building) have been made under such coverage, with the cumulative amount of such claims exceeding the market value of the insured structure.
National Flood Insurance Program (NFIP)	A Repetitive Loss (RL) property is any insurable building for which two or more claims of more than $1,000 were paid by the National Flood Insurance Program (NFIP) within any rolling ten-year period since 1978.	A single-family property (consisting of 1 to 4 residences) that is covered under flood insurance by the NFIP and has incurred flood-related damage for which four or more separate claims payments have been paid under flood insurance coverage, with the amount of each claim payment exceeding $5,000 and with a cumulative amount of such claims payments exceeding $20,000; or for which at least two separate claims payments have been made with the cumulative amount of such claims exceeding the reported value of the property.

There are 49 repetitive loss (RL) properties in Washington County. One property (each) is in Funkstown and Hagerstown, two properties (each) are in Hancock and Sharpsburg, five are in Williamsport, and the remaining 38 are outside municipal boundaries. Of the 49 RL properties, the majority are residential single-family dwellings (n=46). Two of the properties are "other non-residential," and one is "other residential."

There are 10 severe repetitive loss (SRL) properties in Washington County; six are single-family residential dwellings, and four are "other non-residential" properties. These 10 properties have sustained a total of 33 losses. Hagerstown and Sharpsburg have one SRL property; Hancock and Williamsport have two SRL properties, and four are outside municipal boundaries. See the summary table below.

REPETITIVE LOSS / SEVERE REPETITIVE LOSS SUMMARY – WASHINGTON COUNTY

Community Label	*Community Number*	*Count of Occupancy*	*Sum of Total Losses*
FUNKSTOWN, TOWN OF	**240073**	**1**	**2**
Single Family (old methodology)	240073	1	2
HAGERSTOWN, CITY OF	**240074**	**2**	**6**
Other Non-Residential (old methodology)	240074	1	4
Single Family (old methodology)	240074	1	2
HANCOCK, TOWN OF	**240109**	**4**	**10**
Other Non-Residential (old methodology)	240109	3	8
Single Family (old methodology)	240109	1	2
SHARPSBURG, TOWN OF	**240076**	**3**	**6**
Single Family (old methodology)	240076	3	6
WILLIAMSPORT, TOWN OF	**240077**	**7**	**22**
Other Non-Residential (old methodology)	240077	1	4
Single Family (old methodology)	240077	6	18
WASHINGTON COUNTY	**240070**	**42**	**100**
Other Residential (old methodology)	240070	1	2
Other Non-Residential (old methodology)	240070	1	5
Single Family (old methodology)	240070	40	93
Totals	**240109**	**59**	**146**

The following map shows the floodway, Zones A and AE (i.e., the 1% annual chance), and 0.2% annual chance special flood hazard areas (SFHAs) at a county level. These flood zone categories refer to the following (FEMA, 2020).

- **Floodway:** The "regulatory floodway" refers to the channel of a river or stream and the adjacent areas that should be reserved in order to discharge a base flood without cumulatively increasing the water surface elevation more than a designated height.
- **1% Annual Chance:** These areas are those that would be inundated by a flood event having a one percent chance of being equaled or exceeded in any given year. This 1%

annual chance area is typically referred to as “the base flood.” They appear as Zone A and Zone AE on flood insurance rate maps (FIRM) for Washington County.

- **0.2% Annual Chance:** These areas are “moderate flood hazard areas” that often appear as Zone B or Zone X on FIRM maps. These areas are between the limits of the base flood and the 0.2 percent annual chance flood.

Municipal flood risk maps are in Appendix 5.

WASHINGTON COUNTY HAZARD MITIGATION PLAN

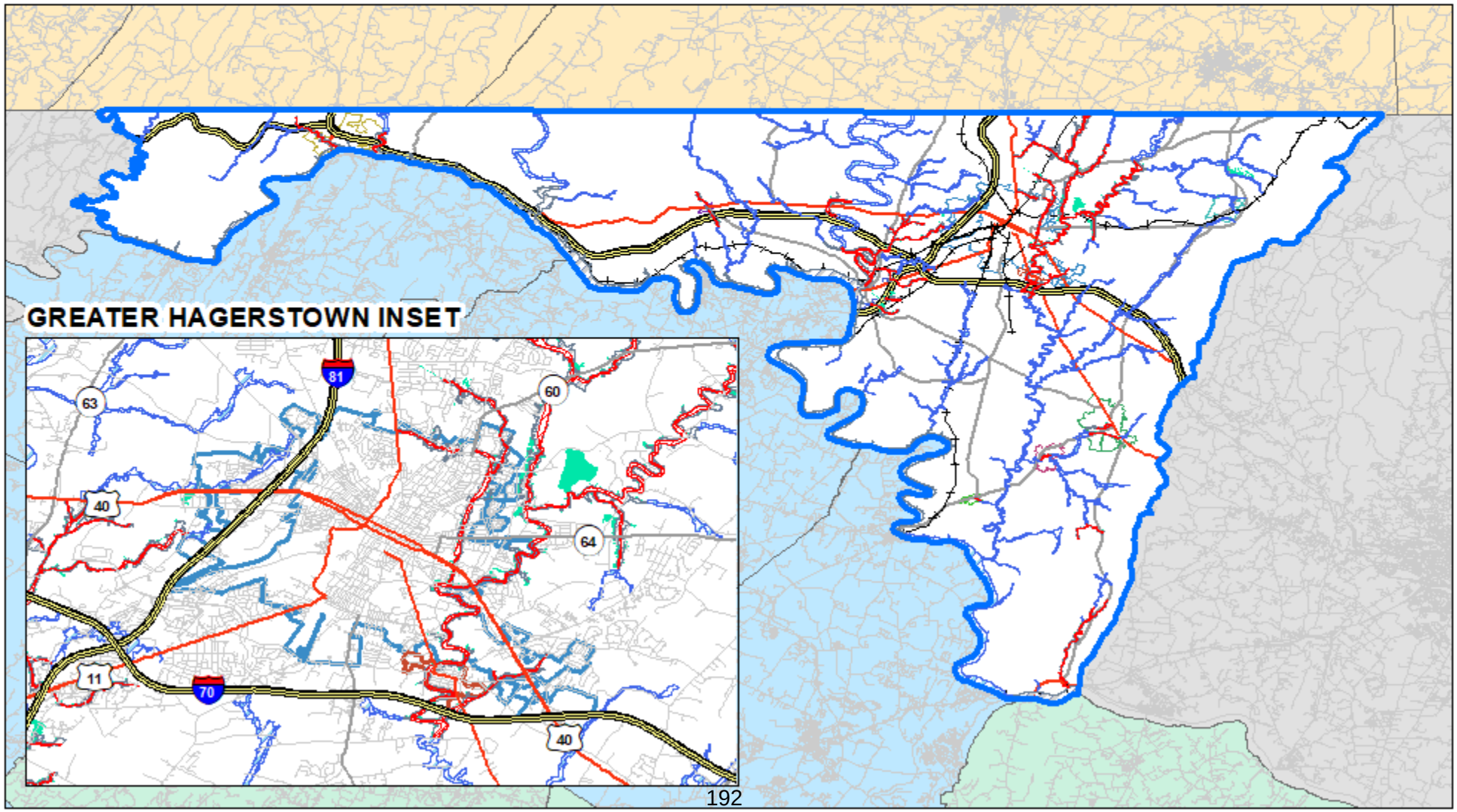
Special Flood Hazard Areas

Data Source(s):
FEMA Region III

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

- SFHA Floodway
- SFHA (Zone AE)-1% Annual Chance
- SFHA (Zone A)-1% Annual Chance
- SFHA-0.2% Annual Chance

N



Impacts and Vulnerability

The following table, taken from the state mitigation plan, is a summary consequence analysis for flooding (MDEM, 2021).

FLOODING CONSEQUENCE ANALYSIS	
Subject	*Impacts*
Health and Safety of the Public	Home and property owners within the FEMA 100-year flood zone are most at risk of impacts from a flood event. Impacts on the public include the potential for injury or loss of life, destruction or loss of land and property, and contamination of water.
Health and Safety of Responders	First responders, such as fire and police, would be called to the incident area(s) to evacuate people, close roads, and attend to any injured. For a flood event, as with all disaster events, responders face the risk of personal injury while performing necessary job functions.
Continuity of Operations (delivery of services)	The impacts on the continuity of operations would be limited unless a facility is within a flood hazard area during a severe flood event. Delivery of services may be slowed or halted in these areas if key roadways become impassable due to flooding.
Property, Facilities & Infrastructure	Home and landowners within flood zones may experience damage to or loss of property depending upon the severity of flooding in the area. Infrastructure may experience impacts in the form of damage from flooding, debris blockages, temporary closure of transportation routes, and the potential inability of the stormwater system to handle floodwater in a severe event.
Environment	Floods impact the environment by spreading pollution, overloading water and wastewater treatment plants, carrying silt and debris, and disturbing wildlife and natural areas.
Economic Condition	A major flood event would be costly for local governments in terms of emergency response, delivery of services, disaster cleanup, and future mitigation projects. Some of the costs could be recouped through federal grant reimbursements. However, local governments would still feel the fiscal impact of a significant event.

Flooding is one of the costliest disasters in the United States. Just one inch of water in a home can cause up to $25,000 in damages. There are a variety of other hazards associated with flooding. Those hazards can be primary, secondary, or tertiary. The following table presents the effects of flood hazards.

EFFECTS OF FLOODING	
Type	*Description*
Primary Effects	• With higher velocities, streams can transport larger particles as suspended loads. Such large particles include not only rocks and sediment but, during a flood, such large objects as automobiles, houses, and bridges. • Floodwaters can accomplish massive amounts of erosion. Such erosion can undermine bridge structures, levees, and buildings, causing their collapse. • Water entering human-built structures causes damage. Even with minor flooding of homes, furniture is ruined, floors and walls are damaged, and anything that comes in contact with the water is likely to be damaged or lost. Flooding of automobiles usually results in damage that cannot easily be repaired. • The higher velocity of floodwaters allows the water to carry more sediment as a suspended load. When the floodwaters retreat, velocity is generally much lower, and sediment is deposited. After the retreat of the floodwaters, everything is usually covered with a thick layer of stream-deposited mud, including the interior of buildings. • Flooding of farmland usually results in crop loss. Livestock, pets, and other animals are often carried away and drowned. • Humans that get caught in high-velocity floodwaters may drown. • Floodwaters can concentrate garbage, debris, and toxic pollutants into small areas that can cause secondary health hazards.
Cascading or Secondary Effects	• Disruption of Services ○ Drinking water supplies may become polluted, especially if sewerage treatment plants flood. ○ Gas and electrical service may be disrupted. ○ Transportation systems may be disrupted, resulting in shortages of food and cleanup supplies.
Long-Term or Tertiary Effects	• The location of river channels may change due to flooding; new channels develop, leaving the old ones dry. • Sediment deposited by flooding may destroy farmland (although silt deposited by floodwaters could also help to increase agricultural productivity). • Jobs may be lost due to the disruption of services, destruction of business, etc. (although jobs may appear in the construction industry to help rebuild or repair flood damage). • Insurance rates may increase. • Corruption may result from the misuse of relief funds. • Destruction of wildlife habitat.

Source https://www.tulane.edu/~sanelson/Natural_Disasters/floodhaz.htm

In addition to property and structure damage, flood waters pose a risk to human health. Floodwaters can contain downed power lines, human and livestock waste, household, medical, and industrial waste and debris, wild or stray animals, and other contaminants that can cause illnesses (CDC, 2022b).

Flash floods are often the most dangerous floods. Flash flood waters are fast-moving and can destroy buildings and bridges and scour new channels. Occasionally, debris floating in flash floodwaters accumulates at natural or human-made obstructions and restricts the flow of water. This obstruction causes upstream flooding and subsequent downstream flooding if the obstacle suddenly releases.

Flooding impacts include injuries and potential fatalities, damage to property, lost revenue and other economic damages, and increased demand for public safety and infrastructure-related services. Response activities include unplanned overtime for emergency operations center (EOC) activations, evacuations and sheltering of displaced individuals, rerouting traffic destined for impassible roads, bridge and road repairs, and rescue or medical missions related to motorists and isolated individuals. Private property damages to homes and vehicles, as well as land erosion, river channel changes, agricultural damages, and livestock losses resulting in significant rural economic impacts to residents.

Social Vulnerability Considerations

Flooding can impact numerous social vulnerability categories, in both direct and subtle ways. Direct impacts include the following. Flood insurance can be costly[2], and those living in poverty may not be able to afford coverage. As a result, they forego coverage and feel disproportionate impacts if their home floods. Renters may not be aware that they can purchase flood insurance, and as such, they may face similar impacts when floods occur. The following map shows the Census tracts with the highest concentrations of persons living in poverty overlaid by flood hazard data.

[2] Interestingly, FEMA anticipates that 61.4% of policy holders in Maryland will see decreased rates as part of Risk Rating 2.0. Just 0.9% of policy holders in Maryland will see an increase of more than $20 per month (ASFPM, 2021).

WASHINGTON COUNTY HAZARD MITIGATION PLAN

Poverty / SFHA Overlays

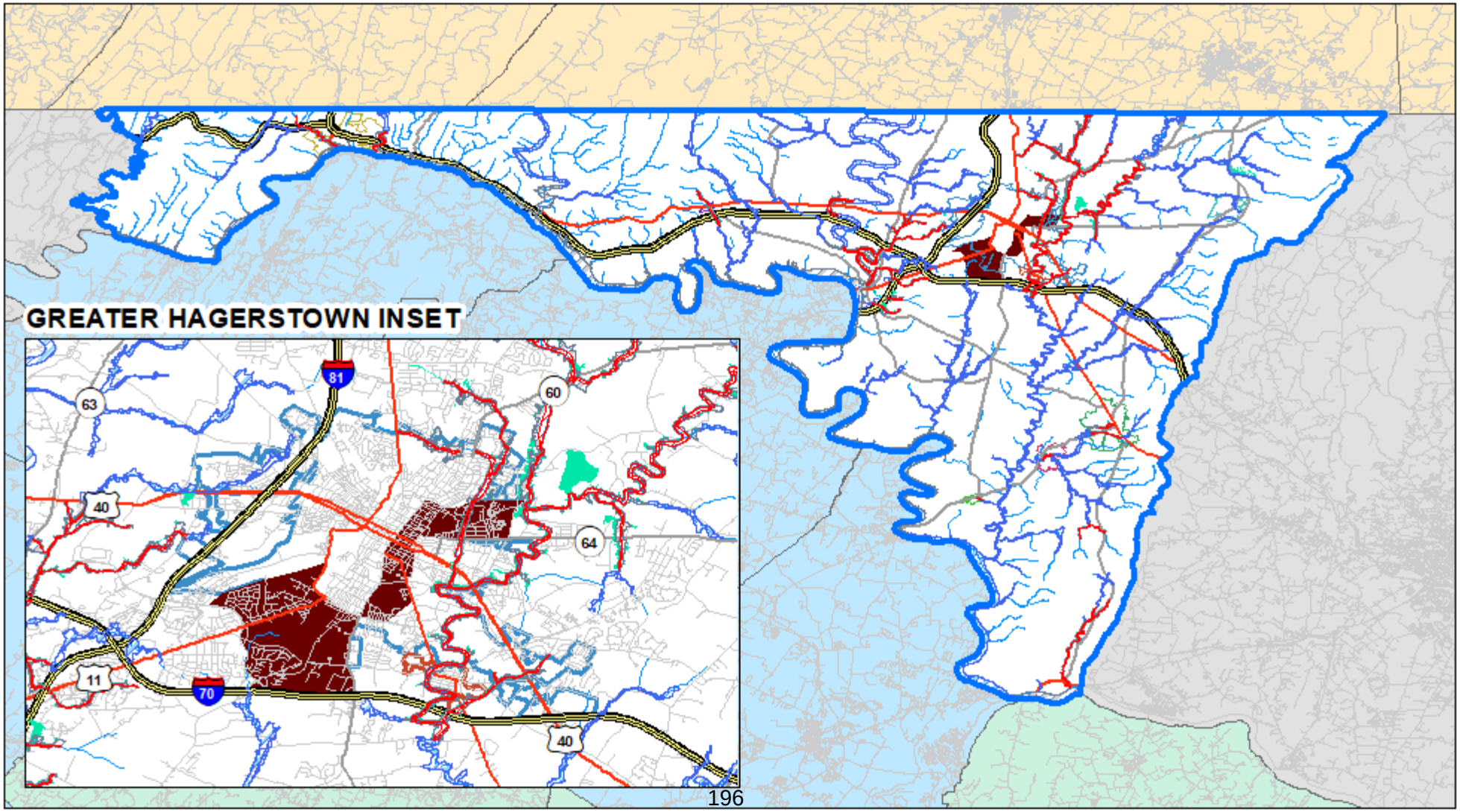
Data Source(s):
CDC SVI Index (2020), FEMA Region III

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

SFHA Floodway
SFHA (Zone AE)-1% Annual Chance
SFHA (Zone A)-1% Annual Chance
SFHA-0.2% Annual Chance

Persons under 150% of Poverty Level
Pov: Lower Conc. (not labeled)
Pov: 1313 - 2396

N



Other direct impacts are related to response capabilities. Populations with a low English proficiency may not understand public awareness messages and forecasts, and when/if an evacuation is warranted, they may not understand the directive (thus delaying or prohibiting their evacuation). Similarly, households with no vehicle can experience difficulty evacuating. The following maps show the relationship between special flood hazard areas and the Census tracts with high concentrations of (a) persons speaking English “less than well,” and (b) households with no vehicle.

WASHINGTON COUNTY HAZARD MITIGATION PLAN

Language Proficiency / SFHA Overlays

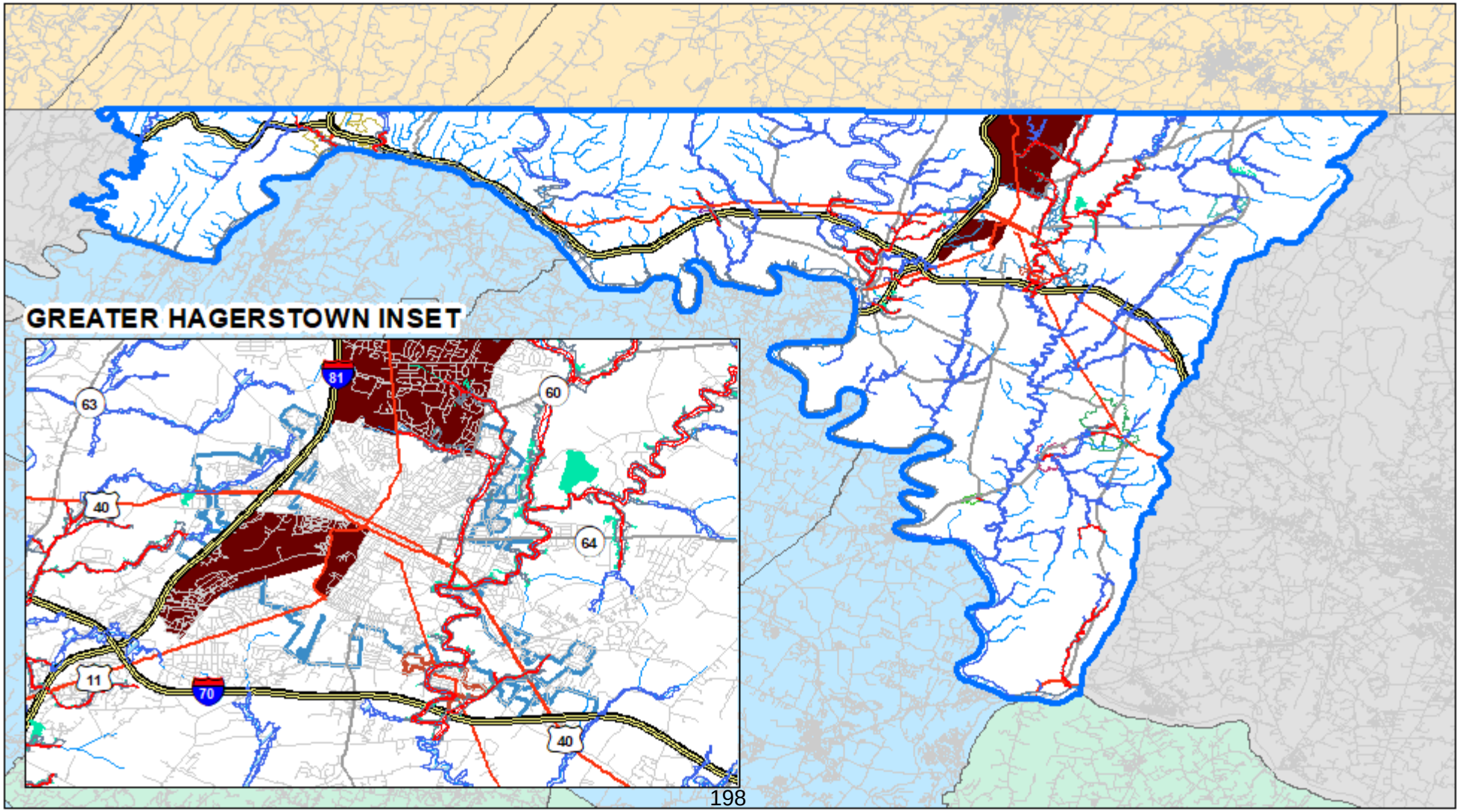
Data Source(s):
CDC SVI Index (2020), FEMA Region III

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

SFHA Floodway
SFHA (Zone AE)-1% Annual Chance
SFHA (Zone A)-1% Annual Chance
SFHA-0.2% Annual Chance

5+ Speaking English "Less than Well"
Lang: Lower Conc. (not labeled)
Lang: 128 - 235

N



WASHINGTON COUNTY HAZARD MITIGATION PLAN

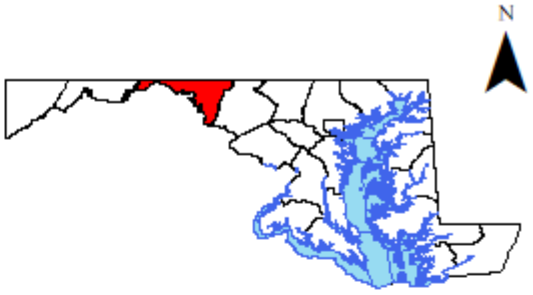
Vehicle Access / SFHA Overlays

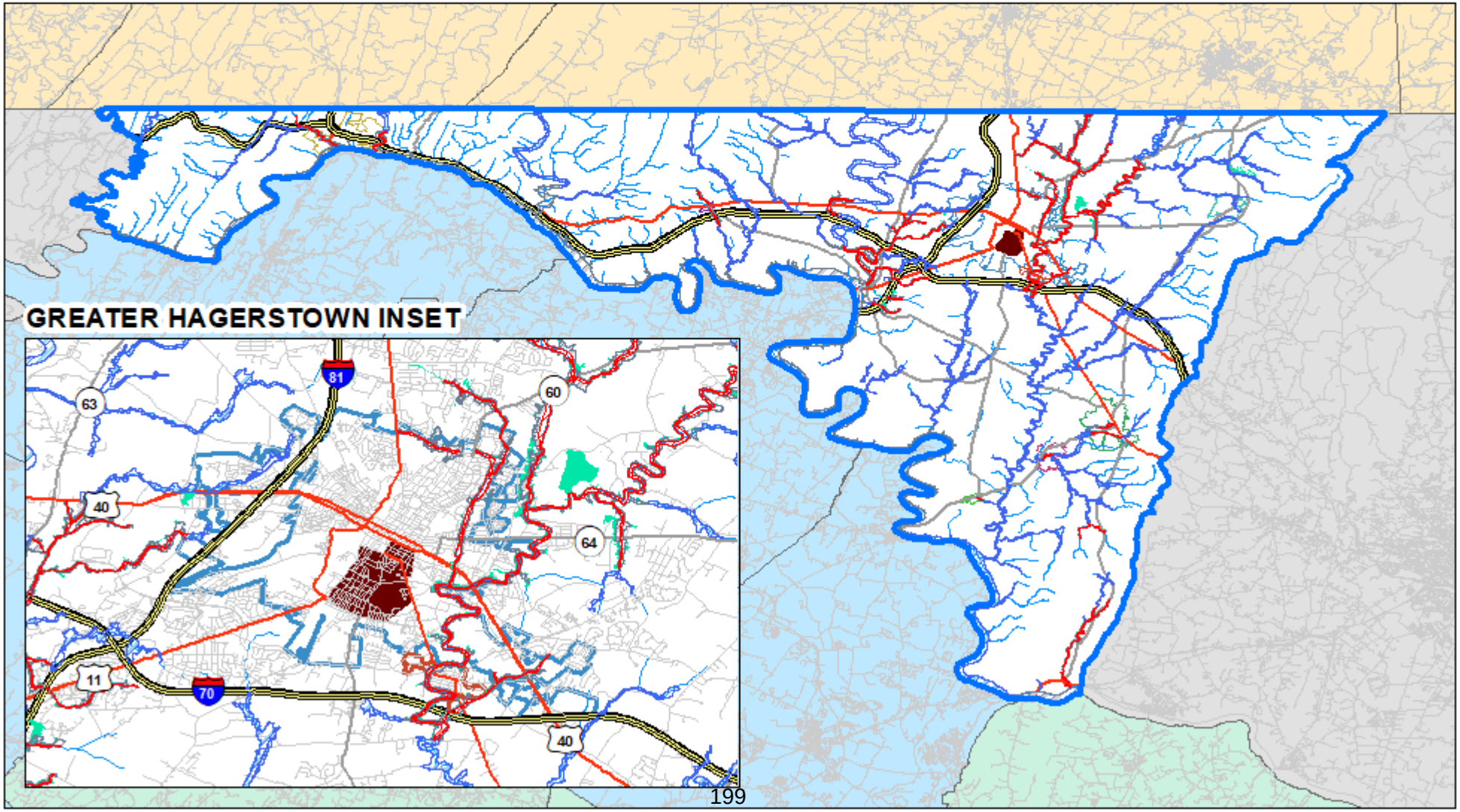
Data Source(s):
CDC SVI Index (2020), FEMA Region III

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

SFHA Floodway
SFHA (Zone AE)-1% Annual Chance
SFHA (Zone A)-1% Annual Chance
SFHA-0.2% Annual Chance

Households w/ No Vehicle
Veh: Lower Conc. (not labeled)
Veh: 406 - 681





Other effects can be more subtle. Frequent flooding (or the potential for frequent flooding) can depress property values in hazard areas, which can (over time) steer lower income residents into those areas as a matter of what they can afford. These individuals not only have difficulty affording flood insurance premiums (as noted above), but also homeowner's insurance more generally. The lack of insurance hampers their ability to recover when floods occur.

In the aftermath of disasters such as Hurricane Katrina in New Orleans and Hurricane Harvey in Houston, Texas, more affluent (often white) impactees chose to purchase or rebuild in less hazard-prone areas, further concentrating lower-income, often racially-segregated populations in hazard-prone areas (Craemer, 2010; Olin, 2021). Though participants in the 2023 update were not aware of any instances like these occurring, the map graphics in Section 1.2 above identify the Census tracts with higher concentrations of racial minorities. The following map shows those tracts and their relationship to special flood hazard areas.

WASHINGTON COUNTY HAZARD MITIGATION PLAN

Minority Populations / SFHA Overlays

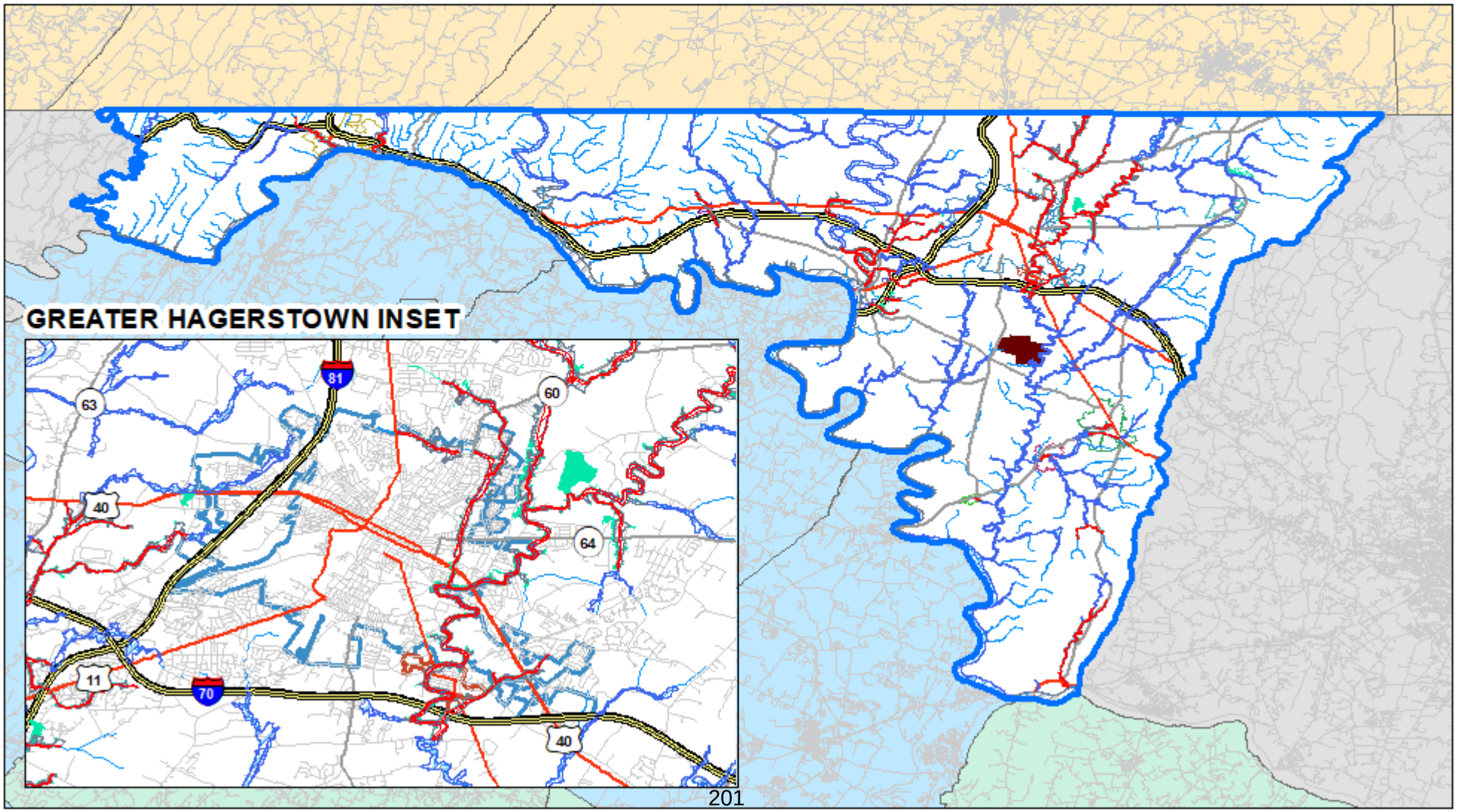
Data Source(s):
CDC SVI Index (2020), FEMA Region III

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

SFHA Floodway
SFHA (Zone AE)-1% Annual Chance
SFHA (Zone A)-1% Annual Chance
SFHA-0.2% Annual Chance

Persons Identifying as Minorities
Min: Lower Conc. (not labeled)
Min: 2158 - 4789

N



Historical Occurrences

Since 1924, Washington County has been affected by numerous high-water events, with several events surpassing 1% annual chance levels in selected watersheds (such as the main stem of the Potomac and on Conococheague and Antietam Creeks). Further, Washington County has received four declarations involving flood or flash flooding disasters in the past 50 years. Historically, the most significant flood events to occur in Maryland remain the 1936 floods on the Potomac River and the 1972 flood resulting from Hurricane Agnes.

According to the *2021 State of Maryland Hazard Mitigation Plan*, there are two historic critical facilities and three state-owned assets within flood zones in Washington County, valued at $958,800 (MDEM, 2021). Flooding events appear in the NOAA National Centers for Environmental Information's Storm Event Database, which has maintained records since 1996. The following table presents the 38 flood events reported in Washington County, along with reported deaths, injuries, and property and crop damages (NOAA NCEI, 2023c).

HISTORICAL FLOODING OCCURRENCES – WASHINGTON COUNTY

Location	*Date*	*Event Type*	*Deaths*	*Injuries*	*Property Damage*	*Crop Damage*
Washington County	1/19/1996	Flood	0	0	$15,000,000	$0
Washington County	9/06/1996	Flood	0	0	$500,000	$20,000
Washington County	3/22/2000	Flood	0	0	$0	$0
Washington County	1/01/2003	Flood	0	0	$0	$0
Washington County	3/20/2003	Flood	0	0	$0	$0
Washington County	5/16/2003	Flood	0	0	$0	$0
Washington County	6/03/2003	Flood	0	0	$0	$0
Washington County	6/07/2003	Flood	0	0	$0	$0
Washington County	9/04/2003	Flood	0	0	$0	$0
Washington County	12/11/2003	Flood	0	0	$0	$0
Washington County	9/28/2004	Flood	0	0	$0	$0
Maugansville	5/12/2008	Flood	0	0	$20,000	$0
Leitersburg	4/28/2011	Flood	0	0	$0	$0
High Field	10/30/2012	Flood	0	0	$0	$0
Leitersburg Pearre	5/16/2014	Flood	0	0	$0	$0
Kemps	1/13/2018	Flood	0	0	$0	$0
Sandy Hook	5/15/2018	Flood	0	0	$0	$0
Clear Spring Big Spring	5/26/2018	Flood	0	0	$0	$0
Bakersville Mapleville Sharpsburg	6/01/2018	Flood	0	0	$0	$0
Bakersville Antietam Sharpsburg	6/02/2018	Flood	0	0	$0	$0
Pearre	6/03/2018	Flood	0	0	$0	$0
Williamsport	6/04/2018	Flood	0	0	$0	$0

HISTORICAL FLOODING OCCURRENCES – WASHINGTON COUNTY						
Location	*Date*	*Event Type*	*Deaths*	*Injuries*	*Property Damage*	*Crop Damage*
Leitersburg	7/23/2018	Flood	0	0	$0	$0
Fairview	8/02/2018	Flood	0	0	$0	$0
Cavetown	8/21/2018	Flood	0	0	$0	$0
Security Chewsville	9/07/2018	Flood	0	0	$0	$0
Cearfoss Pearre Broadfording Fairview	9/09/2018	Flood	0	0	$0	$0
Fairview	9/13/2018	Flood	0	0	$0	$0
Pearre Pecktonville Ashton Corbett Fairview	9/28/2018	Flood	0	0	$0	$0
Fairview Broadfording Charlton Ashton	5/19/2019	Flood	0	0	$0	$0
Belle Grove	12/25/2020	Flood	0	0	$0	$0
Dargan	6/11/2021	Flood	0	0	$0	$0
Cearfoss	9/01/2021	Flood	0	0	$0	$0
Fairview Pecktonville Hancock	9/02/2021	Flood	0	0	$0	$0
Leitersburg Cavetown	9/15/2021	Flood	0	0	$0	$0
Leitersburg	9/23/2021	Flood	0	0	$0	$0
Pecktonville Fairview	5/07/2022	Flood	0	0	$0	$0
Fountain Head Corbett	9/07/2022	Flood	0	0	$0	$0
	Totals	**38**	**0**	**0**	**$15,520,000**	**$20,000**

The NCEI database also lists flash flooding (2023c). Since 1996, there have been 30 flash flood events, for an average of 1.15 events per year. These flash floods have resulted in approximately $7,000,000 in property damage and $35,000 in crop damages. The following table describes these events.

HISTORICAL FLASH FOOD OCCURRENCES – WASHINGTON COUNTY						
Location	*Date*	*Event Type*	*Deaths*	*Injuries*	*Property Damage*	*Crop Damage*
Countywide	1/19/1996	Flash Flood	0	0	$1,000,000	$0
Eastern Portion	6/18/1996	Flash Flood	0	0	$1,000,000	$0
Hagerstown	6/20/1996	Flash Flood	0	0	$0	$0
Southeastern Portion	7/30/1996	Flash Flood	0	0	$15,000	$0

HISTORICAL FLASH FOOD OCCURRENCES – WASHINGTON COUNTY						
Location	*Date*	*Event Type*	*Deaths*	*Injuries*	*Property Damage*	*Crop Damage*
Countywide	9/06/1996	Flash Flood	0	0	$150,000	$35,000
Sharpsburg	9/10/1997	Flash Flood	0	0	$15,000	$0
Countywide	11/07/1997	Flash Flood	0	0	$5,000	$0
Eastern Portion	2/04/1998	Flash Flood	0	0	$5,000	$0
Eastern Portion	3/20/1998	Flash Flood	0	0	$10,000	$0
Eastern Portion	5/08/1998	Flash Flood	0	0	$3,000	$0
Countywide	3/21/2000	Flash Flood	0	0	$0	$0
Countywide	6/03/2003	Flash Flood	0	0	$0	$0
Countywide	6/13/2003	Flash Flood	0	0	$0	$0
Eastern Portion	9/03/2003	Flash Flood	0	0	$20,000	$0
Smithsburg	6/14/2004	Flash Flood	0	0	$0	$0
Forest Park	9/08/2004	Flash Flood	0	0	$0	$0
Countywide	9/17/2004	Flash Flood	0	0	$25,000	$0
Hagerstown	9/28/2004	Flash Flood	0	0	$0	$0
Sharpsburg	3/28/2005	Flash Flood	0	0	$0	$0
Hagerstown	6/25/2006	Flash Flood	0	0	$0	$0
Hagerstown	6/27/2006	Flash Flood	0	0	$25,000	$0
Roxbury Security Pondsville	4/28/2011	Flash Flood	0	0	$0	$0
Breathedsville Pondsville	5/29/2012	Flash Flood	0	0	$0	$0
Grimes	5/16/2014	Flash Flood	0	0	$0	$0
Clear Spring Indian Springs	6/12/2014	Flash Flood	0	0	$0	$0
Fountain Head	6/25/2014	Flash Flood	0	0	$0	$0
Corbett Fiddlesburg	7/01/2014	Flash Flood	0	0	$0	$0
Gapland Dargan Augusta Sandy Hook	5/15/2018	Flash Flood	0	0	$4,700,000	$0
Edgemont	9/15/2021	Flash Flood	0	0	$0	$0
Fountain Head	9/07/2022	Flash Flood	0	0	$0	$0
	Totals	**30**	**0**	**0**	**$6,958,000**	**$35,000**

Major floods (since 1924) include the March 1936 snowmelt event, which affected much of the central and northern Appalachians; the passage of Hurricane Hazel in the fall of 1954, which affected parts of the Potomac Basin; the passage of Hurricane Agnes in the summer of 1972, which caused widespread flooding throughout the Northeast, and the flood of November 1985, which stemmed from excessive rainfall over a several-day period and affected much of the Potomac Basin. More recently, flooding from snowmelt accompanied by heavy rain affected Washington County in January 1996. During the fall of that year, Hurricane Fran caused more than $500,000 in flooding damage and $150,000 in flash flood damage throughout the county (NOAA NCEI, 2023c).

May 15, 2018 – Severe Storms and Flooding (DR-4374-MD)

A series of severe thunderstorms containing excessive rain impacted portions of western and central Maryland for several days, leading to widespread urban and stream flooding in parts of Frederick and Washington Counties. During the first two days, multiple roadways and bridges were inundated, with many being "washed out." The storms primarily impacted roads and bridges. The total FEMA Public Assistance (PA) cost estimate was approximately $12.6 million (NOAA NCEI, 2023c).

Loss and Damages

The 38 flooding events in Washington County caused a reported $15,540,000 in property and crop damages, for an average of $408,947 per flood event. There have been 30 flash flooding events, resulting in approximately $6,993,000 in property and crop damages, for an average of $233,100 per flash flood event.

The table below includes loss estimations obtained from the *State of Maryland 2021 Hazard Mitigation Plan* (MDEM, 2021). Washington County contains 3% of the state's critical facilities located within flood zones and less than 1% of state-owned assets situated in flood zones.

FLOODING LOSS ESTIMATIONS – CRITICAL FACILITIES / STATE ASSETS				
Jurisdiction	*Critical Facilities Totals in Flood Zones*	*Critical Facilities Loss Estimations*		
		Building Value	*Content Value*	*Total Loss*
Washington County	2	$734,900	$536,500	$1,271,400
Maryland	63	$225,104,700	$230,276,900	$455,381,600
Jurisdiction	*Historic Critical Facility Totals in Flood Zones*	*Historic Critical Facilities Loss Estimations*		
		Building Value	*Content Value*	*Total Loss*
Washington County	2	$734,900	$536,500	$1,271,400
Maryland	23	$19,380,000	$5,956,300	$25,336,300
Jurisdiction	*State Asset Totals in Flood Zones*	*State Assets Loss Estimations*		
		Building Value	*Content Value*	*Total Loss*
Washington County	3	$223,900	$74,633	$298,533
Maryland	619	$1,129,830,576	$73,364,066	$1,203,194,642
Jurisdiction	*Historic State Asset Totals in Flood Zones*	*Historic State Assets Loss Estimations*		
		Building Value	*Content Value*	*Total Loss*
Washington County	0	$0	$0	$0
Maryland	131	$299,009,647	$13,758,427	$312,768,074

FEMA estimates losses from flooding through the HAZUS-MH program (FEMA, 2022b). The program calculates the expected losses to buildings during a 1% annual chance flood event.

The following tables outline damages during the event to buildings by occupancy, buildings by construction type, and building economic losses.

EXPECTED BUILDING DAMAGE BY OCCUPANCY – WASHINGTON COUNTY												
Occupancy	*1-10*		*11-20*		*21-30*		*31-40*		*41-50*		*>50*	
	Ct.	*%*	*Ct.*	*%*	*Ct.*	*%*	*Ct.*	*%*	*Ct.*	*%*	*Ct.*	*%*
Agriculture	0	0	0	0	0	0	0	0	0	0	0	0
Commercial	0	0	0	0	0	0	0	0	0	0	0	0
Education	0	0	0	0	0	0	0	0	0	0	0	0
Government	0	0	0	0	0	0	0	0	0	0	0	0
Industrial	0	0	0	0	0	0	0	0	0	0	0	0
Religion	0	0	0	0	0	0	0	0	0	0	0	0
Residential	0	0	0	0	2	7	1	3	3	10	23	79
Total	**0**		**0**		**2**		**1**		**3**		**23**	

EXPECTED BUILDING DAMAGE BY BUILDING TYPE – WASHINGTON COUNTY												
Building Type	*1-10*		*11-20*		*21-30*		*31-40*		*41-50*		*Substantially*	
	Ct.	*%*	*Ct.*	*%*	*Ct.*	*%*	*Ct.*	*%*	*Ct.*	*%*	*Ct.*	*%*
Concrete	0	0	0	0	0	0	0	0	0	0	0	0
Manufactured Housing	0	0	0	0	0	0	0	0	0	0	0	0
Masonry	0	0	0	0	0	0	0	0	0	0	7	100
Steel	0	0	0	0	0	0	0	0	0	0	0	0
Wood	0	0	0	0	2	9	1	5	3	14	16	73

BUILDING-RELATED ECONOMIC LOSS ESTIMATES (MILLIONS OF DOLLARS) – WASHINGTON COUNTY						
Category	*Area*	*Residential*	*Commercial*	*Industrial*	*Others*	*Total*
Building Loss	Building	34.13	7.49	13.20	1.57	**56.39**
	Content	18.11	18.19	28.60	7.75	**72.65**
	Inventory	0.00	2.31	4.45	0.13	**6.89**
	Subtotal	52.24	27.99	46.25	9.45	**135.93**
Business Interruption	Income	0.95	12.68	0.33	1.84	**15.80**
	Relocation	6.22	2.64	0.34	1.10	**10.30**
	Rental Income	2.88	1.93	0.09	0.14	**5.04**
	Wage	2.24	12.83	0.58	22.56	**38.21**
	Subtotal	12.29	30.08	1.34	25.64	**69.35**
	Totals	**64.53**	**58.07**	**47.59**	**35.09**	**205.28**

Future Occurrences

Based on the frequency of previous occurrences, the future probability of flooding in Washington County is highly likely. According to the *Fourth National Climate Assessment*, climate change may impact flooding. Continued increases in the frequency and intensity of localized

heavy precipitation in many regions of the United States, including the Northeast (which includes Maryland), may contribute to increased flooding (USGCRP, 2018).

Regarding changes in land use and development, new urban development upslope of inadequate existing stormwater facilities in older urban areas also exacerbates stormwater runoff issues as these communities expand. In Washington County, the local governments utilize a designated "growth area" concept. Through this effort, many areas of the county remain naturalized. Though not explicitly for hazard mitigation, this approach provides areas for increased water runoff to absorb back into the ground. Impacts could be substantial in developed areas, but the county's development supports a general regulation of the runoff. In the developed areas, local officials should consider upgrades to stormwater management systems, the integration of urban-area green infrastructure solutions etc.

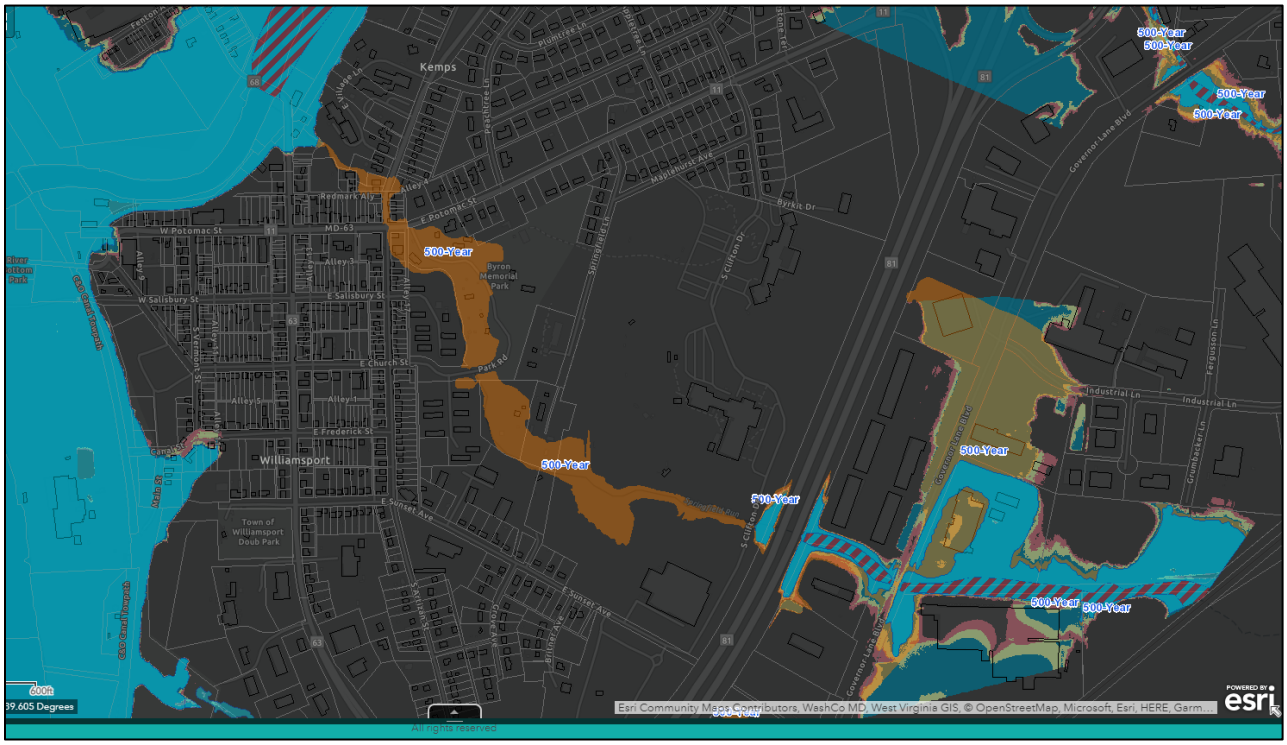
Washington County and all participating municipalities participate in the NFIP and thus regulate development in SFHAs. As population patterns change, new growth and in-migration to the county and municipalities should not increase flood risk (by limiting development in floodways and 1% annual chance areas) nor should flood impacts escalate for those emigrants by virtue of them moving into the area (or moving within the county). The risk remains with older properties that precede NFIP regulations. As these properties age, they may become more feasible options for those with limited incomes, thereby putting greater strain on socially vulnerable populations.

Future Climate Considerations

Many climate researchers anticipate periods of heavy rain becoming more common as the future climate changes. The *Fourth National Climate Assessment* suggests that rainfall in the most severe of rain events increased across the United States between 1958 and 2016 (USBCRP, 2018). Hersher (2022) reports that floods have become larger in rivers and streams throughout the Northeast and Midwest, while frequencies have decreased in other parts of the country. FEMA further reports that, generally, floodplain inundation is expected to increase by approximately 45% by the end of the 21st century (AECOM, n.d.).

Researchers have also documented that a warmer atmosphere holds more water, and as such, it can release that water (USBCRP, 2018). Climate assessments often point out potential changes in seasonal patterns, which can influence the number rain-on-snow events (USBCRP, 2018) that occur. Fluctuations in precipitation, to include more precipitation and increased instances of locally-contained heavy downpours may contribute to the runoff flooding noted above.

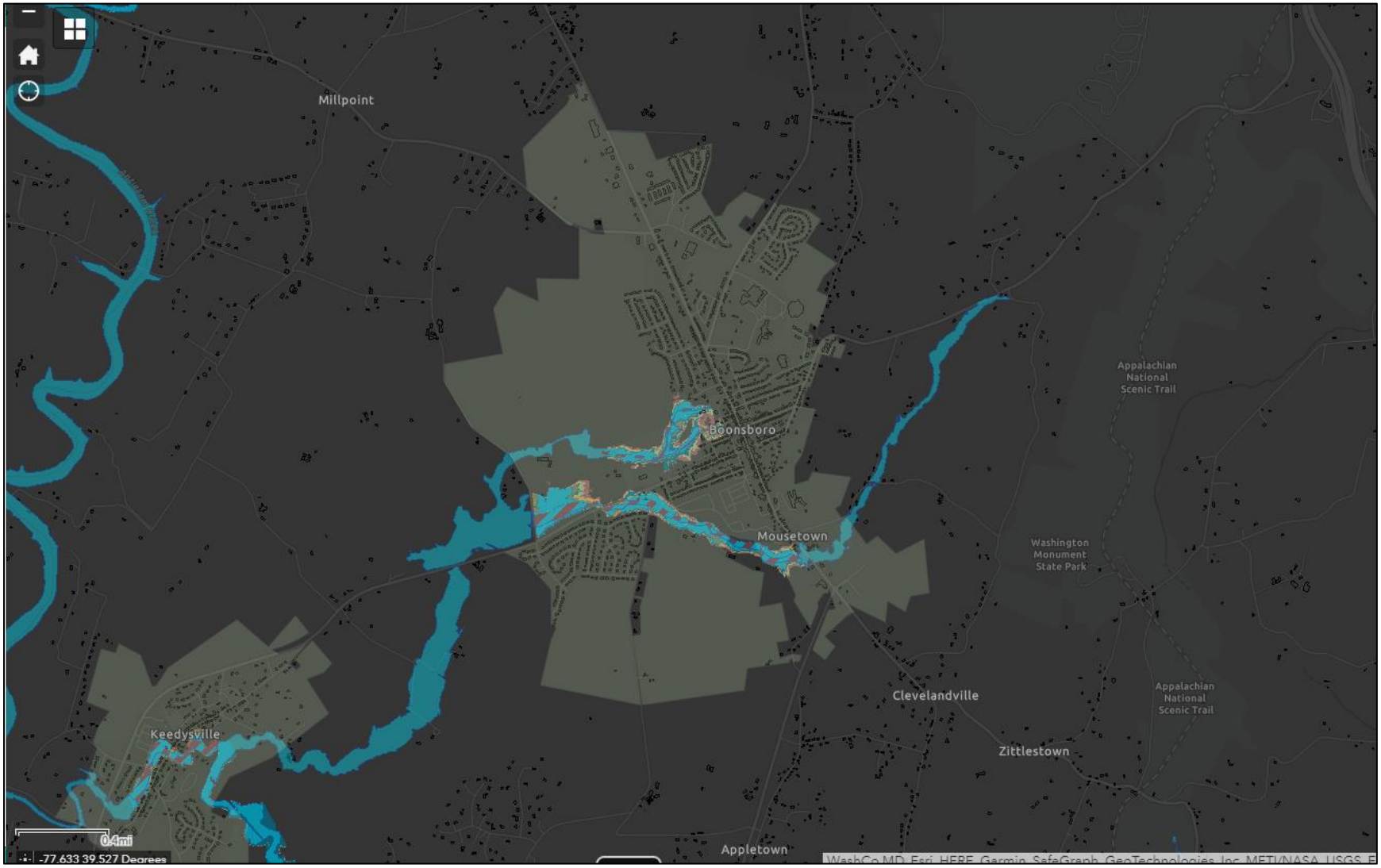
The Maryland Department of the Environment (MDE) compiled the Riverine Climate Ready Action Boundary (R-CRAB) tool[3] to help communities visualize where existing SFHA determinations may not account for future flooding with increased precipitation (MDE, n.d.C). R-CRAB depicts the current "effective floodplain," and then adds additional shaded areas to show depths greater than 2 feet, 1 to 2 feet, and 0.034 to 1 foot above the effective floodplain. In some areas, the greater depth and, consequently, "larger" SFHA is considerable. Further, the R-CRAB allows users to zoom into a level that shows parcel lines and building footprints, as shown in the image below (for Williamsport). In the image, the darkest blue areas are those with greater than 2' depths, the olive green areas are those with 1-2' depths, and the burgundy areas are those with less than 1' more water depth.



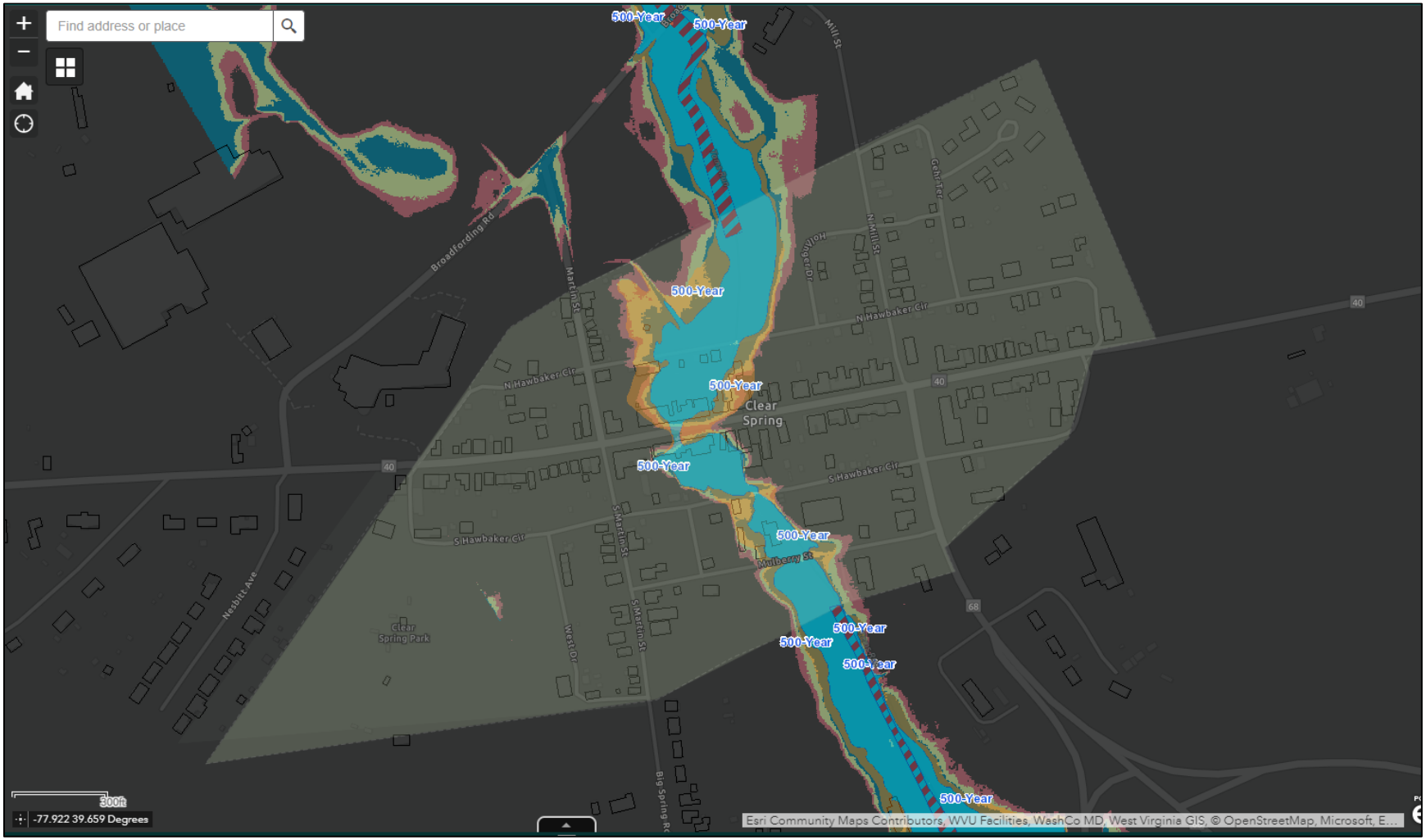
The following screen captures show, at a zoomed-out level, R-CRAB images for each of the participating municipalities.

[3] The R-CRAB is a companion to the MDE's CS-CRAB tool, which looks at increased coastal flooding risks. The R-CRAB is a newer tool than the coastal tool, and whereas communities can download the data layers comprising the CS-CRAB, R-CRAB layers are not yet available for download. Future versions of this plan, then, can take advantage of those layers when they are available, providing a more structure-by-structure consideration of future risk.

Boonsboro


Millpoint
Boonsboro
Mousetown
Appalachian National Scenic Trail
Washington Monument State Park
Clevelandville
Appalachian National Scenic Trail
Keedysville
Zittlestown
Appletown
0.4mi
-77.633 39.527 Degrees

Clear Spring



Funkstown


Find address or place
Funkstown
500-Year
Southern Blvd
E Oak Ridge Dr
Oak Ridge Pl
Frederick St
W Poplar St
E Poplar St
N Potomac St
Chestnut St
Edgewood Dr
S Edgewood Dr
Paul Smith Blvd
Baltimore St
E Baltimore St
W Maple St
E Maple St
W Cemetery St
W Green St
E Green St
S Antietam St
Potomac St
Bethlehem Ct
Hebb Rd
Beaver Creek Rd
Funkstown Community Park
Freedom Rd
Lagoon Rd
Herman Caver Pl
Raymond Xing
Bessy Naomi Dr
Emmert Rd
Charlotte St
Beaver Creek
600ft
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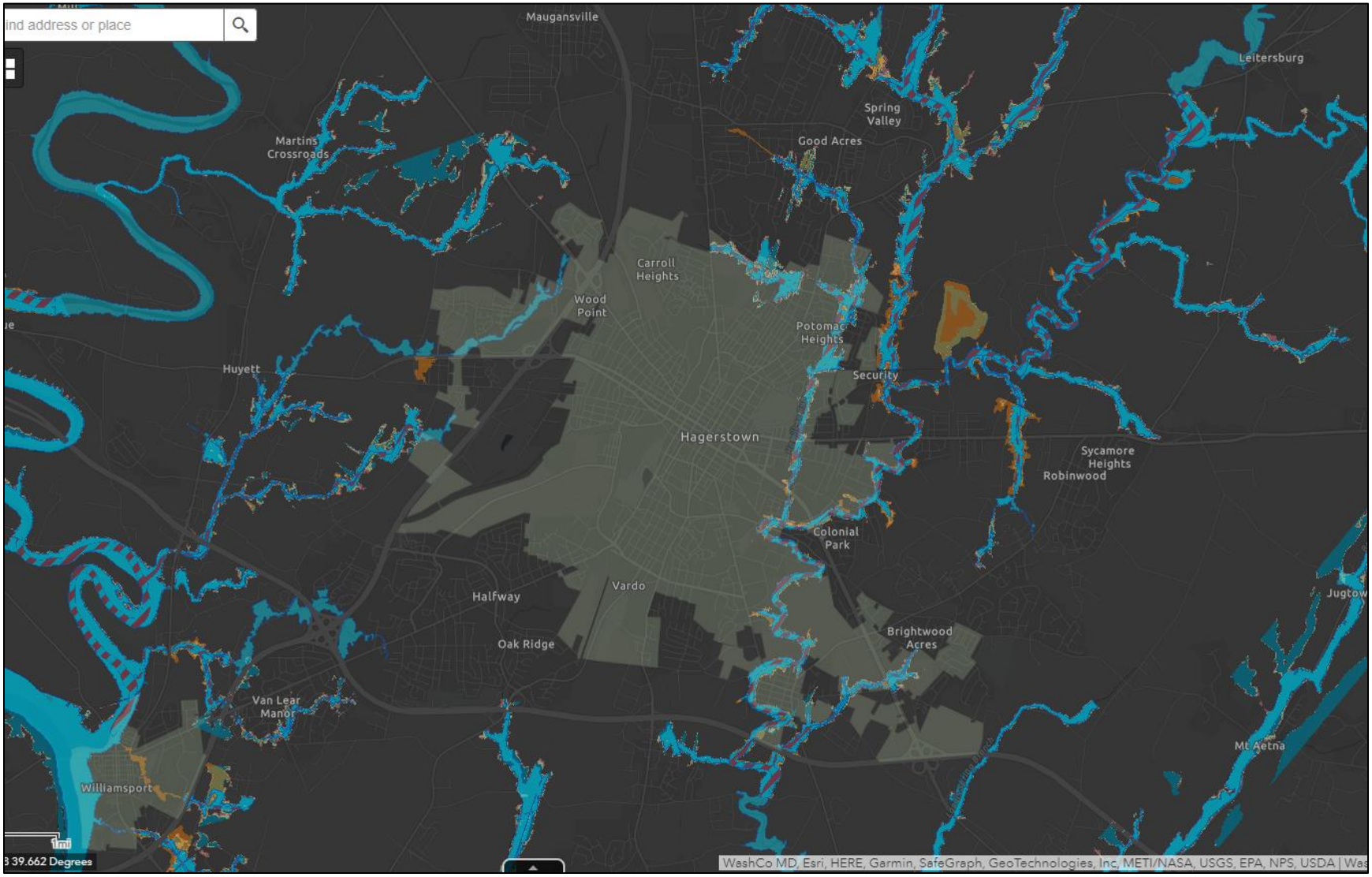
Esri Community Maps Contributors, WashCo MD, © OpenStreetMap, Microsoft, Esri, HERE, Garmin, SafeGraph, Ge...

Hagerstown


ind address or place
Maugansville
Leitersburg
Spring Valley
Martins Crossroads
Good Acres
Carroll Heights
Wood Point
Potomac Heights
Huyett
Security
Hagerstown
Sycamore Heights
Robinwood
Colonial Park
Vardo
Halfway
Jugtow
Brightwood Acres
Oak Ridge
Van Lear Manor
Mt Aetna
Williamsport
39.662 Degrees
WashCo MD, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, USDA | Was

Hancock


Find address or place
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Kirk Woods Park
Myersdale
Hancock Little League Park
Widmyer Park
Hancock
AE (427)
Blue Hill
Western Pike
Fort Tonoloway State Park
Hancock
Potomac Airpark
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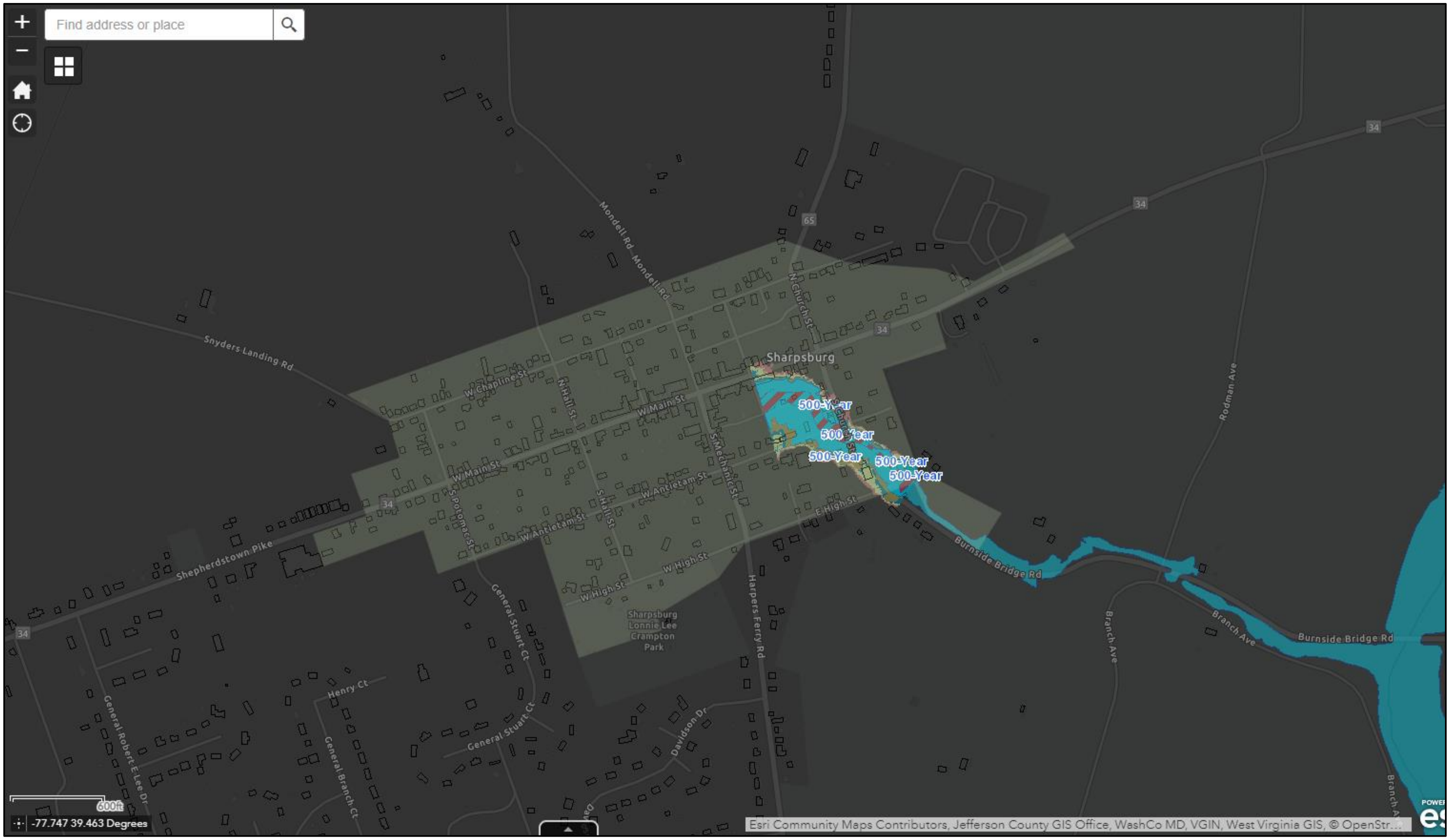
Esri Community Maps Contributors, WVU Facilities, WashCo MD, Esri, HERE, Garmin, SafeGraph, GeoTechnologies,...
POWERED BY esri

Keedysville

Sharpsburg


Find address or place
Sharpsburg
500-Year
Snyders Landing Rd
Shepherdstown Pike
W Chapline St
W Main St
W Antietam St
W High St
N Hall St
S Hall St
N Church St
S Mechanic St
S Potomac St
E High St
Mondell Rd
Harpers Ferry Rd
Burnside Bridge Rd
Branch Ave
Rodman Ave
General Stuart Ct
Henry Ct
General Branch Ct
General Robert E Lee Dr
Davidson Dr
Sharpsburg Lonnie Lee Crampton Park
600ft
-77.747 39.463 Degrees
Esri Community Maps Contributors, Jefferson County GIS Office, WashCo MD, VGIN, West Virginia GIS, © OpenStr...

Smithsburg


Find address or place
Smithsburg Lions Community Park
Edgemont Reservoir
Veterans Park
Smithsburg
Smithsburg Reservoir
Holiday Acres
Cavetown
Havenwood Hills
Smithsburg Pike
Foxville Rd
Wolfsville Rd
Maplesville Rd
Fruit Tree Dr
Grove Creek
E Water St
S Main St
Pennsylvania Ave
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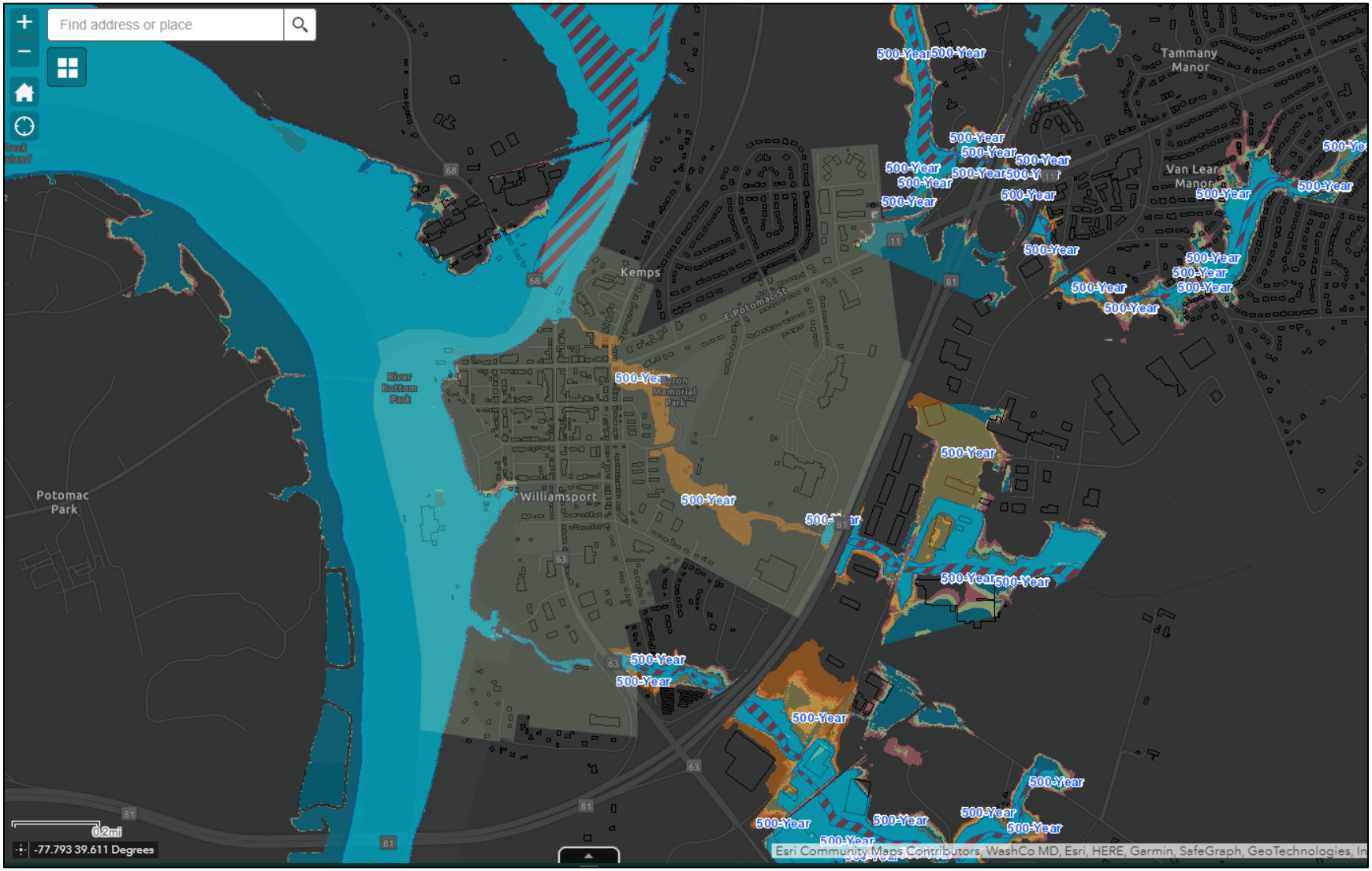
Esri Community Maps Contributors, WashCo MD, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/N

Williamsport



Local leaders can inform their decision-making with the tool by visiting https://mdfloodmaps.net/crab/.

Vulnerability Assessment

This section summarizes the vulnerability of Washington County to flooding. The steering committee conducted an online survey for the public to share its thoughts on the hazards listed in this plan. The following table presents the results of that survey, specifically regarding flooding.

PUBLIC SENTIMENT, FLOODING					
Hazard	*Level of Concern*				*Total Responses*
	Not at All	*Somewhat*	*Concerned*	*Very*	
Flooding	46 (36.51%)	52 (41.27%)	18 (14.29%)	10 (7.94%)	126
In the past ten years, do you remember this hazard occurring in your community?				43 (34.13%)	126
Have you noticed an increase in the occurrences or intensity of this hazard?				29 (23.02%)	126
Have you noticed a decrease in the occurrences or intensity of this hazard?				6 (4.76%)	126

For site-specific hazards like flooding, planners can identify specific facilities sitting within risk areas. The following table lists the assets (taken from the asset inventory listed in Section 1.2 above) located in flood risk areas.

ASSETS LOCATED IN SPECIAL FLOOD HAZARD AREAS								
Critical Facility	*Economic Asset*	*Historic Consideration*	*Special Consideration*	*Vulnerable Population*	*Asset Type*	*Name*	*Address*	*City*
X					Infrastructure	Funkstown WWTP	Lagoon Rd.	Funkstown
		X			Building	Funk, Jacob M., Farm	21116 Black Rock Rd.	Hagerstown
		X			Building	Rockland Farm	728 Antietam Dr.	Hagerstown
		X			Building	Elmwood	16311 Kendle Rd.	Williamsport
X					Infrastructure	Hagerstown RC Wilson WTP	70802 Water Works Rd.	Williamsport
X					Infrastructure	R Paul Smith Power Station	15952 Lockwood Rd.	Williamsport

The following table assigns point totals based on the methodology identified in Section 2.2: Profile Hazards above.

FLOODING RISK RANKING			
Category	*Points*	*Description*	*Notes*
Frequency	5	Excessive (will occur in a year)	There have been 38 flood events and 30 flash flood events in Washington County since 1996, for a combined average of 2.62 events per year.
Response	4	One month	The recovery from large-scale flooding events can take several weeks.
Onset	3	6 – 12 hours	With current technology, meteorologists can detect flash floods up to 6 hours before an event.
Magnitude	2	Limited (10-25% of land area affected)	On average, floods can impact between 10 and 25% of land area per event.
Business	2	At least two weeks	The HAZUS analysis indicates that minor business interruptions would result in commercial/industrial categories from flooding; as such, the general economy of the county would likely be impacted for no more than one week.
Human	2	Low (some injuries)	Floods and flash floods are capable of causing injuries and fatalities in Washington County.
Property	1	Less than 10% of property affected	Historical data indicates that average property damage is $408,421 per flood and $231,933 per flash flood event, which is less than 10% of the property in Washington County.
Totals	**19**	**MEDIUM**	

FEMA's *Local Mitigation Planning Handbook* (2023c) directs entities compiling multi-jurisdictional plans to identify any jurisdictions within the planning area for which the identified risks or vulnerabilities are more or less prevalent as compared to the other participating jurisdictions. The following table quickly synthesizes the data to capture the jurisdiction-specific aspects of risks and vulnerabilities for each city or town.

MULTI-JURISDICTIONAL CONSIDERATIONS, FLOODING		
Jurisdiction	*Comparison*	*Notes*
Washington County	**More**	**Despite flood hazard areas being located throughout the county, many of the historical occurrences have impacted unincorporated areas. The unincorporated areas of the county show the highest number of repetitive loss properties, 42, as well as the highest number of NFIP policies in force with 183. Riskfactor.com (n.d.) lists the county's flood risk as "Major," with 19% of the properties in the county have greater than a 26% chance of being severely affected by flooding over the next 30 years.**
Boonsboro	Same	Boonsboro has flood hazard areas of all four types (floodway, Zone A, Zone AE, and 0.2% annual chance); however, its list of historical occurrences is short and it does not have any repetitive loss properties. Riskfactor.com (n.d.) lists the town's flood risk as "Major," though, with 201 properties (19% of its properties) having a 26% chance of being severely impacted by floods in the next 30 years.

MULTI-JURISDICTIONAL CONSIDERATIONS, FLOODING		
Jurisdiction	*Comparison*	*Notes*
Clear Spring	More	Clear Spring was significantly impacted by flooding in 2014, and areas along Toms Run remain at elevated risk (per the town's administrator). Riskfactor.com (n.d.) ranks the town's flood risk as "Severe," with 30% of all properties having greater than a 26% chance of being severely impacted by flooding in the next 30 years.
Funkstown	More	Funkstown mitigated its most vulnerable area, a series of mobile homes along Antietam Creek. Many of its assets remain in close proximity to the stream, as does one repetitive loss property. Funkstown has the largest number of NFIP policies in force (10) after the county and Hagerstown. Riskfactor.com (n.d.) classifies the town's flooding risk as "Major," citing 25% of all properties as having a greater than 26% chance of being severely impacted by floods in the next 30 years.
Hagerstown	Same	Hagerstown has the largest number of structures in the county, but it does not have a large portion of its areas in flood hazard areas. Flood impacts are often from heavy rains and stormwater issues. Hagerstown has two repetitive loss properties, but that is a small percentage of its building stock. Riskfactor.com (n.d.) notes that 21% of all properties in the town have greater than a 26% risk of being severely impact by flooding over the next 30 years, which results in a "Major" risk categorization by the site. Hagerstown has the highest number of NFIP policies in force (33) of the participating municipalities, which is likely a function of having the largest and most densely-constructed building stock.
Hancock	More	Hancock has the second-most repetitive loss properties (and total losses by those properties) of the participating municipalities. Much of the downtown area could be impacted by flooding from the Tonoloway and Little Tonoloway Creeks. (The Potomac River's floodplain impacts the corporate limits, though it would mostly affect the former C&O Canal. Riskfactor.com (n.d.) estimates 23% of all town properties as having a greater than 26% chance of being severely affected by flooding in the next 30 years (which yields a "Severe" ranking).
Keedysville	Same	Little Antietam Creek flows through downtown Keedysville, creating floodway, Zone A, Zone AE, and 0.2% annual chance hazard areas. The list of historical occurrences in the town is low, though, and there are no repetitive loss properties in the town. Riskfactor.com (n.d.), though, lists the town's risk as "Extreme," citing 25% of its properties as having a greater than 26% chance of being severely affected by flooding in the next 30 years.
Sharpsburg	More	Sharpsburg has floodway, Zone A, Zone AE, and 0.2% annual change hazard areas; however, there is no floodplain data available for most of the town. Sharpsburg includes three repetitive loss properties. Riskfactor.com (n.d.) notes that 42% of all properties in the town have greater than a 26% risk of being severely impact by flooding over the next 30 years, for a "Severe" rating.
Smithsburg	Same	Smithsburg's corporate limits include Zone A areas, but much of its building stock is outside of those areas. Riskfactor.com (n.d.) classifies the town's flood risk as "Moderate," noting that 19% of its properties have greater than a 26% chance of being severely impacted by flooding in the next 30 years.
Williamsport	More	Though Williamsport is a river community, the former C&O Canal provides some level of protection from flooding on the Potomac. Per town officials, most flood impacts come from runoff-related flash flooding incidents. Williamsport does have seven repetitive loss properties, the most of the municipalities participating in this plan. Riskfactor.com (n.d.) classifies the town's flood risk as "Extreme," listing 97 properties (20% of all properties) as having a greater than 26% chance of being severely affected by flooding in the next 30 years.

2.2.6 Hazardous Materials

Hazardous material releases can contaminate air, water, and soils and potentially cause injury or death. Dispersion can take place rapidly when transported by water and wind. While often accidental, releases can occur due to human carelessness, intentional acts, or natural hazards. When caused by natural hazards, these incidents are known as secondary events.				
Vulnerability HIGHEST HIGH MEDIUM LOW LOWEST	**Period of Occurrence:**	At anytime	**Washington County Risk Ranking:**	Medium
	Warning Time:	Less than 6 hours	**State Risk Ranking:**	N/A
	Probability:	Excessive (will occur in a year)	**Impact:**	Localized (less than 10% of land area affected)
	Type of Hazard:	Human-caused	**Disaster Declarations:**	N/A

Hazard Overview

According to the National Fire Protection Association (NFPA), a hazardous material is matter or energy that, when released, is capable of creating harm to people, the environment, or property, including weapons of mass destruction, as well as any other criminal use of hazardous materials, such as illicit labs, environmental crimes, or industrial sabotage. Hazardous materials come in the form of explosives, flammable and combustible substances, poisons, and radioactive materials. They are in nearly every home and most hospitals and factories.

Incidents involving chemical releases are common and on the rise. Before World War II, these events primarily affected employees of specific occupations, but the expansion of the chemical industry and increased industrialization has led to danger to people outside work environments. The manufacture, storage, transportation, and utilization of large amounts of varying types of chemicals and growing population densities in areas near chemical manufacturing have contributed to an increase in the exposed population.

Hazardous material incidents can occur because of an industrial accident during production, while in storage, in transportation, during use or disposal, or as part of an intentional attack. They can also occur due to (or in tandem with) natural hazard events, such as earthquakes, floods, windstorms, or winter storms (Planning for Hazards, n.d.). The large-scale release of hazardous materials in combination with natural hazard events can increase the spread of contamination to large geographic areas and amplify the potential for long-term impacts on human and ecological health.

Congress enacted the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly known as Superfund, in 1980 to provide broad federal

authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment. CERCLA established prohibitions and requirements concerning closed and abandoned hazardous waste sites, provided for the liability of persons responsible for releasing hazardous wastes at these sites, and established a trust to provide for cleanup when no responsible party could be identified.

The U.S. Environmental Protection Agency's (USEPA) Toxic Release Inventory (TRI) program tracks the management of certain toxic chemicals that threaten human health and the environment. U.S. facilities report the amounts of chemicals released into the environment or managed through recycling, energy recovery, and treatment. Since its inception in 1986, the TRI program has provided citizens access to information about potentially hazardous chemicals in their communities.

Location and Extent

Hazardous material releases can be localized events, such as minor releases at a fixed site, or regional events, such as radiological incidents. Several factors determine a community's risk of hazardous material releases, including the size of the community, the location and number of sites containing hazardous materials, and the community's proximity to mobile hazardous material risk areas, such as roads and railways.

The USEPA also monitors and regulates sites that use or produce hazardous materials. The USEPA's Enforcement and Compliance History Online (ECHO) database lists regulated sites. The list is far more extensive than the list of facilities that annually report to the county's local emergency planning committee (LEPC). The ECHO database identifies facilities with permitted discharges, those against whom the USEPA has taken enforcement actions, etc. (USEPA, 2023a). There are 491 facilities in or around Washington County that are (or have been) regulated by the USEPA.

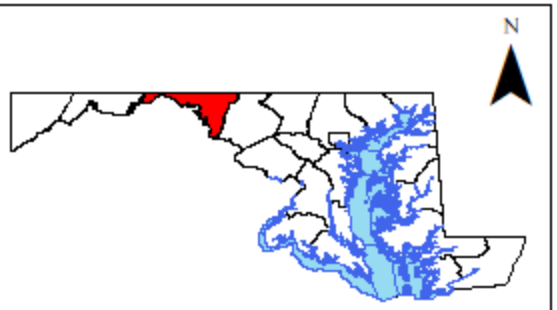
WASHINGTON COUNTY HAZARD MITIGATION PLAN

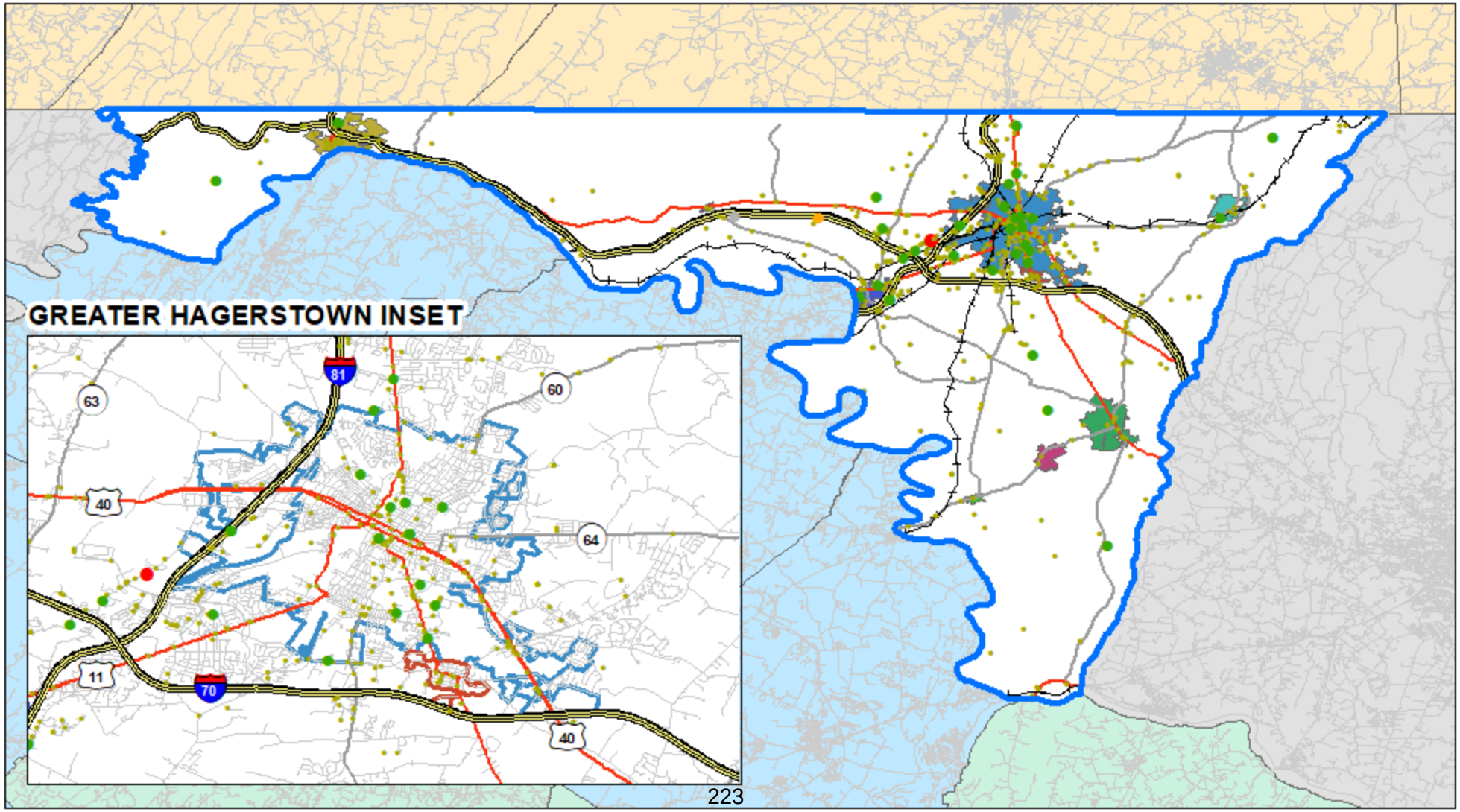
ECHO-Listed Facilities in Washington County

Data Source(s):
USEPA

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

- Significant Violation
- Violation Identified
- No Violation Identified
- Inactive
- ECHO Facilities (No Details)





Regulators classify hazardous materials in several ways. The U.S. Department of Transportation (USDOT) organizes substances into nine classes, as shown in the table below. Other agencies further categorize hazardous materials, but the nine USDOT classifications are consistent across all reporting agencies.

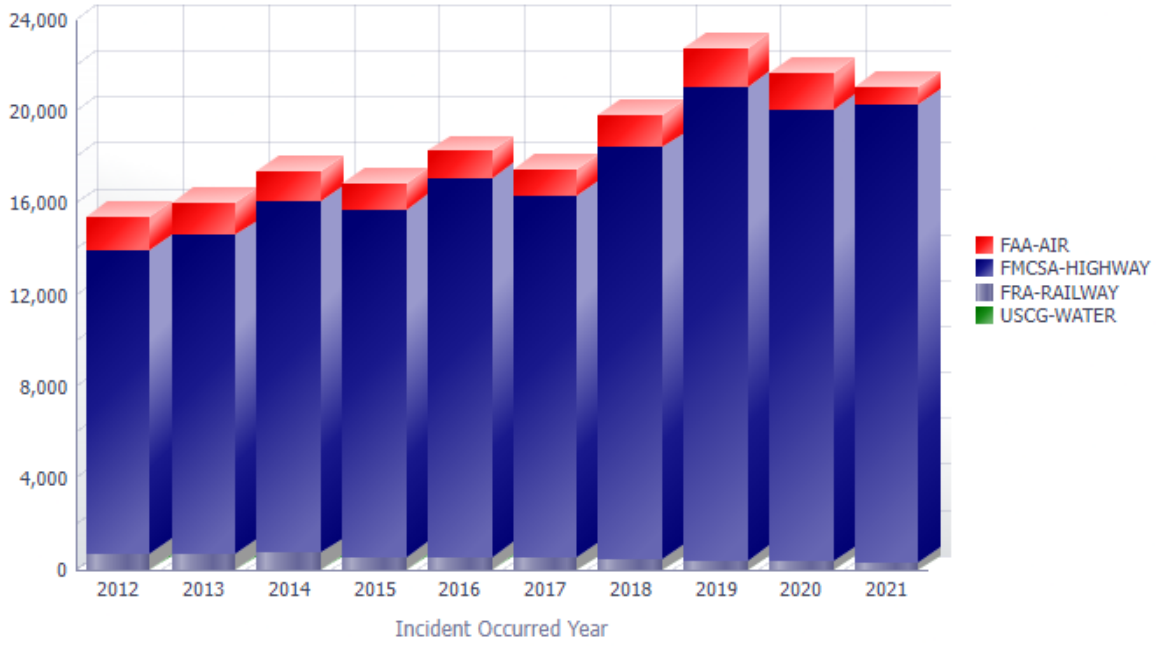
DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION SYSTEM	
Hazard Classification	*Category*
Class 1	Explosives
Class 2	Gases
Class 3	Flammable (and combustible) liquids
Class 4	Flammable solids
Class 5	Oxidizing substances and organic peroxides
Class 6	Toxic substances
Class 7	Radioactive materials
Class 8	Corrosive substances
Class 9	Miscellaneous dangerous goods, hazardous materials, and articles

The United States Environmental Protection Agency (USEPA) established a list of extremely hazardous substances in 1987 (USEPA, 2022b). Though the USEPA does not explicitly define "extremely hazardous substance" in its legislation, these substances generally cause harm to human health. The list of extremely hazardous substances and their reportable quantities appears in the Emergency Planning and Community Right to Know Act (EPCRA) of 1986. The following extremely hazardous substances appeared in Washington County's latest commodity flow study (WCDES, 2013a; WCDES, 2013b).

- Ammonia
- Ammonium hydroxide
- Hydrofluoric acid
- Hydrogen
- Hydrogen fluoride
- Hydrogen peroxide
- Isoprene
- Nitric acid
- Paraldehyde
- Sodium hydroxide
- Sulfuric acid
- Titanium tetrachloride

As shown in the following graphic, the U.S. Department of Transportation (USDOT) has posited that the majority of hazardous materials incidents in the United States occur on highways (USDOT PHMSA, 2023). A much smaller number occur on railways and airways. (The portions of the Potomac River along Washington County's southern border are not navigable.)

HAZARDOUS MATERIALS INCIDENTS BY MODE, 2012-2021



The following map identifies the primary roadways, with a 1,000' buffer that shows potential impact areas for transportation-based hazardous material incidents.

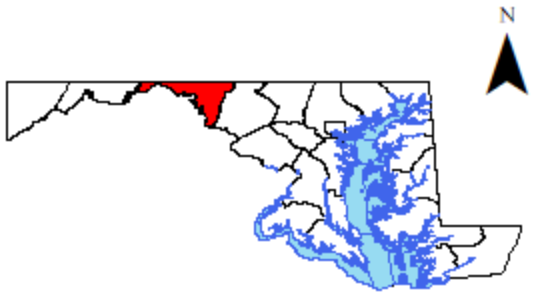
WASHINGTON COUNTY HAZARD MITIGATION PLAN

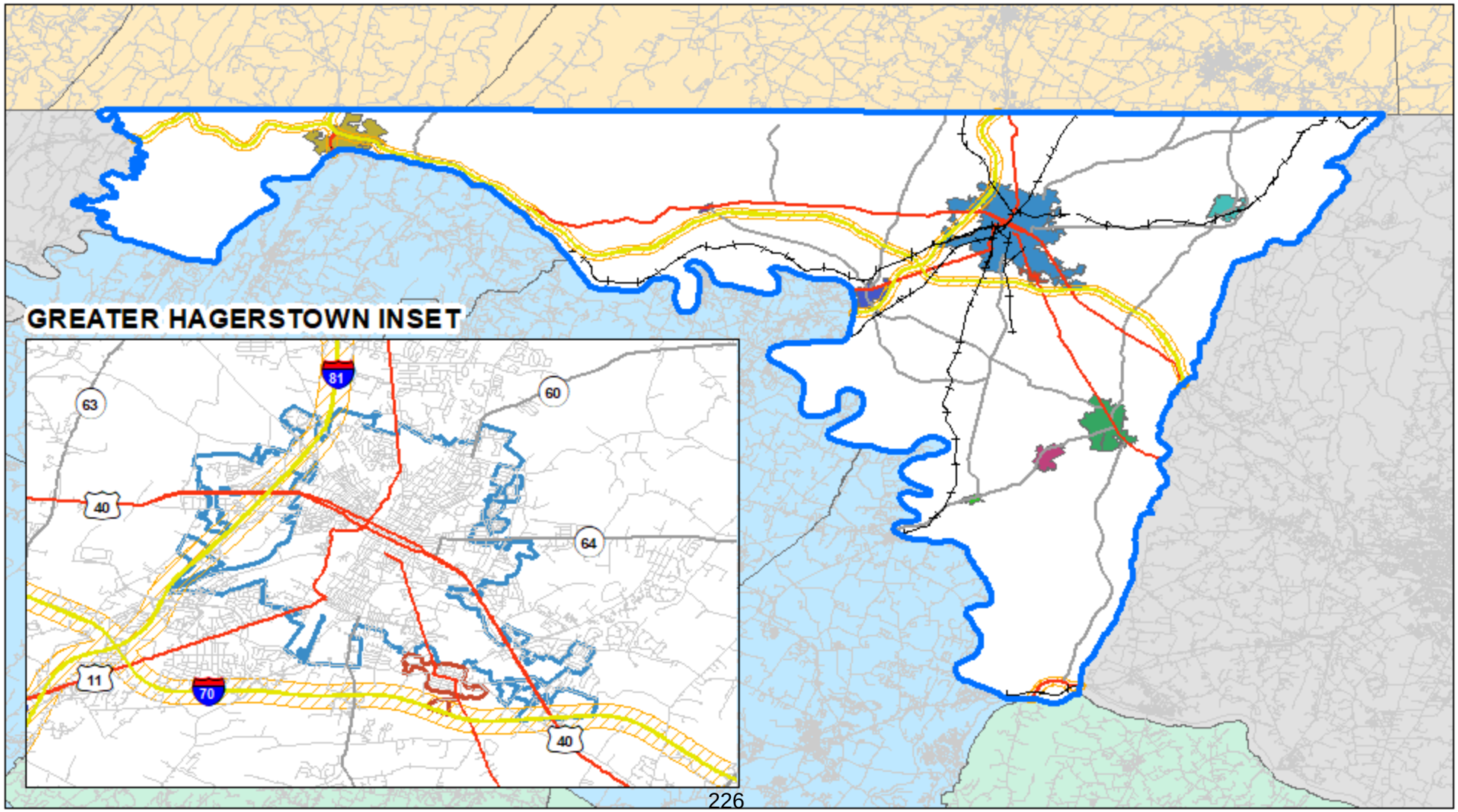
Highways (w/ Buffer on Primary Commodity Routes)

Data Source(s):
US Census (Tiger Data), WCDES

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

- 1,000' Buffer
- Interstates
- U.S. Routes
- State Routes





Washington County was in the process of updating this plan when a series of high-profile rail accidents put a focus on the transport of hazardous materials by rail. Significant hazardous commodity transport occurs by rail. Transport is generally safe, with the American Association of Railroads (AAR) noting "more than 99.9% of all hazmat moved by rail reaches its destination without a release caused by a train accident" (n.d.). Within freight rail shipping, the hazmat accident rate is down 78%. The AAR points to similar ton-mile data for truck and rail shipping[1], and notes approximately just 10% of the number of hazmat accidents on rails as there are on roadways (AAR, n.d.).

In a 2006 statement to the Subcommittee on Railroads within the Committee on Transportation and Infrastructure in the U.S. House of Representatives, Joseph Boardman (then the administrator of the Federal Railroad Administration) referenced 2004 data. He identified approximately 1.7 million shipments (i.e., cars) of hazardous materials by rail, and within that dataset, 29 train accidents in which a hazardous material was released. A total of 47 cars released materials in those 29 accidents. As such, in 2004, 0.0028% of the total hazardous material shipments suffered a release (see https://www.transportation.gov/testimony/current-issues-rail-transportation-hazardous-materials for more information).

Railroads are subject to rigorous operating requirements, and operators are subject to frequent inspections. The manufacture of railcars includes extensive testing to ensure safety during accidents. As a result, many rail incidents involving hazardous materials do not actually have *a release* of hazardous materials.

Still, rail infrastructure, like other transportation infrastructure, is vast and challenging to maintain. Fielding a complete fleet of new, modern cars is difficult. As a result, cars subject to numerous design standards are in use. Administrative changes to freight shipment scheduling, trends in customer orders (e.g., smaller inventories at locations and just-in-time ordering practices), etc., have created a very complex industrial apparatus. Ensuring fail-safe, complex systems is complicated. Thus, accidents happen.

Significant railway accidents involving hazardous materials tend to be high-profile events. Several major rail accidents happened in the drafting of the 2023 update: (a) a Norfolk Southern train just outside of East Palestine, Ohio (February 3, 2023), (b) a Union Pacific train in Nebraska (February 21, 2023), and (c) a collision between a freight and passenger train in Tempi, Greece (February 28, 2023). The East Palestine incident was the most widely reported.

[1] The 2017 *Economic Census: Transportation, Commodity Flow Study* is consistent with this claim for total commodities shipped. The data show (in millions) 1,371,732 ton-miles for truck and 1,328,603 for rail (USDOT BTS, 2017, pp. 29-30). The hazmat export series, however, shows 126,800 ton-miles for trucks (again, in millions) and 61,669 for rail (p. 73).

It involved a derailment, a large fire, a release of vinyl chloride, benzene residue, and butyl acrylate, and ultimately a controlled burn of the vinyl chloride to mitigate a potential BLEVE situation. The extent of contamination from the incident is unknown. Though the probability of a rail-based hazardous material incident is low, the potential severity of the incidents is high, with life safety and protracted economic and environmental impacts.

Washington County's rail network is robust and includes freight and passenger elements. The following map shows the locations of railroads as well as rail-roadway crossings.

WASHINGTON COUNTY HAZARD MITIGATION PLAN

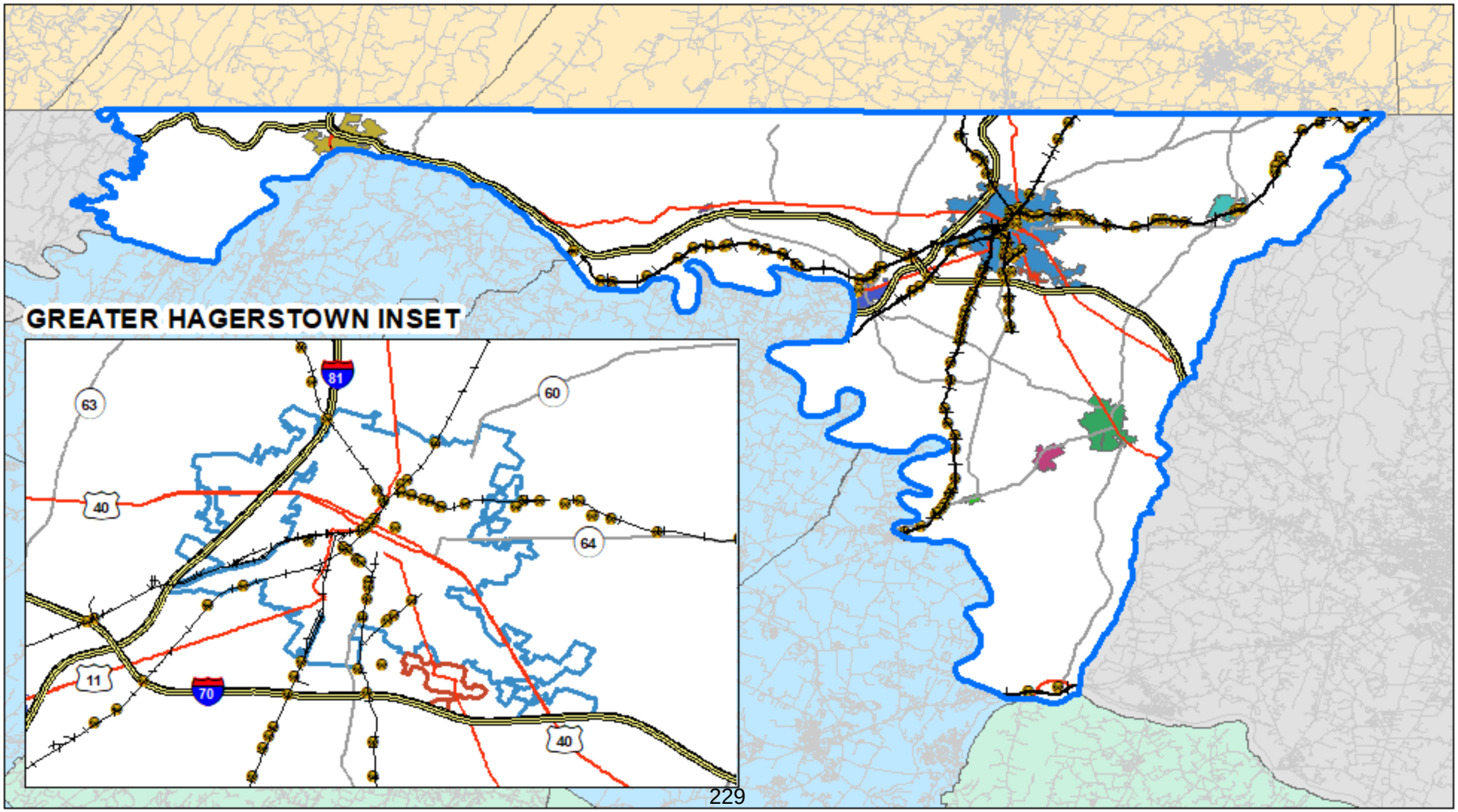
Railway Infrastructure

Data Source(s):
FRA, US Census (Tiger Data)

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

Railways
RR Crossings

N



Impacts and Vulnerability

The effects of a hazardous material release on the environment can be devastating. On land or in bodies of water, animals and plants in affected areas can die or experience reproductive complications (USEPA, 2022c). Certain hazardous materials have the potential to explode or cause a fire, threatening all organisms close to the incident.

Hazardous materials vary significantly in the health risks they pose to humans. According to the USEPA, hazardous substances may irritate the skin or eyes, make breathing difficult, cause headaches or nausea, or cause other illnesses (USEPA, 2022c). Additional health risks include thermal harm, radiological harm, asphyxiation, chemical harm, biological harm, or mechanical harm.

- **Thermal Harm:** Thermal harm results from exposure to temperature extremes. Thermal injuries can be external (from contact or proximity to a fire or heat source) or internal (from inhaling fumes or heated air). Thermal injuries can also include frostbite from contact with low-temperature hazardous materials.
- **Radiological Harm:** Radiological harm results from exposure to radioactive materials. Different types of radiation have different energy levels, and not all are dangerous. The radiation that threatens humans is ionizing radiation, which can damage living cells and DNA. Examples of sources of ionizing radiation are medical isotopes used for diagnostic and therapeutic purposes, X-rays, and some survey equipment.
- **Asphyxiation:** Asphyxiation results from exposure to materials that reduce oxygen levels that may cause suffocation. Asphyxiation can occur in confined spaces or with highly concentrated chemical asphyxiants, such as carbon dioxide and methane. Asphyxiants are generally odorless and tasteless and displace so much oxygen from the atmosphere that the lungs cannot deliver enough oxygen to tissues, and the victim slowly suffocates.
- **Chemical Harm:** Chemical harm results from chemical exposure, including poisons and corrosives. Injuries and illnesses vary by material.
- **Biological Harm:** Biological harm results from exposure to biological materials, including bacteria, viruses, and toxins. Symptoms of biological harm are often delayed because the pathogens require time to multiply sufficiently and cause illness in the person carrying the pathogen.
- **Mechanical Harm:** Mechanical harm results from exposure to, or contact with, fragmentation or debris scattered because of a pressure release, explosion, or boiling liquid expanding vapor explosion (BLEVE) event. Predictable reactions occur during and

immediately following an explosion, which routinely injures or kills anyone nearby. The degree of harm closely relates to the size of the blast and proximity to the device. Sources of injury include fragmentation and flying debris, blast overpressure, and secondary blast injuries.

Social Vulnerability Considerations

Social vulnerability concerns with respect to hazardous materials are nuanced. As noted in other profiles, persons with a lower proficiency in English may not understand regular public outreach from facilities, warnings, or evacuation/shelter-in-place instructions. Households without a vehicle may experience difficulty evacuating.

Understanding other issues, though, requires a longer historical consideration. Numerous studies have shown linkages between higher occupancy of zip codes and communities near landfills, hazardous waste sites, and high numbers of chemical and manufacturing facilities by low-income and minority populations (Abel, 2008; Allen, 2001; Benjamin & Lee, 1987; Chakraborty & Armstrong, 1997; Daniels & Friedman, 1999; Goldman & Fitton, 1994; Kershaw, Gower, Rinner, & Campbell, 2013; Pastor, Morello-Frosch, & Sadd, 2005). Some of these authors posit that a de-gentrification occurs, whereby families of means leave those areas over time. Washington County is home to large commercial facilities and some light manufacturing along the I-81 corridor, near the I-70/I-81 interchange, and generally along the fringes of the greater Hagerstown area. As shown in the social vulnerability maps in Section 1.2 above, many of the Census tracts with higher numbers of people (corresponding to the social variables highlighted) are in and near these greater Hagerstown areas. It is important to note that these data sets (i.e., the location of large commercial facilities and socially-vulnerable populations) does not mean that the de-gentrification has occurred. Areas along the I-81 corridor have long been the most densely-populated in the county. Rather, these data give local leaders the knowledge they need to be mindful of this potential and to mitigate its occurrence.

Historical Occurrences

The Pipeline and Hazardous Materials Safety Administration (PHMSA) maintains data on the frequency of hazardous materials incidents during rail, air, and highway transport. PHMSA reports 2,631 incidents in Washington County between 1996 and 2022 (PHMSA, 2023). The table below includes 104 incidents with monetary damages of at least $1,000.

HAZARDOUS MATERIALS INCIDENTS WITH LOSSES EXCEEDING $1,000							
Carrier Reporter Name	*Incident City*	*Date*	*Commodity Name*	*Hazard Class*	*Fatalities*	*Total Damages*	*Mode of Transportation*
Hahn Transportation, Inc.	Hancock	1/4/1990	Fuel Oil	2	0	$64,000.00	Highway
Overnite Transportation Co.	Sharpsburg	2/20/1995	Nitric Acid Other Than Red Fuming	8	0	$10,456.00	Highway
Roeder Cartage Co., Inc.	Hancock	10/4/1995	Sodium Hydroxide, Solution	8	0	$98,663.00	Highway
Overnite Transportation Co.	Williamsport	11/7/1995	Hydrochloric Acid, Solution	8	0	$1,000.00	Highway
Big T Transfer, Inc.	Ashton	4/29/1997	Calcium Carbide	4.3	0	$43,000.00	Highway
CSX Transportation	Hagerstown	8/1/1997	Sodium Hydroxide, Solution	8	0	$1,000.00	Rail
Rogers Cartage Co.	Williamsport	4/15/1998	Resin Solution, Flammable	3	0	$2,405.00	Highway
Yellow Freight System, Inc.	Hagerstown	9/4/1998	Corrosive Liquid, Acidic, Organic, N.O.S.	8	0	$1,175.00	Highway
AC&T Co., Inc.	Hagerstown	10/1/1998	Gasoline	3	0	$83,090.00	Highway
Roadway Express, Inc.	Hagerstown	5/27/1999	Corrosive Liquids, Toxic, N.O.S.	8	0	$2,010.00	Highway
Roadway Express, Inc.	Hagerstown	1/4/2000	Ethanol Or Ethyl Alcohol Or Ethanol Solutions	3	0	$1,160.00	Highway
American Freightways Co., Inc.	Hagerstown	7/11/2000	Carbamate Pesticides, Solid, Toxic	6.1	0	$2,600.00	Highway
American Freightways Co., Inc.	Hagerstown	7/19/2000	Environmentally Hazardous Substances, Liquid, N.O.S.	9	0	$1,900.00	Highway
American Freightways Co., Inc.	Hagerstown	8/10/2000	Environmentally Hazardous Substances, Solid, N.O.S.	9	0	$1,530.00	Highway
American Freightways Co., Inc.	Hagerstown	9/6/2000	Corrosive Liquids, N.O.S.	8	0	$1,925.00	Highway
Griffith Consumers Co.	Hagerstown	10/16/2000	Fuel Oil, No. 1, 2, 4, 5, Or 6	2	0	$1,530.00	Highway
American Freightways Co., Inc.	Hagerstown	11/28/2000	Flammable Liquids, N.O.S.	3	0	$1,181.00	Highway
American Freightways Co., Inc.	Hagerstown	1/22/2001	Organophosphorus Pesticides, Solid, Toxic	6.1	0	$2,300.00	Highway
American Freightways Co., Inc.	Hagerstown	2/1/2001	Organophosphorus Pesticides, Solid, Toxic	6.1	0	$1,850.00	Highway
American Freightways Co., Inc.	Hagerstown	2/2/2001	Lead Compounds, Soluble, N.O.S.	6.1	0	$1,325.00	Highway
American Freightways Co., Inc.	Hagerstown	4/10/2001	Isophoronediamine	8	0	$2,000.00	Highway

HAZARDOUS MATERIALS INCIDENTS WITH LOSSES EXCEEDING $1,000							
Carrier Reporter Name	*Incident City*	*Date*	*Commodity Name*	*Hazard Class*	*Fatalities*	*Total Damages*	*Mode of Transportation*
American Freightways Co., Inc.	Hagerstown	4/12/2001	Hydrobromic Acid Solution	8	0	$2,050.00	Highway
American Freightways Co., Inc.	Hagerstown	4/13/2001	Poisonous Solids, N.O.S	6.1	0	$1,550.00	Highway
American Freightways Co., Inc.	Hagerstown	4/20/2001	Corrosive Liquid, Basic, Organic, N.O.S.	8	0	$2,500.00	Highway
American Freightways Co., Inc.	Hagerstown	5/10/2001	Organophosphorus Pesticides, Solid, Toxic	6.1	0	$1,850.00	Highway
American Freightways Co., Inc.	Hagerstown	5/30/2001	Aluminum Chloride, Solution	8	0	$2,875.00	Highway
American Freightways Co., Inc.	Hagerstown	8/14/2001	Toxic Liquids, Organic, N.O.S.	6.1	0	$2,000.00	Highway
American Freightways Co., Inc.	Hagerstown	8/28/2001	Nitrogen, Refrigerated Liquid (Cryogenic Liquid)	2.2	0	$1,200.00	Highway
American Freightways Co., Inc.	Hagerstown	8/31/2001	Chlorophenols, Liquid	6.1	0	$1,850.00	Highway
American Freightways Co., Inc.	Hagerstown	9/5/2001	Toxic Solids, Organic, N.O.S.	6.1	0	$1,875.00	Highway
Overnite Transportation Co.	Williamsport	9/20/2001	Ammonia Solution, Relative Density Between 0.880 And 0.957 At 15 Degrees C In Water, With More Than 10 Percent But Not More Than 35 Percent Ammonia	8	0	$2,700.00	Highway
American Freightways Co., Inc.	Hagerstown	11/13/2001	Fire Extinguishers Containing Compressed Or Liquefied Gas	2.2	0	$1,700.00	Highway
American Freightways Co., Inc.	Hagerstown	1/17/2002	Self-Reactive Solid Type D	4.1	0	$3,100.00	Highway
American Freightways Co., Inc.	Hagerstown	2/7/2002	Resorcinol	6.1	0	$1,830.00	Highway
American Freightways Co., Inc.	Hagerstown	2/7/2002	Resorcinol	6.1	0	$1,825.00	Highway
American Freightways Co., Inc.	Hagerstown	4/6/2002	Pesticides, Solid, Toxic, N.O.S.	6.1	0	$2,250.00	Highway
American Freightways Co., Inc.	Hagerstown	4/9/2002	Organophosphorus Pesticides, Solid, Toxic	6.1	0	$2,000.00	Highway

HAZARDOUS MATERIALS INCIDENTS WITH LOSSES EXCEEDING $1,000							
Carrier Reporter Name	*Incident City*	*Date*	*Commodity Name*	*Hazard Class*	*Fatalities*	*Total Damages*	*Mode of Transportation*
American Freightways Co., Inc.	Hagerstown	6/8/2002	Xylenes	3	0	$1,625.00	Highway
American Freightways Co., Inc.	Hagerstown	6/20/2002	Environmentally Hazardous Substances, Liquid, N.O.S.	9	0	$1,915.00	Highway
FedEx Freight, Inc.	Hagerstown	6/29/2002	Organophosphorus Pesticides, Solid, Toxic	6.1	0	$1,650.00	Highway
FedEx Freight, Inc.	Hagerstown	10/4/2002	Hydrofluoric Acid Solution	8	0	$1,425.00	Highway
FedEx Freight, Inc.	Hagerstown	10/11/2002	Hydrofluoric Acid Solution	8	0	$1,950.00	Highway
FedEx Freight, Inc.	Hagerstown	11/22/2002	Sodium Chloroacetate	6.1	0	$1,525.00	Highway
BRT, Inc.	Hagerstown	1/16/2003	Fuel Oil, No. 1, 2, 4, 5, Or 6	2	0	$6,075.00	Highway
FedEx Freight, Inc.	Hagerstown	5/13/2003	Barium Compounds, N.O.S.	6.1	0	$3,565.00	Highway
FedEx Freight, Inc.	Hagerstown	7/1/2003	Environmentally Hazardous Substances, Solid, N.O.S.	9	0	$3,565.00	Highway
FedEx Freight, Inc.	Hagerstown	7/26/2003	Methyl Acetate	3	0	$3,750.00	Highway
FedEx Freight, Inc.	Hagerstown	9/12/2003	Carbamate Pesticides, Liquid, Toxic, Flammable, Flash Point Not Less Than 23 Degrees C	6.1	0	$3,850.00	Highway
FedEx Freight, Inc.	Hagerstown	2/20/2004	Tetrachloroethylene	6.1	0	$3,502.00	Highway
Roadway Express, Inc.	Hagerstown	3/13/2004	Chromic Acid Solution	8	0	$2,300.00	Highway
FedEx Freight, Inc.	Hagerstown	5/14/2004	Corrosive Liquids, Toxic, N.O.S.	8	0	$5,150.00	Highway
FedEx Freight, Inc.	Hagerstown	5/20/2004	Organophosphorus Pesticides, Solid, Toxic	6.1	0	$1,285.00	Highway
FedEx Freight, Inc.	Hagerstown	6/15/2004	Organophosphorus Pesticides, Solid, Toxic	6.1	0	$3,350.00	Highway
FedEx Freight, Inc.	Hagerstown	8/3/2004	Pesticides, Solid, Toxic, N.O.S.	6.1	0	$2,750.00	Highway
FedEx Freight, Inc.	Hagerstown	8/6/2004	Isophorone Diisocyanate	6.1	0	$4,150.00	Highway

HAZARDOUS MATERIALS INCIDENTS WITH LOSSES EXCEEDING $1,000							
Carrier Reporter Name	*Incident City*	*Date*	*Commodity Name*	*Hazard Class*	*Fatalities*	*Total Damages*	*Mode of Transportation*
Griffith Energy Services, Inc.	Hagerstown	10/20/2004	Fuel Oil, No. 1, 2, 4, 5, Or 6	2	0	$25,025.00	Highway
FedEx Freight, Inc.	Hagerstown	12/2/2004	Corrosive Liquid, Acidic, Inorganic, N.O.S.	8	0	$2,565.00	Highway
U S Xpress Enterprises, Inc.	Hagerstown	1/13/2005	Paint Including Paint, Lacquer, Enamel, Stain, Shellac Solutions, Varnish, Polish, Liquid Filler And Liquid Lacquer Base	3	0	$19,000.00	Highway
FedEx Freight, Inc.	Hagerstown	6/16/2005	Corrosive Liquid, Basic, Inorganic, N.O.S.	8	0	$3,050.00	Highway
Roadway Express, Inc.	Hagerstown	6/21/2005	Resin Solution, Flammable	3	0	$2,600.00	Highway
CSX Transportation, Inc.	Hagerstown	9/13/2005	Combustible Liquid, N.O.S.	2	0	$3,000.00	Rail
FedEx Freight East, Inc.	Hagerstown	11/18/2005	Organophosphorus Pesticides, Solid, Toxic	6.1	0	$2,150.00	Highway
FedEx Freight East, Inc.	Hagerstown	4/26/2006	Barium Nitrate	5.1	0	$2,600.00	Highway
FedEx Freight East, Inc.	Hagerstown	6/24/2006	Hydroquinone, Solid	6.1	0	$2,950.00	Highway
FedEx Freight East, Inc.	Hagerstown	9/28/2006	Organic Peroxide Type C, Liquid	5.2	0	$3,450.00	Highway
FedEx Freight East, Inc.	Hagerstown	11/10/2006	Compounds, Cleaning Liquid	8	0	$2,001.00	Highway
Quality Carriers	Williamsport	2/16/2007	Vinyltoluenes, Stabilized	3	0	$5,000.00	Highway
FedEx Freight East, Inc.	Hagerstown	3/14/2007	Organic Peroxide Type D, Solid	5.2	0	$3,800.00	Highway
FedEx Freight East, Inc.	Hagerstown	5/15/2007	Paint Including Paint, Lacquer, Enamel, Stain, Shellac Solutions, Varnish, Polish, Liquid Filler And Liquid Lacquer Base	3	0	$3,220.00	Highway
Quality Carriers	Hagerstown	6/19/2007	Ferric Chloride, Solution	8	0	$4,000.00	Highway
ABF Freight System, Inc.	Hagerstown	12/18/2007	Compounds, Cleaning Liquid	8	0	$3,300.00	Highway
Quality Carriers	Hagerstown	10/12/2009	Resin Solution, Flammable	3	0	$6,433.00	Highway
Vitran Express	Hagerstown	2/2/2010	Paint	2	0	$3,000.00	Highway

HAZARDOUS MATERIALS INCIDENTS WITH LOSSES EXCEEDING $1,000							
Carrier Reporter Name	*Incident City*	*Date*	*Commodity Name*	*Hazard Class*	*Fatalities*	*Total Damages*	*Mode of Transportation*
FedEx Freight, Inc.	Hagerstown	3/27/2010	Organophosphorus Pesticides, Solid, Toxic	6.1	0	$2,500.00	Highway
Vitran Express	Hagerstown	6/7/2011	Paint	2	0	$4,000.00	Highway
FedEx Freight, Inc.	Hagerstown	11/4/2011	Flammable Liquids, N.O.S.	3	0	$2,500.00	Highway
Tri-State Motor Transit Co.	Clear Spring	8/10/2012	Explosive, Blasting, Type E Or Explosive, Agent Blasting, Type E	1.5D	0	$5,000.00	Highway
R&L Carriers	Hagerstown	5/3/2013	Potassium Hydroxide, Solid	8	0	$2,500.00	Highway
R&L Carriers	Hagerstown	6/11/2013	Acetic Acid Solution, Not Less Than 50 Percent But Not More Than 80 Percent Acid, By Mass	8	0	$5,000.00	Highway
FedEx Freight, Inc.	Hagerstown	10/31/2013	Flammable Liquid, Toxic, Corrosive, N.O.S.	3	0	$4,000.00	Highway
R&L Carriers	Hagerstown	3/13/2014	Corrosive Liquid, Basic, Inorganic, N.O.S.	8	0	$3,000.00	Highway
UPS Freight Services, Inc.	Williamsport	9/30/2014	Hydrochloric Acid	8	0	$2,000.00	Highway
R&L Carriers	Hagerstown	3/31/2015	Amines, Liquid, Corrosive, N.O.S. Or Polyamines, Liquid, Corrosive, N.O.S.	8	0	$5,000.00	Highway
R&L Carriers	Hagerstown	1/14/2016	Paint, Corrosive, Flammable (Including Paint, Lacquer, Enamel, Stain, Shellac, Varnish, Polish, Liquid Filler And Liquid Lacquer Base)	8	0	$3,500.00	Highway
R&L Carriers	Hagerstown	2/2/2016	Liquefied Gases, Non-Flammable Charged With Nitrogen, Carbon Dioxide Or Air	2.2	0	$1,200.00	Highway
R&L Carriers	Hagerstown	3/17/2016	Aerosols, Flammable (Each Not Exceeding 1 L Capacity)	2.1	0	$3,500.00	Highway
R&L Carriers	Hagerstown	7/14/2016	Paint Including Paint, Lacquer, Enamel, Stain, Shellac Solutions, Varnish, Polish, Liquid Filler And Liquid Lacquer Base	3	0	$3,500.00	Highway
Quality Carriers, Inc.	Hagerstown	9/9/2016	Ferric Chloride, Solution	8	0	$2,520.00	Highway

HAZARDOUS MATERIALS INCIDENTS WITH LOSSES EXCEEDING $1,000							
Carrier Reporter Name	*Incident City*	*Date*	*Commodity Name*	*Hazard Class*	*Fatalities*	*Total Damages*	*Mode of Transportation*
R&L Carriers	Hagerstown	11/17/2016	Paint Including Paint, Lacquer, Enamel, Stain, Shellac Solutions, Varnish, Polish, Liquid Filler And Liquid Lacquer Base	3	0	$1,000.00	Highway
R&L Carriers	Hagerstown	12/20/2016	Flammable Liquids, N.O.S.	3	0	$3,500.00	Highway
NEMF World Transport Inc.	Hagerstown	3/13/2017	Hypochlorite Solutions	8	0	$4,500.00	Highway
R&L Carriers	Hagerstown	5/1/2017	Paint Including Paint, Lacquer, Enamel, Stain, Shellac Solutions, Varnish, Polish, Liquid Filler And Liquid Lacquer Base	3	0	$4,800.00	Highway
R&L Carriers	Hagerstown	2/23/2018	Organic Peroxide Type F, Liquid	5.2	0	$3,500.00	Highway
YRC, Inc.	Hagerstown	5/10/2018	Tetrachloroethylene	6.1	0	$2,900.00	Highway
YRC, Inc.	Hagerstown	5/10/2018	Corrosive Liquid, Acidic, Organic, N.O.S.	8	0	$2,350.00	Highway
YRC, Inc.	Hagerstown	5/11/2018	Extracts, Flavoring, Liquid	3	0	$2,400.00	Highway
R & J Trucking, Inc.	Clear Spring	6/26/2018	Aluminum Smelting By-Products Or Aluminum Remelting By-Products	4.3	0	$6,500.00	Highway
R&L Carriers, Shared Services, LLC	Hagerstown	11/9/2018	Sulfuric Acid With More Than 51 Percent Acid	8	0	$2,000.00	Highway
R&L Carriers, Shared Services, LLC	Hagerstown	2/22/2019	Resin Solution, Flammable	3	0	$4,800.00	Highway
YRC, Inc.	Hagerstown	9/23/2019	Ethanol Or Ethyl Alcohol Or Ethanol Solutions Or Ethyl Alcohol Solutions	3	0	$4,300.00	Highway
R&L Carriers, Shared Services, LLC	Hagerstown	12/20/2019	Corrosive Liquids, N.O.S.	8	0	$4,300.00	Highway
R&L Carriers, Shared Services, LLC	Hagerstown	6/24/2020	Potassium Hydroxide, Solution	8	0	$5,625.00	Highway
R&L Carriers, Shared Services, LLC	Hagerstown	8/12/2020	Flammable Liquids, Corrosive, N.O.S.	3	0	$3,500.00	Highway
RDX, LLC	Hagerstown	8/15/2020	Lead Compounds, Soluble, N.O.S.	6.1	0	$10,000.00	Highway
YRC, Inc.	Hagerstown	9/12/2020	Cresols, Liquid	6.1	0	$1,400.00	Highway
R+L Paramount Transportation Systems, Inc.	Hagerstown	2/3/2021	Corrosive Liquid, Basic, Inorganic, N.O.S.	8	0	$4,000.00	Highway

HAZARDOUS MATERIALS INCIDENTS WITH LOSSES EXCEEDING $1,000							
Carrier Reporter Name	*Incident City*	*Date*	*Commodity Name*	*Hazard Class*	*Fatalities*	*Total Damages*	*Mode of Transportation*
YRC, Inc	Hagerstown	2/17/2021	Batteries, Wet, Filled With Acid, Electric Storage	8	0	$1,000.00	Highway
YRC, Inc.	Hagerstown	2/23/2021	Lithium Hydroxide	8	0	$1,500.00	Highway
R&L Carriers, Shared Services, LLC	Hagerstown	8/16/2021	Flammable Liquids, Toxic, N.O.S.	3	0	$5,250.00	Highway
R&L Carriers, Shared Services, LLC	Hagerstown	10/11/2021	Corrosive Liquids, Toxic, N.O.S.	8	0	$3,750.00	Highway
YRC, Inc.	Hagerstown	12/7/2021	Batteries, Wet, Filled With Acid, Electric Storage	8	0	$3,300.00	Highway
YRC, Inc	Hagerstown	6/16/2022	Extracts, Aromatic, Liquid	3	0	$6,300.00	Highway
R&L Carriers, Shared Services, LLC	Hagerstown	10/3/2022	Paint Related Material, Including Paint Thinning, Drying, Removing, Or Reducing Compound	3	0	$5,000.00	Highway
YRC, Inc.	Hagerstown	3/14/2023	Batteries, Wet, Filled With Acid, Electric Storage	8	0	$6,400.00	Highway
				Totals	**0**	**$663,376.00**	

October 2004, Oil Spill

The most costly event, according to the PHMSA data, occurred on October 20, 2004, in Hagerstown, costing around $25,000. The incident happened when a driver delivered to the wrong property, causing oil to spill into a basement. The driver called the service department to lay down sorbent dust. An environmental cleanup company handled the rest of the property mitigation.

January 2005, Motor Vehicle Accident

On January 13, 2005, a trailer separated from its tractor at the fifth wheel, releasing the trailer. The load shifted toward the front of the trailer, causing paint cans to rupture, releasing spray paint. Environmental services responded and provided cleanup and disposal of materials. This incident cost $19,000 in damages.

Loss and Damages

By law, the parties responsible for the use, transportation, storage, and disposal of hazardous substances are liable for costs of containment, cleanup, and damages resulting from a release to their activities (USEPA, 2022d). When a responsible party cannot be identified or refuses to cooperate with the response effort, the EPA and participants in the National Response System ensure the emergency is dealt with in an appropriate and timely manner. According to PHMSA incident data, the 2,630 transportation-based incidents caused $759,423 in damages, for an average of $289 per incident.

Data is also available nationally regarding loading/unloading incidents at fixed facilities. According to a report prepared for the Federal Motor Carrier Safety Administration, the average non-explosion loading/unloading incident results in losses of $5,000 (Battelle, 2001). Though it is difficult to extrapolate that figure to an annualized loss estimate, it provides a site-specific point of reference for future planning.

Future Occurrences[2]

Hazardous material incidents are difficult to predict. While it is safe to assume that releases will occur in Washington County, it is impossible to predict when or where they may happen. The property damage, loss of life, or environmental damage of future occurrences depends on the location, the material, and the quantity released.

[2] Future climate considerations are not included because hazardous materials incidents represent a technological hazard.

As noted above, a large number of transportation-based hazardous material incidents occur on roadways, which makes the primary thoroughfares (i.e., I-70 and I-81) and surrounding areas the most likely to experience a future hazardous material incident. Nationally, Class 3 flammable liquids comprise, by far, the most hazmat shipments (USDOT BTS, 2017, p. 75) and are involved in most incidents (USDOT PHMSA, 2023).

Vulnerability Assessment

This section summarizes the vulnerability of Washington County to a hazardous materials incident. The steering committee conducted an online survey for the public to share its thoughts on the hazards listed in this plan. The following table presents the results of that survey, specifically regarding hazardous materials.

PUBLIC SENTIMENT, HAZARDOUS MATERIALS					
Hazard	*Level of Concern*				*Total Responses*
	Not at All	*Somewhat*	*Concerned*	*Very*	
	19 (15.08%)	54 (42.86%)	33 (26.19%)	20 (15.87%)	126
In the past ten years, do you remember this hazard occurring in your community?				28 (22.20%)	126
Have you noticed an increase in the occurrences or intensity of this hazard?				26 (20.31%)	128
Have you noticed a decrease in the occurrences or intensity of this hazard?				6 (4.69%)	128

For site-specific hazards like hazardous materials, planners can identify specific facilities sitting within risk areas. The following table lists the assets (taken from the asset inventory listed in Section 1.2 above) located in hazardous material risk areas[3].

ASSETS LOCATED IN TRANSPORTATION-BASED HAZMAT HAZARD AREAS								
Critical Facility	*Economic Asset*	*Historic Consideration*	*Special Consideration*	*Vulnerable Population*	*Asset Type*	*Name*	*Address*	*City*
				X	School	Cedar Ridge School	12146 Cedar Ridge Rd.	Williamsport (unincorporated)
		X			Building	Funk, Jacob M., Farm	21116 Black Rock Rd.	Hagerstown
			X		Post Office	Hancock Post Office	210 N. Pennsylvania Ave.	Hancock

[3] These assets are located in estimated risk areas from *transportation-based* hazardous material incidents.

ASSETS LOCATED IN TRANSPORTATION-BASED HAZMAT HAZARD AREAS								
Critical Facility	*Economic Asset*	*Historic Consideration*	*Special Consideration*	*Vulnerable Population*	*Asset Type*	*Name*	*Address*	*City*
				X	School	Hillside Mennonite School	11610 Greencastle Pike	Williamsport
X					Police	Sheriff & Detention Center	500 Western Md. Pkwy.	Halfway (unincorporated)
				X	School	Springfield Middle School	334 Sunset Ave.	Williamsport
				X	School	Williamsport Elementary School	1 S. Clifton Dr.	Williamsport
				X	School	Williamsport High School	5 S. Clifton Dr.	Williamsport

The following table assigns point totals based on the methodology identified in Section 2.2: Profile Hazards above.

HAZARDOUS MATERIALS RISK RANKING			
Category	*Points*	*Description*	*Notes*
Frequency	5	Excessive	Per PHMSA, there have been 2,631 incidents in 26 years (i.e., 2016-2022), averaging 101 events per annum.
Response	2	One day	The initial response to a hazardous materials incident would likely conclude within one day. Cleanup may continue for several days.
Onset	4	Less than 6 hours	Hazardous material incidents can occur at any time without warning.
Magnitude	1	Localized (less than 10% of land area affected)	Though the impacts of a hazardous materials incident can be significant, they are typically local events.
Business	1	Less than 24 hours	A hazardous materials event would not typically affect the county's economy.
Human	2	Low (some injuries)	There have been five incidents with reported injuries in Washington County.
Property	3	25-50% of property affected	A hazmat release at a fixed facility would most likely affect 25-50% of the property.
Totals	**18**	**MEDIUM**	

Local Mitigation Planning Handbook (2023c) directs entities compiling multi-jurisdictional plans to identify any jurisdictions within the planning area for which the identified risks or vulnerabilities are more or less prevalent as compared to the other participating jurisdictions.

The following table quickly synthesizes the data to capture the jurisdiction-specific aspects of risks and vulnerabilities for each city or town.

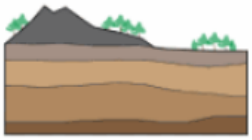
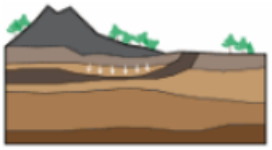
MULTI-JURISDICTIONAL CONSIDERATIONS, HAZARDOUS MATERIALS		
Jurisdiction	*Comparison*	*Notes*
Washington County	**More**	**Significant portions of Interstate 70 and 81, as well as US 40 and 340 pass through unincorporated areas of the county, as do several miles of rail line. Further, county response resources would support hazardous material responses throughout Washington County.**
Boonsboro	Same	Boonsboro has a small number of USEPA ECHO facilities, but it sits distant from the primary hazmat-bearing transportation routes and rail lines.
Clear Spring	Same	Clear Spring sits just north of I-70, but it is not located within a 1,000' distance from the route. Clear Spring also has a small number of USEPA ECHO facilities and do not contain a rail line.
Funkstown	More	Funkstown's southern limits run adjacent to I-70, and it is within close proximity to several of the larger commercial facilities (that receive shipments from truck traffic).
Hagerstown	More	Hagerstown has the highest concentration of USEPA ECHO database facilities (largely consisting of regulated TRI reporters). Further, it sits at the intersection of Interstates 70 and 81, and portions of its corporate limits are within a 1,000' buffer zone from those heavily-traveled (by hazmat-carrying trucks) routes. Hagerstown also has the most extensive rail infrastructure of the municipalities in Washington County. Finally, the city has seen the majority of the hazmat incidents cited above, and the city's emergency services entities would likely support others elsewhere in the county with hazmat responses.
Hancock	More	I-70 runs through Hancock's northern corporate limits; further, the town could be impacted by a rail line on the West Virginia side of the Potomac River.
Keedysville	Same	Keedysville has a small number of USEPA ECHO facilities, but it sits distant from the primary hazmat-bearing transportation routes and rail lines.
Sharpsburg	Same	Sharpsburg has a small number of USEPA ECHO facilities, but it sits distant from the primary hazmat-bearing transportation routes and rail lines.
Smithsburg	(Slightly) More	Though Smithsburg is distant from the primary transportation routes for hazardous materials, there is a rail line that runs through the town.
Williamsport	More	Williamsport could be impacted by a transportation-based incident on I-81, and two rail lines pass just outside of its corporate limits (one on each side).

2.2.7 Land Subsidence

Land subsidence is the loss of elevation caused by the removal of support below the surface. These events can range in size from a significant regional lowering to severe localized collapses, such as sinkholes, and they can strike with little to no warning.				
Vulnerability HIGHEST HIGH MEDIUM LOW LOWEST	**Period of Occurrence:**	At any time, increased in areas where mining and extraction of groundwater have occurred, and regions with Karst topography	**Washington County Risk Ranking:**	Medium
	Warning Time:	Ranges from no warning to months	**State Risk Ranking:**	Medium
	Probability:	Frequent (will occur on an annual basis)	**Impact:**	Localized (less than 10% of land area affected)
	Type of Hazard:	Natural	**Disaster Declarations:**	N/A

Hazard Overview

Land subsidence involves the loss of elevation caused by the removal of support below the surface. These events can range in size from a large regional lowering to severe localized collapses, such as sinkholes. Land subsidence is a geologic hazard that can strike with little to no warning and result in catastrophic and costly damages. Land subsidence involves the motion of the Earth's surface as it shifts downward relative to a benchmark (often sea level) of the surrounding terrain. Land subsidence causes damage and loss of life through several processes, including pushing, crushing, or burying objects in their path and the damming of rivers and waterways (Haddow, Bullock, & Coppola, 2014, pg. 46.)

EFFECTS OF LAND SUBSIDENCE			
Type	*Existing Condition*	*Disturbance*	*Effect*
Mining			

There are several causes for this effect, such as the dissolving of limestone, earthquakes, human actions like the withdrawal of subsurface fluids and mining, and commercial, residential, or industrial developments. In Maryland, the two primary causes of land subsidence are mining activity and karst topography. All mining activities create voids under the Earth's surface. Several

key factors contributing to the potential for these voids to collapse include depth, mining technique, type of rock and soil, and development on the surface above the mines.

According to Strahler's *Physical Geography* (2013), karst topography is prevalent where limestone solution has been especially active. The term "karst" comes from the type of landscape noted along the Dalmatian coastal area of the former country Yugoslavia. Still, it refers to any limestone area where sinkholes are numerous and small surface streams are nonexistent due to the subsurface drainage system. In humid areas such as the eastern United States, carbonic acid removes calcite from limestone by forming calcium bicarbonate, which groundwater then carries off. This chemical process eventually removes vast quantities of limestone and creates the caverns and sinkholes prevalent in karst areas. Per the Maryland Geological Survey (2023b), karst is a little-known but unique and important landform found throughout Maryland. Regions that contain sinkholes, caves, springs, disappearing streams, and enlarged fractures are known as karst terrain. Washington County includes areas of karst topography.

Another cause of land subsidence is associated with expansive soils, which are soils or soft rocks that dramatically expand or swell when wet and shrink or contract when dry. This swelling and shrinking action can cause extensive damage to the transportation routes and structures built over the areas, as the soils can experience significant shifting. Washington County contains approximately 11,000 acres (3.7% of the county) of various types of expansive soils.

Location and Extent

Washington County is at risk of land subsidence related to abandoned and active mines, as illustrated in the table below. Quarrying of natural limestone in Maryland began in the late 18th century and became a major industry after the construction of railroads started in the 1830s. Mine subsidence events may occur with little to no warning, especially if involving an unmapped and unregistered abandoned mine site. While the area of the subsidence will most likely be small, damage to roads and structures located within or adjacent to the event can be significant - the potential damage increases as the size of the mine increases. Roadways damaged by these types of events often require substantial repairs, including the reinforcement of the roadbed. Detours of major travel routes could have significant economic impacts.

The United States Geological Survey (USGS) lists 27 mines in Washington County (TheDiggings.com, 2023). The most commonly listed commodity obtained from the mines is iron. There are two manganese mines and one copper mine listed as well. Mine areas are near Bagtown, Big Spring, Boonsboro, Clear Spring, Dargan, Edgemont, Hancock, Jugtown, Keedysville, Mount Aetna, and North Mountain near Indian Springs.

WASHINGTON COUNTY MINES		
Mine Name	*Location (closest community)*	*Commodity*
Appletown Ore Bank Mine	Boonsboro	Iron
Barton Iron Deposit	Hancock	Iron
Boonsboro Ore Bank Iron Mine	Boonsboro	Iron
Charles Ore Bank Iron Mine	Big Spring	Iron
Dargan Manganese Mine	Dargan	Manganese
Geeting Ore Bank Iron Mine	Keedysville	Iron
Green Spring Ore Bank Iron Mine	Big Spring	Iron
Kohler Ore Bank Iron Mine	Jugtown	Iron
Lane Property Ore Bank Iron Mine	Bagtown	Iron
Land Property Ore Bank Iron Mine	Mount Aetna	Iron
Mclaughlin Ore Bank Iron Mine	Clear Spring	Iron
North Green Spring Furnace Ore Bank Iron Mine	Indian Springs	Iron
Northwest Boonsboro Ore Bank Iron Mine	Boonsboro	Iron
Potomac Refining Company Mine	Dargan	Manganese
Southeast Indian Springs Ore Bank Iron Mine	Indian Springs	Iron
South Mountain Prospect	Edgemont	Copper
Wheatstone Ore Bank Iron Mine	Indian Springs	Iron
Wilson Farm Ore Bank Iron Mine	Clear Spring	Iron
Wyand Ore Bank Iron Mine	Keedysville	Iron

Sinkholes are the primary hazard associated with karst landforms. Glaciers advancing from the north that reached the area roughly 14,000 years ago created the current landscape in the karst region of Maryland. When the last glaciers receded, they left behind a layer of unconsolidated material in a wide range of depths. The shallower and looser the material layer, the greater the chance of water penetrating the underlying bedrock, resulting in a void or ground deformation.

A significant portion of Washington County occupies the Great Valley, a limestone belt extending from eastern Pennsylvania through Virginia and Tennessee into Alabama. In Maryland, this belt is approximately 15 miles wide. It consists of limestone and shale of Cambrian and Ordovician age (about 425-600 million years old). These rock units folded and faulted during the creation of the Appalachian Mountains (approximately 230 million years ago) and eroded over time into the current landscape.

Expansive soils are another common type of soil movement process in Maryland. Expansive soils have a prolonged infiltration rate (high runoff potential) when wet. These soils consist chiefly of clays with a high shrink-swell potential, soils with a high water table, soils with a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a slow rate of water transmission, which creates runoff.

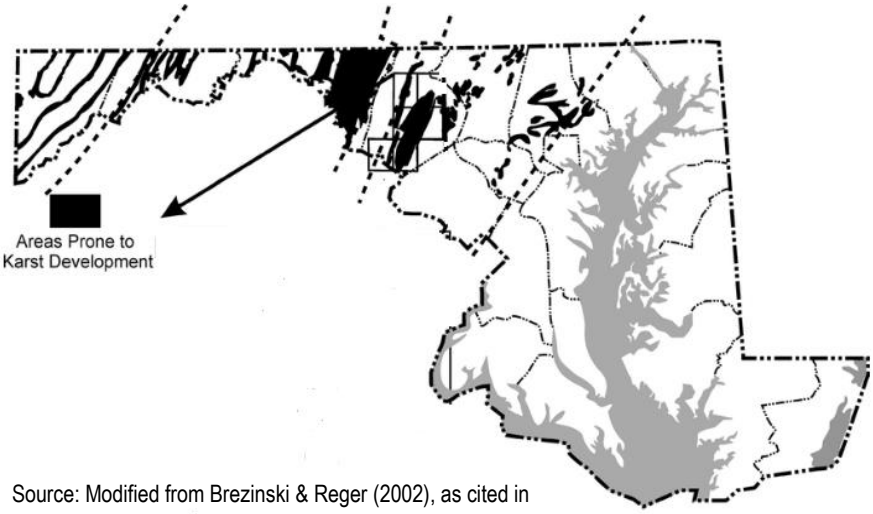
Sedimentary rock units alternate between sandstone, shale, and limestone, the prevalent rock type in the Great Valley. When exposed on steep slopes, the sandstone normally forms the cap rock at the top of the slope, with shale or limestone lying underneath. When these weaker rocks are disturbed, the sandstone eventually fails and moves downslope. The slump type of soil movement is most common, particularly in road cuts. While these movements are usually not on a large scale, they can result in road blockage, particularly where a stream, roads, and railroads share narrow valley floors. The table below lists the amount and types of expansive soils found in Washington County (USDA NRCS, 2019).

EXPANSIVE SOILS – WASHINGTON COUNTY

Map Unit Symbol	*Map Unit Name*	*Acres in County*	*Percent of County*
AnB	Andover-Buchanan loams 0-8 percent slopes, very stony	276	0.1
At	Atkins silt loam	1,228	0.4
BtB	Brinkerton Silt loam, 0-8 percent slopes	552	0.2
Fa	Fairplay (marl) silt loam	1,644	0.5
Hh	Hatboro silt loam	197	0.1
LaB	Lantz-Rohrersville silt loams, 0-8 percent slopes, extremely stony	65	0.1
Me	Melvin silt loam	1,876	0.6
RhB	Rohrersville-Lantz silt loams, 0-8 percent slopes	892	0.3
TyA	Tyler silt loam, 0-3 percent slopes	447	0.1
TyB	Tyler silt loam, 0-8 percent slopes	171	0.1
UrB	Urban land, 0-8 percent slopes	3,315	1.1
UrD	Urban land, 0-25 percent slopes	216	0.1
	Totals	**10,879**	**3.7**

According to the Washington County Soil Survey (USDA NRCS, 2019), units having a high percentage of calcium carbonate ($CaCO_3$), which readily dissolve in water, are in two areas, one extending along the east flank of Fairview Mountain from Clear Spring to Wilson just west of Conococheague Creek, and another from Huyett to Chewsville. The area between Wilson and Huyett extends to the north and south on both sides of Conococheague Creek. It is on the Martinsburg Shale formation, which is not susceptible to karst effects.

Most of the county's growth area is within the limestone area extending from Huyett to Chewsville. This area includes Hagerstown, Clear Spring, Williamsport, Funkstown, and Sharpsburg. Because of the folding and faulting of rock units, this portion of the Great Valley has not had the extreme type of karst development seen in areas where rock units are essentially horizontal. However, there is enough uncertainty about the subsurface to raise concerns about the development of sinkholes and subsequent subsidence. All Washington County municipalities, except Hancock, are within the Great Valley and, therefore, located on limestone bedrock. In terms of karst topography, these municipalities and surrounding unincorporated communities face similar hazards, such as sinkholes and cavern development. Hagerstown is the only municipality with significant expansive soils, likely because of the urban soil component. The upper foot to 1.5 feet of soil is heavily compacted, creating a highly impervious surface layer.



Source: Modified from Brezinski & Reger (2002), as cited in Brezinski (2007)

A portion of Washington County's topography is steep to gently sloping, which, along with the number of ore bank iron mines, karst topography, and expansive soils, increase the county's vulnerability to land subsidence. The following maps illustrate general risk areas. The first map identifies the karst geology in the county as well as the location of known sinkholes. The second map identifies the soil types prone to expansion.

WASHINGTON COUNTY HAZARD MITIGATION PLAN

Karst Geology and Known Sinkholes

Data Source(s):
USGS SSURGO

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

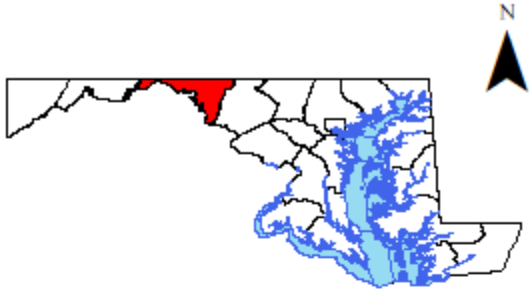
Landslide (per USGS)

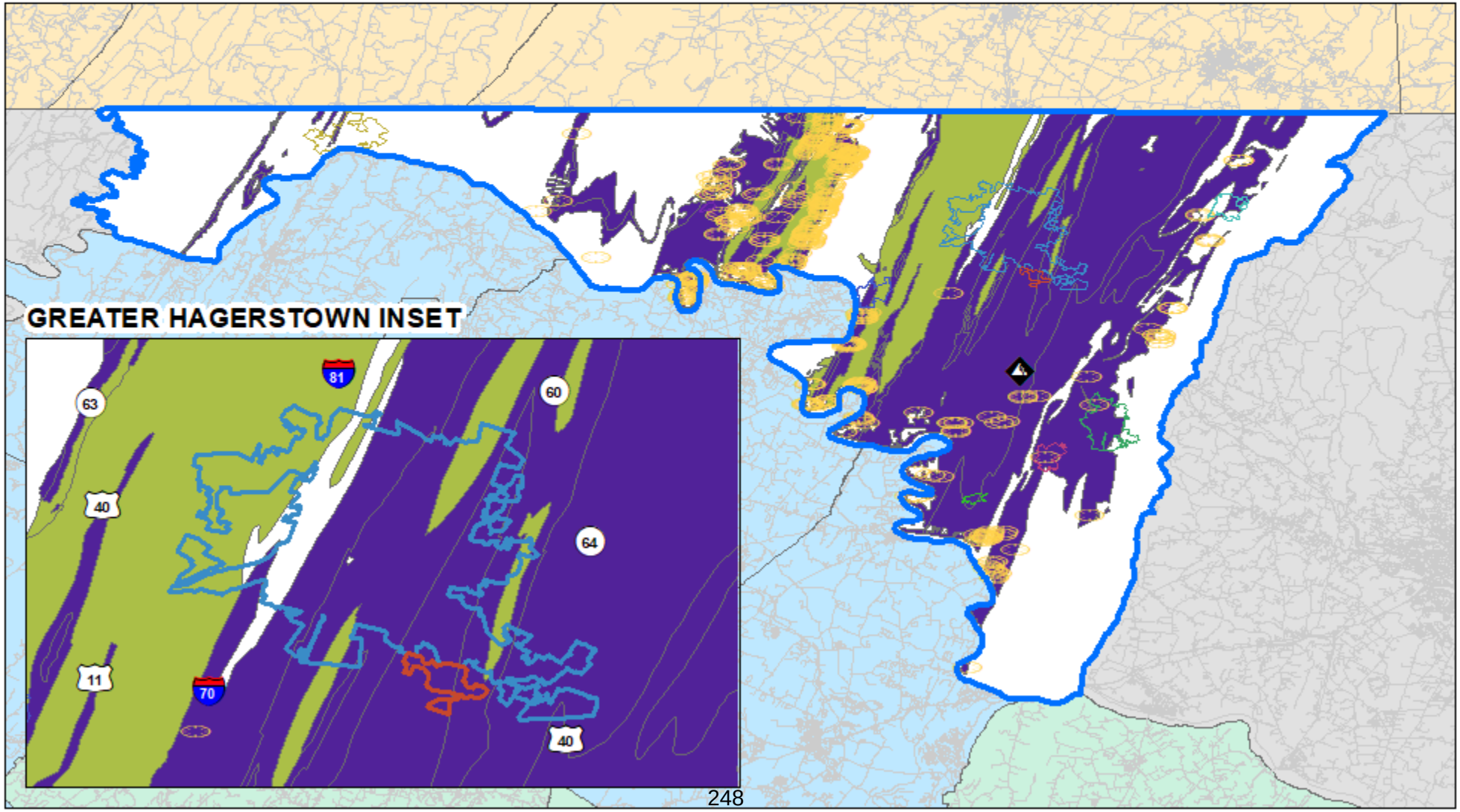
Sinkholes

Karst Geology

Dolomite

Limestone





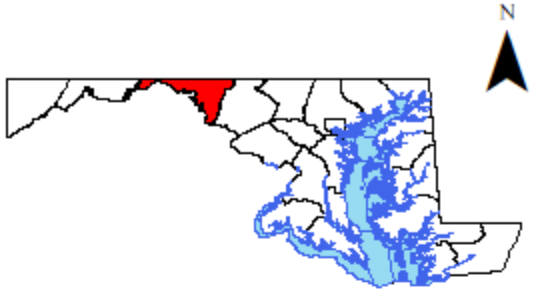
WASHINGTON COUNTY HAZARD MITIGATION PLAN

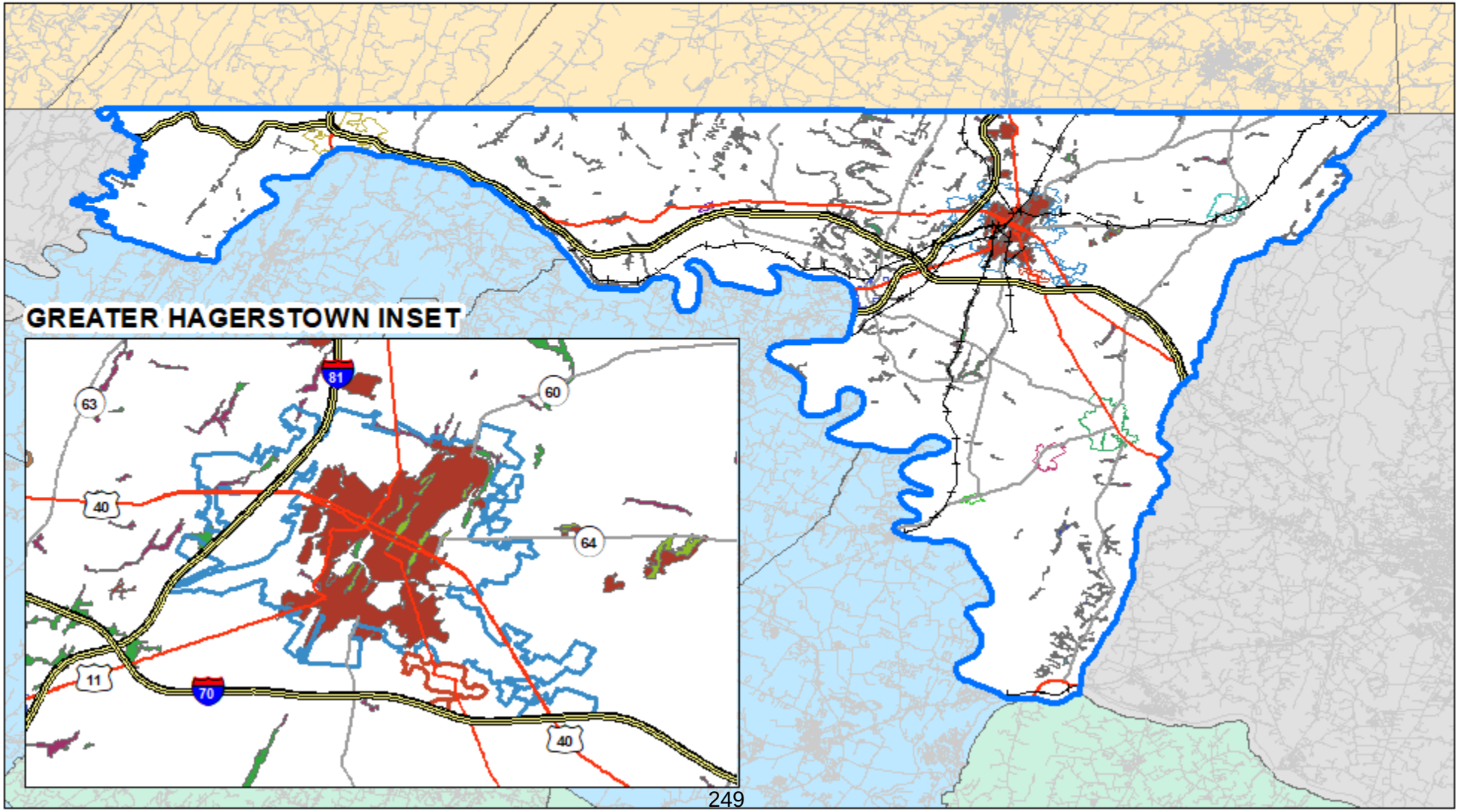
Soil Types Prone to Shrink/Swell

Data Source(s):
USGS SSURGO

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

AnB	Me
At	RhB
BtB	TyA
Fa	TyB
Hh	UrB
LaB	UrD





Impacts and Vulnerability

The MDNR recognizes land subsidence as a significant risk in Washington County. According to the MDNR, land subsidence can damage or destroy homes, businesses, highways, and railways, resulting in annual costs of millions of dollars throughout Maryland. After a land subsidence event, the county's engineering department prepares the clean-up projects for the county's roads, and the department often contracts the projects out for completion. The projects can range in cost from $50,000 to $6,000,000, depending on the scope.

Although there have not been large, catastrophic land subsidence incidents in Washington County, the potential for damage is present. Generally, land subsidence incidents cause death, injuries, trauma, and suffocation from entrapment. Depending on the location, these events could cause losses and damages to homes, infrastructure, and critical facilities and isolate entire communities.

The occurrences of land subsidence are not entirely random and are not wholly unpredictable. Certain inherent geologic conditions are a prerequisite, and one or more of the following conditions can serve as an alert to potential land subsidence problems.

- Joined rocks
- Fine-grained, porous rock or sediment
- Areas of abandoned underground mines
- Areas with sizeable buried utility pipelines

Regarding groundwater pollution, the towns of Boonsboro, Keedysville, Hancock, and Clear Spring rely on springs or wells for their water supply. In contrast, Hagerstown, Williamsport, Funkstown, and Smithsburg rely on surface water for their needs. The four towns relying on groundwater should closely monitor development near their wells, springs, and recharge areas. In all instances, land subsidence can impact underground distribution lines.

Other critical infrastructure that subsidence could impact includes the transportation network. Though engineers design roadways with soil conditions in mind and construction often requires cut and fill, compaction or swelling at deeper geologic layers can impact the surface above. Roadways may sink, berm areas and travel lanes may slip, etc. These instances can be immediate or slow-onset, and they can result in either minor inconveniences as crews conduct repairs or complete closure for extended periods. Railways are at similar risks. All of the roadways and railways in the hazard areas identified by the mapping above are at risk.

Washington County's communities contain extensive historic and cultural resources, ranging from the C&O Canal to the Antietam Battlefield to structures connected to a variety of

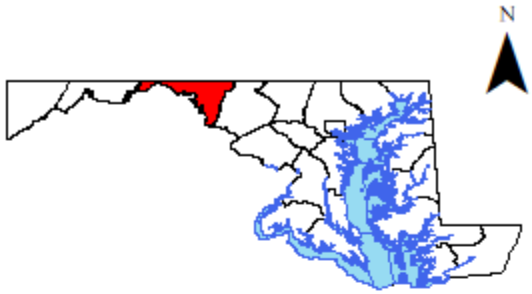
historic figures. Other such assets, like the Hagerstown Historic District, are broader and represent key architectural elements for periods of local and U.S. history. The geologic features presenting challenges now were present when the assets were originally built, and they remain at risk today. They are unique, however, in that if they suffer extensive damage, they may not be retrievable. The following map image shows several historic and cultural assets and their relation to subsidence risk areas.

WASHINGTON COUNTY HAZARD MITIGATION PLAN

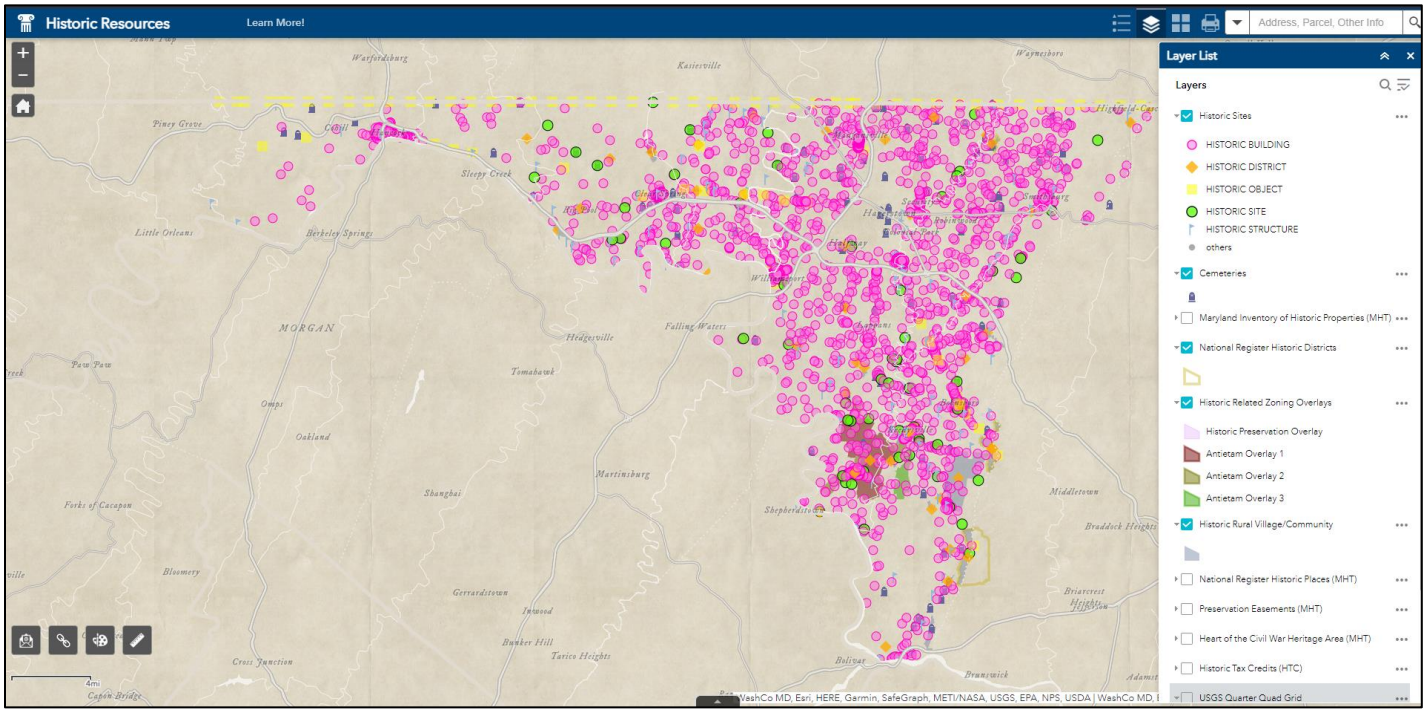
Historic Assets in Subsidence Risk Areas

Data Source(s):
USGS SSURGO

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.



Significantly, though, the assets on this map show just the assets that appear with a street address from the National Register of Historic Places. Washington County and the participating municipalities show far more historically important sites, as evidences by the following image.



Social Vulnerability Considerations

Authors such as Nam, Choi, Copeland, and Kim (2023) have noted a lack of research specifically on how the negative effects of geohazards (like earthquakes, sinkholes, land subsidence, landslides, etc.) impact vulnerable and marginalized groups. In Washington County, there are no apparent trends suggesting the population and housing distribution avoids areas prone to subsidence. Other hazard considerations note how those with a lower proficiency in English may not readily understand preparedness messages and warnings, and the same may be true regarding descriptors of the risks associated with subsidence. Low-income populations may not be able to afford structural alterations and retrofits if subsidence impacts their homes.

Historical Occurrences

Mud and rock slides often occur, especially following heavy rainfall events. Mapping from the Maryland Department of Natural Resources / Maryland Geological Survey shows numerous sinkholes throughout Washington County.

An April 2007 article in the *Hagerstown Herald-Mail* discussed the repair of a sinkhole that had depressed an area of the North Hagerstown High School football field by approximately six inches. Additionally, a lawn care provider posted videos of four sinkhole repairs in the Clear Spring area on YouTube.

According to an article from the Washington County Public Relations and Marketing Department on August 23, 2019, a moderate landslide event impacted an area along Sandy Hook Road (see image at right). This event followed heavy downpours. As a result, the Washington County Division of Emergency Services and the Division of Engineering announced a road closure on Sandy Hook Road between Hoffmaster Road and the school bus turnaround.

The United State Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) produces shapefile mapping layers that depict several different soil features. According to one layer, a sinkhole is "a closed depression formed either by solution of the surficial rock, or by collapse of underlying caves" (NRCS, n.d.). The shapefile presents data corresponding to these features between 1998 and 2015. The file shows 368 sinkholes throughout Washington County (see the map above).

Loss and Damages

Losses associated with land subsidence and sinkholes are difficult to estimate. Reclamation costs following an event impacting roads can range in price from $50,000 to $6,000,000, depending on the scope of the repair.

The specific features of individual sinkholes impact the costs of repairing affected areas. For instance, Weary (2015) reports that costs totaled approximately $2,000,000 to repair a sinkhole that impacted a roadway in nearby Frederick County, while the 2007 Maugans Avenue sinkhole repair in Washington County totaled $217,141.

Future Occurrences

Decades of groundwater withdrawals from unconsolidated, confined aquifers in Maryland have resulted in significant drawdown of groundwater levels. Projected withdrawal increases to

supply a growing population will result in additional drawdown. Withdrawing water from a confined aquifer reduces the hydrostatic pressure in adjacent confining layers (clay and silt). A reduction of hydrostatic pressure may increase the load on the sediment, which may lead to compaction and land subsidence incidents (Maryland Geological Survey, 2023a). Given the presence of karst topography and expansive soils, future occurrences of land subsidence and sinkholes are inevitable and expected to increase due to the continuation of withdrawals of subsurface fluids.

In Washington County, land subsidence will continue to be a hazard, and as development occurs, the impacts attributed to it may evolve. Subsidence risks, though varied across the county, exist throughout the county and impact all designated growth areas in some way. The areas not subject to subsidence are, in many cases, mountainous (and at risk of landslides). Thus, changes in land use and development will not increase or decrease subsidence exposure in notable ways.

A focus on construction that is resilient to potential subsidence will continue to be necessary. As designated growth areas develop, with the potential for greater population density and, thus, building density, these construction techniques will be important. However, some populations may not be able to access new, more resilient construction. Structures the pre-date modern building codes with measures designed to protect buildings in areas prone to expansive soils may be more at risk, adversely affecting those who own and occupy them.

Future Climate Considerations

The implications of a changing climate are more indirect with respect to geologic hazards. Changes in precipitation can influence drought conditions, and a secondary hazard from droughts can be the exacerbation of land subsidence as well as increases in wildfires, flooding, and dust storms (FEMA, 2023b).

Vulnerability Assessment

This section summarizes the vulnerability of Washington County to land subsidence. The steering committee conducted an online survey for the public to share its thoughts on the hazards listed in this plan. The following table presents the results of that survey, specifically regarding land subsidence.

PUBLIC SENTIMENT, LAND SUBSIDENCE					
Hazard	*Level of Concern*				*Total Responses*
	Not at All	*Somewhat*	*Concerned*	*Very*	
Land Subsidence	53 (42.06%)	43 (34.13%)	25 (19.84%)	5 (3.97%)	126
In the past ten years, do you remember this hazard occurring in your community?				16 (12.70%)	126
Have you noticed an increase in the occurrences or intensity of this hazard?				21 (16.67%)	126
Have you noticed a decrease in the occurrences or intensity of this hazard?				3 (2.38%)	126

For site-specific hazards like land subsidence, planners can identify specific facilities sitting within risk areas. The following table lists the assets (taken from the asset inventory listed in Section 1.2 above) located in areas with soils that are prone to shrinking and swelling.

ASSETS LOCATED IN SOIL SHRINK/SWELL HAZARD AREAS								
Critical Facility	*Economic Asset*	*Historic Consideration*	*Special Consideration*	*Vulnerable Population*	*Asset Type*	*Name*	*Address*	*City*
		X			Landmark	Alms House	239 N. Locust St.	Hagerstown
X					Fire	Antietam Co. 2	790 Potomac Ave.	Hagerstown
		X		X	School	Barbara Ingram School for the Arts	7 S. Potomac St.	Hagerstown
X		X			Government	County Courthouse	95 W. Washington St.	Hagerstown
X					Government	County Office Building	100 W. Washington St.	Hagerstown
X					Government	County Office Building	33 W. Washington St.	Hagerstown
			X		Government	County Park & Rec. Headquarters	11400 Robinwood Dr.	Hagerstown
			X		Government	County Transit Center	119 W. Franklin St.	Hagerstown
X					Infrastructure	County Transportation Dept.	1000 W. Washington St.	Hagerstown
X					Emergency Support Services	Emergency Services Special Operations Team Station 20	638 Frederick St.	Hagerstown
		X			Landmark	F. Stevens House	414 W. Washington St.	Hagerstown
		X			Building	Fiery, Joseph, House	15107 Hicksville Rd.	Clear Spring
X					Fire	Fire Training Center	940 Bowman Ave.	Hagerstown
X		X			Fire	First Hose Co.1	33 S. Potomac St.	Hagerstown

ASSETS LOCATED IN SOIL SHRINK/SWELL HAZARD AREAS								
Critical Facility	*Economic Asset*	*Historic Consideration*	*Special Consideration*	*Vulnerable Population*	*Asset Type*	*Name*	*Address*	*City*
		X			Building	Hagerstown Armory	328 N. Potomac St.	Hagerstown
X					Infrastructure	Hagerstown Central Maint. Garage	425 E. Baltimore St.	Hagerstown
		X		X	School	Hagerstown Charity School	102 E. Washington St.	Hagerstown
				X	School	Hagerstown Children's School	22 N. Mulberry St.	Hagerstown
X		X			Government	Hagerstown City Hall	1 E. Franklin St.	Hagerstown
X					Government	Hagerstown City Hall Annex (Early 2024)	32 N. Potomac St.	Hagerstown
				X	Higher Education	Hagerstown Community College	11400 Robinwood Dr.	Hagerstown
			X		Government	Hagerstown Department of Community and Economic Development	14 N. Potomac St.	Hagerstown
X					Infrastructure	Hagerstown Electric Division	425 E. Baltimore St.	Hagerstown
X					Fire	Hagerstown Fire Dept.	25 W. Church St.	Hagerstown
			X		Government	Hagerstown Park & Rec.	351 N. Cleveland Ave.	Hagerstown
X					Police	Hagerstown Police Auxiliary	309 Valley Rd.	Hagerstown
X		X			Police	Hagerstown Police HQ	50 N. Burhans Blvd.	Hagerstown
X		X			Police	Hagerstown Police Substation	32 W. Washington St.	Hagerstown
X					Police	Hagerstown Police Watch Center	14 N. Potomac St.	Hagerstown
		X	X		Post Office	Hagerstown Post Office	44 W. Franklin St.	Hagerstown
X					Government	Hagerstown Public Works	51 W. Memorial Blvd.	Hagerstown
X					Government	Hagerstown Water Division	51 W. Memorial Blvd.	Hagerstown
X					Government	Maryland Dept. of Social Services	122-128 N. Potomac St.	Hagerstown
X					Government	Maryland District Court	36 W. Antietam St.	Hagerstown

ASSETS LOCATED IN SOIL SHRINK/SWELL HAZARD AREAS								
Critical Facility	*Economic Asset*	*Historic Consideration*	*Special Consideration*	*Vulnerable Population*	*Asset Type*	*Name*	*Address*	*City*
		X	X		Building	Maryland Theatre Performing Arts Center	21 S. Potomac St.	Hagerstown
				X	Medical & Higher Education	Meritus Family Medicine & USMH	24 N. Walnut St.	Hagerstown
		X			Building	Old Washington County Library	21 Summit Ave.	Hagerstown
		X			Building	Price-Miller House	131-135 W. Washington St.	Hagerstown
				X	School	Salem Ave. Elementary School	1323 Salem Ave.	Hagerstown
X					Fire	S. Hagerstown Co. 5	409 W. First St.	Hagerstown
				X	School	St. Mary Catholic School	218 W. Washington St.	Hagerstown
				X	School	Truth Christian Academy	41 Bryan Circle	Hagerstown
		X		X	Higher Education	University System of Maryland Center at Hagerstown (USMH)	32 W. Washington St.	Hagerstown
			X		Library	Washington Co. Free Library	100 S. Potomac St.	Hagerstown
	X		X		Government	Washington County Board of Education	820 Commonwealth Ave.	Hagerstown
X					Fire	Western Enterprise Co. 4	526 Washington Square	Hagerstown
				X	Nursing Home	Wilhelm Assisted Living	1205 Kuhn Ave.	Hagerstown

Of the 263 assets listed in Section 1.2, 214 (81.37%) of them are located in karst areas. Those that are not in karst areas (*n* = 49) are primarily located in Boonsboro (14.29%), Hancock (18.37%), and Williamsport (14.29%). Smaller numbers are in Smithsburg (8.16%).

The following table assigns point totals based on the methodology identified in Section 2.2: Profile Hazards above.

LAND SUBSIDENCE RISK RANKING			
Category	*Points*	*Description*	*Notes*
Frequency	5	Frequent	The USDA NRCS reported the presence of 368 sinkholes in Washington County over 17 years (i.e., 1998 to 2015); this yields an estimate of 22 sinkholes per annum.
Response	3	One week	Most land subsidence areas take at least one week to clean up and repair.
Onset	5	N/A	Some instances of land subsidence can occur with no warning at all.
Magnitude	1	Localized (<10% of land area affected)	All land subsidence events are site-specific and do not affect vast areas.
Business	2	One week	Businesses located in the affected area would be impacted for a minimum of one week (per the clean-up estimate above)
Human	1	Minimum (minor injuries)	Historically land subsidence incidents have only resulted in property damage. The greatest chance of personal injury would be to motorists.
Property	1	<10% of property affected	All land subsidence incidents are site-specific and do not affect vast areas.
Totals	**18**	**MEDIUM**	

FEMA's *Local Mitigation Planning Handbook* (2023c) directs entities compiling multi-jurisdictional plans to identify any jurisdictions within the planning area for which the identified risks or vulnerabilities are more or less prevalent as compared to the other participating jurisdictions. The following table quickly synthesizes the data to capture the jurisdiction-specific aspects of risks and vulnerabilities for each city or town.

MULTI-JURISDICTIONAL CONSIDERATIONS, LAND SUBSIDENCE		
Jurisdiction	*Comparison*	*Notes*
Washington County	**More**	**Numerous unincorporated areas have karst topography, and there are various pockets of soil types prone to shrinkage and swelling in unincorporated areas. The only USGS-recorded landslide in Washington County is in an unincorporated area, as are areas that may be more prone to slippage on the western end of the county.**
Boonsboro	(Slightly) Less	Though the risk is present, the eastern portions of Boonsboro are not underlaid by karst (as evidenced by the asset data above).
Clear Spring	More	Clear Spring is partially underlaid by karst.
Funkstown	Same	Funkstown is underlaid by karst.
Hagerstown	More	Portions of Hagerstown are underlaid by karst, and the majority of the soils prone to shrinking and swelling in the county are within Hagerstown's corporate limits.
Hancock	Less	Hancock has small pockets of its corporate limits over karst features (as noted above, it has a higher percentage of its assets not in karst risk areas). Though it is on the western side of the county which may see more slips associated with Sideling Hill, the town's experience with landslides has been minimal.
Keedysville	(Slightly) More	Keedysville is underlaid by karst; there is one known sinkhole within the corporate limits.
Sharpsburg	Same	Sharpsburg is underlaid by karst.

MULTI-JURISDICTIONAL CONSIDERATIONS, LAND SUBSIDENCE		
Jurisdiction	*Comparison*	*Notes*
Smithsburg	Same	Some portions through central Smithsburg are underlaid by karst, but as shown above, several of its assets are not in karst hazard areas. There is a small area in the eastern portion of town with a soil type prone to shrinkage/swelling.
Williamsport	(Slightly) More	Most of Williamsport is underlaid by karst, and there are areas in the central and eastern portions of town with soils prone to shrinkage and swelling. Interestingly, though, it has a higher portion of its assets outside of karst hazard areas.

2.2.8 Opioid Epidemic

The opioid epidemic refers to the public health crisis stemming from the rapid increase in the use of and deaths from prescription and non-prescription opioid drugs.				
Vulnerability HIGHEST HIGH MEDIUM LOW LOWEST	**Period of Occurrence:**	At any time	**Washington County Risk Ranking:**	High
	Warning Time:	The public health situation is ongoing; there is little to no warning time for individual overdoses	**State Risk Ranking:**	N/A
	Probability:	Excessive (will occur in a year)	**Impact:**	High (multiple deaths)
	Type of Hazard:	Human-caused	**Disaster Declarations:**	N/A

Hazard Overview

In the United States, what is commonly referred to as the opioid epidemic, not for being a contagious or infectious disease, but by acting like one, has grown to alarming proportions. In 2019 alone, 10.1 million people misused prescription opioids. Opioids are drugs primarily used for pain relief; they include legal and illegal substances. Legally prescribed opioids include oxycodone, hydrocodone, and morphine. Illicit drugs include substances such as heroin and fentanyl. According to the U.S. Department of Health and Human Services (USDHHS), 1.6 million people misused prescription opioids for the first time, and 70,630 people died from overdosing on opioids in 2019. Of these deaths, 14,480 were attributed to overdosing on commonly prescribed opioids. Around 745,000 people used heroin, 50,000 for the first time, and about 63,000 deaths were attributed to overdoses of synthetic opioids or heroin, again in 2019 (USDHHS, 2022).

Location and Extent

The opioid epidemic has, in some way, reached into the lives of nearly every person in the U.S. This disease does not have a preference for age, class, economic status, or even gender. It is difficult to pinpoint a specific location of this epidemic. However, the CDC maintains data on states' and counties' dispensing rates. The table below shows a comparison between Maryland and Washington County (CDC, 2021).

OPIOID DISPENSING RATE PER 100 PERSONS		
Year	*Washington County*	*Maryland*
2020	86.0	39.5
2019	100.2	42.3
2018	90.3	45.1
2017	100.8	52.0
2016	113.1	58.7

The Secretary of Health and Human Services issued a Determination of a Public Health Emergency on October 26, 2017, that has been renewed annually (by subsequent HHS secretaries). Along with overdose fatalities, medical professionals and researchers have linked opioid abuse to increases in other medical conditions, including Hepatitis C, HIV, and neonatal abstinence syndrome. Although the use of prescription opioids under physician's care has made it possible for some individuals with injuries to return to work, opioids have lowered labor force participation. Federal and state budgets have also been affected by the opioid epidemic as costs for subsidized health insurance, rehabilitation, preventative programs, and child welfare programs have increased (CBO, 2022).

This crisis is a problem that is affecting every state in the nation. On March 1, 2017, Maryland Governor Larry Hogan announced a state of emergency to expand and coordinate resources to combat the opioid epidemic, consistent with the previously-announced 2017 Heroin Prevention, Treatment, and Enforcement Initiative, a multi-pronged strategy to tackle the evolving threat of heroin and opioid addiction. Recognizing that the opioid crisis was a long-term health threat, then-Governor Hogan signed Executive Order 01.01.2018.30 in December 2018, which replaced the original declaration. The state's opioid operational command center (OOCC) serves as the primary coordinating mechanism (Inter-Agency Heroin & Opioid Coordinating Council, 2020).

Impacts and Vulnerability

The impacts of the opioid crisis are numerous, and they range from individual to community levels. Losing loved ones, having children taken away and placed in foster care, worsening financial hardships, turning to prostitution, theft, etc. to pay for drugs, etc., are some of the individual impacts. Strains on local economies and threats to local emergency services and medical officials constitute some of the community effects.

OPIOID EPIDEMIC CONSEQUENCE ANALYSIS	
Type of Impact	*Description*
Public /Responder Health and Safety	This hazard manifests within the general population. Residents should be aware of higher crime and how to manage and handle people who exhibit addictive behavior. Having a loved one addicted to opioids may cause financial, physical, and emotional stress. First responders can be in danger when responding to overdose incidents due to the nature of unknown drugs and their side effects.
Continuity of Operations (incl. Delivery of services)	Businesses whose employees suffer from addiction may see reduced productivity, possibly leading to a deficit of available human resources.
Property, Facilities, And Infrastructure	An increase in crime may cause some property damage.
Economic Condition	The opioid epidemic is becoming more and more costly to residents and governments. Costs include first-response activities, hospital care, treatment, etc.
Environmental	The environmental impacts of the opioid epidemic are minimal.

Social Vulnerability Considerations

One could compellingly argue that the opioid epidemic creates a socially-vulnerable population, as it erodes health, impacts finances and pushes households into poverty, impacts an individual's ability to work productively (and to find employment), etc. (Paris, Rowley, & Frank, 2023). The opioid crisis has not discriminated in its impacts, as those from low-income and wealthier backgrounds have become victims. The crisis is not bound by geography. Many groups have tried to identify risk factors associated with opioid effects, though consensus has been elusive. Older adults (i.e., 65+) or teenagers, those with respiratory conditions (e.g., sleep apnea, asthma, or COPD), those with a previous history of substance abuse, untreated psychological disorders, and those with a social or family environment that encourages misuse have been noted (Judd, King, & Galke, 2023; USDOL, n.d.).

Historical Occurrences

The Maryland Department of Health issues annual reports that detail alcohol and drug-related intoxication deaths for every county in the state. The table below shows drug-related deaths from 2011 through 2020 in Washington County. There has been an upward trend in deaths caused by the substances analyzed through the years; overall, there has been a 408% increase in drug-related deaths in the ten years analyzed.

DRUG-RELATED DEATHS IN WASHINGTON COUNTY											
Substance	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*	*Total*
Heroin	8	11	14	21	38	39	22	29	25	20	227
Prescription Opioid	11	9	11	16	20	23	8	19	17	18	152
Oxycodone	5	2	5	5	6	11	2	7	9	2	54
Methadone	5	4	3	10	6	5	4	10	6	14	67
Fentanyl	1	1	4	1	14	31	39	70	70	95	326
Cocaine	3	5	6	6	10	9	10	31	24	31	135
Benzodiazepine	4	3	2	5	3	6	2	4	2	4	35
Phencyclidine	0	0	0	0	1	0	1	0	0	2	4
Methamphetamine	0	0	0	0	1	1	1	3	7	2	15
Totals	**37**	**35**	**45**	**64**	**99**	**125**	**89**	**173**	**160**	**188**	**1,015**

Loss and Damages

In addition to the over 70,000 fatalities in 2021, the healthcare cost for opioid overdoses exceeds $35 billion in the United States annually. Opioid use is associated with another $14.8 billion in criminal justice costs and an estimated $92 billion in lost productivity (Florence, Luo, & Rice, 2021).

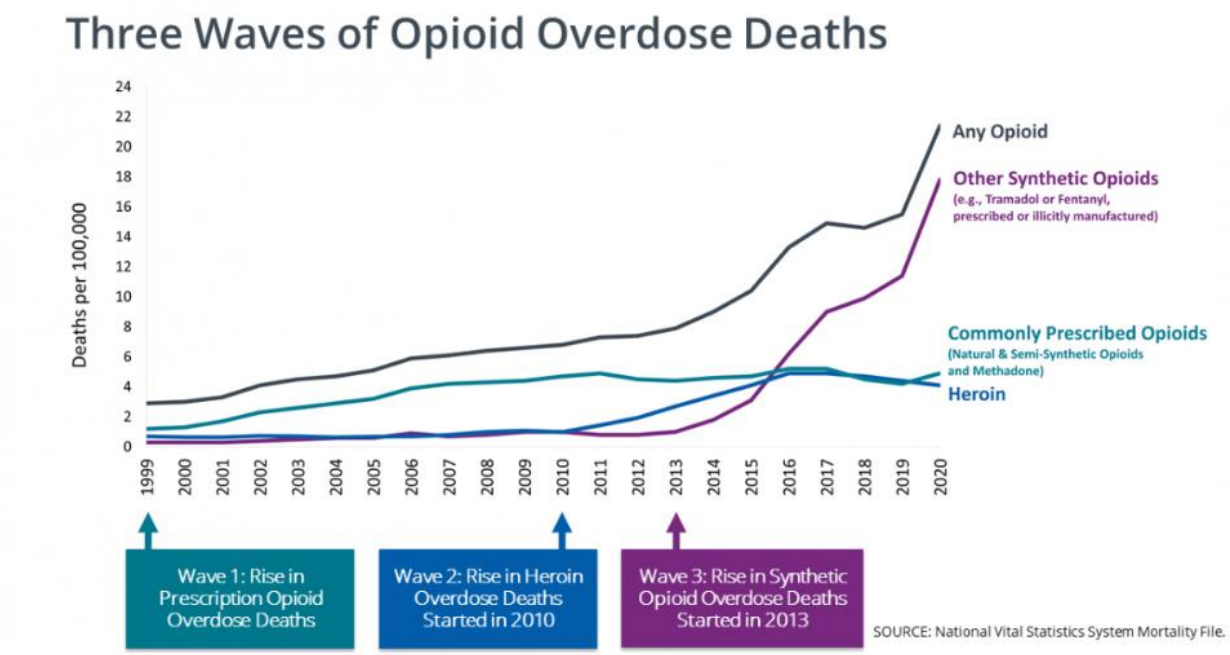
Other sources have attempted to quantify losses from the crisis. According to a Matrix Global Advisors report in 2015, the healthcare cost of the opioid epidemic in Maryland is over $451M, accounting for around 1.8% of the total healthcare costs in the state and a per capita healthcare cost of $75. These calculations accounted for the population, the cost of health care in the state, and the rate of opioid abuse.

The Council of Economic Advisers estimated the cost of the opioid crisis in 2015 to be around $504B which took healthcare bills, criminal justice costs and lost productivity into consideration (LaMagna, 2017).

- **Hospitals**: The Beth Israel Deaconess Medical Center in Boston studied the average cost of treating an opioid overdose patient in intensive care units. They found that the costs between 2009 and 2015 rose by 58%. The average cost was around $92K per patient.
- **Criminal Justice**: state and local governments have incurred costs of nearly $8B in criminal justice-related activities. Around 45% of addicts will become repeat offenders within three years of their prison release.
- **Businesses**: Absenteeism and decreased job performance due to drug use have cost companies around $20B.
- **Unseen costs**: Other costs related to drug overdoses that are difficult to quantify include the impact on the quality of life, the pain endured by the people affected, loss of tax revenue, etc.

Future Occurrences[1]

As seen in the graphic below, the number of prescription opioid deaths that quickly rose in the early 2000s has remained relatively consistent due to laws and policies put in place by the federal and state governments. However, as oversight on dispensing opioids has become more stringent, fatalities from synthetic opioids have increased substantially. The CDC has identified three waves of opioid overdose deaths that correspond with the passing and enforcing of legislation to combat prescription opioid abuse (CDC, 2022c).



The number of opioid-related deaths will likely continue to rise due to the manufacturing of synthetic opioids. Individuals who had been prescribed medication for injuries or acute pain in the past can substitute these synthetic opioids to feel the same relief or high they felt before. To combat the manufacturing and distribution of these synthetic drugs, Congress passed the Combat Methamphetamine Epidemic Act in 2005, requiring pharmacies to log all purchases of pseudoephedrine, the main ingredient used in methamphetamine. However, most methamphetamines used in the United States are manufactured in Mexico and shipped into the U.S. (NIH, 2019).

[1] Future climate considerations are not included because the opioid epidemic is a human-caused hazard.

Vulnerability Assessment

This section summarizes the vulnerability of Washington County to the opioid epidemic. The steering committee conducted an online survey for the public to share its thoughts on the hazards listed in this plan. The following table presents the results of that survey, specifically regarding the opioid epidemic.

PUBLIC SENTIMENT, OPIOID EPIDEMIC					
Hazard	*Level of Concern*				*Total Responses*
	Not at All	*Somewhat*	*Concerned*	*Very*	
Opioid Epidemic	18 (14.28%)	35 (27.78%)	32 (25.00%)	41 (32.54%)	126
In the past ten years, do you remember this hazard occurring in your community?				91 (72.22%)	126
Have you noticed an increase in the occurrences or intensity of this hazard?				98 (77.78%)	126
Have you noticed a decrease in the occurrences or intensity of this hazard?				5 (3.97%)	126

The following table assigns point totals based on the methodology identified in Section 2.2: Profile Hazards above.

OPIOID EPIDEMIC RISK RANKING			
Category	*Points*	*Description*	*Notes*
Frequency	5	Excessive	The number of opioid-related deaths in Washington County has continued to rise over the past 10 years. It has a 10-year average of 101.5 per year.
Response	5	More than one month	The fight to combat opioid misuse has been ongoing for decades.
Onset	4	Less than 6 hours	Opioid-related deaths can occur at any time without warning.
Magnitude	4	Catastrophic (more than 50% of land area affected)	The opioid epidemic is nationwide, affecting all communities.
Business	1	Less than 24 hours	The opioid epidemic does not usually affect businesses in Washington County.
Human	4	High (multiple deaths)	Washington County averages 101.5 deaths per year from opioid use.
Property	1	Less than 10% of property affected	The opioid epidemic has minimal effect on property.
Totals	**24**	**HIGH**	

FEMA's *Local Mitigation Planning Handbook* (2023c) directs entities compiling multi-jurisdictional plans to identify any jurisdictions within the planning area for which the identified risks or vulnerabilities are more or less prevalent as compared to the other participating jurisdictions. However, regarding the opioid epidemic, all communities are feeling the impacts of it, losing residents to it, and collaborating to address it. While planners could say that Hagerstown is "more" susceptible thanks to larger numbers, that masks the seriousness of the

issue for smaller towns with lower populations. Similarly, planners could label the county as more susceptible thanks to a larger area and a potentially higher number of agencies working to address it (e.g., the health department), but that too masks the complexity of the issue. For the purposes of this assessment, then, all participating jurisdictions are equally at risk to the impacts of the opioid epidemic as described above.

2.2.9 Reportable Disease Epidemic

This profile primarily examines two types of public health emergencies, each corresponding to the level of disease presence (defined below): epidemic and pandemic.				
Vulnerability HIGHEST HIGH MEDIUM LOW LOWEST	**Period of Occurrence:**	At any time	**Washington County Risk Ranking:**	Medium
	Warning Time:	Over 24 hours	**State Risk Ranking:**	Medium-High
	Probability:	Low (unlikely to occur in a year)	**Impact:**	High (multiple deaths)
	Type of Hazard:	Natural	**Disaster Declarations:**	EM-3430-MD (2020) DR-4491-MD (2020)

Hazard Overview

According to the Centers for Disease Control and Prevention (CDC), there are three widely-accepted levels of disease presence. This profile focuses on epidemics and pandemics.

- **Endemic:** The baseline level of a particular disease in the population of an area. This level is not necessarily the desired level but the observed level.
- **Epidemic:** An increase in the number of cases of a disease above the usual level in that population or area. Epidemics may result from an increase in the disease's virulence, the presence of a disease in a new outbreak, enhanced disease transmission, increased susceptibility among exposed persons, or increased exposure to the disease-causing agent. Note that while the term "epidemic" originally included infectious diseases, some non-infectious health conditions (such as obesity and opioid misuse) have reached epidemic status in the United States.
- **Pandemic:** An epidemic that has spread over several countries or continents, typically affecting a large number of people.

In addition to disease epidemics, such events can take the form of large-scale incidents of food or water contamination, infestations of disease-bearing insects or rodents, or extended periods without adequate water or sewer service. Epidemics may also be secondary to other disasters such as floods, tornadoes, hurricanes, or hazardous materials incidents. According to the U.S. Centers for Disease Control, in 1997, Maryland ranked high in sexually transmitted diseases but low for vaccine-preventable diseases such as Hepatitis B. The Maryland Department of Health (MDH) maintains counts for diseases. The surveillance and reporting of

these diseases is the responsibility of the local health department, which investigates and completes reporting both electronically and manually as per MDH regulations.

Location and Extent

An epidemic can affect all parts of Washington County. Still, it is more likely to impact densely-populated areas and congregate populations, such as multi-unit residential complexes, nursing homes, detention facilities, etc. The graphic below shows the county's population by Census tract (ATSDR, 2022).

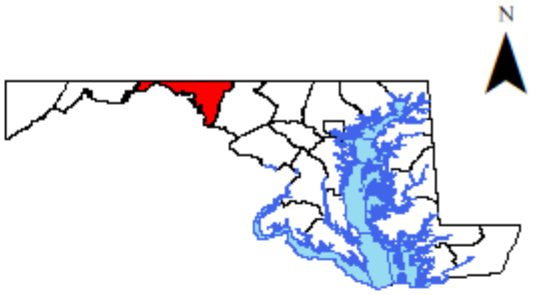
WASHINGTON COUNTY HAZARD MITIGATION PLAN

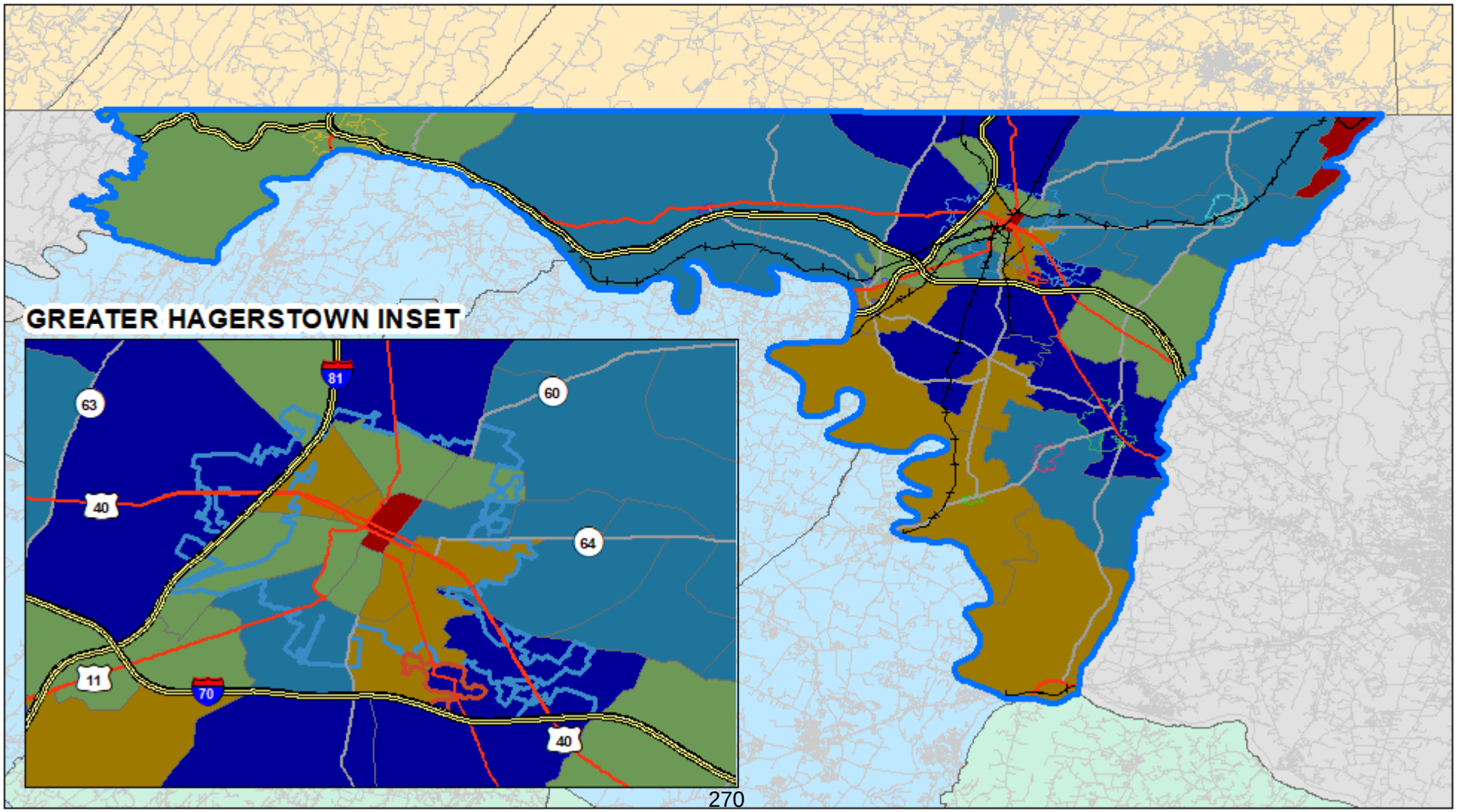
Population by Census Tract

Data Source(s):
CDC SVI Index (2020)

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

- 1012 - 1764 persons
- 1765 - 3250 persons
- 3251 - 4139 persons
- 4140 - 5480 persons
- 5481 - 7645 persons





The following graphic identifies long-term care and assisted living facilities as well as detention facilities in Washington County. These facilities house populations in close quarters and outbreaks are common (during both epidemics and pandemics). The map also identifies the schools in the county. During the Covid-19 pandemic, virus spread in schools was a significant concern. Similar to congregate housing, schools see concentrated populations of vulnerable individuals frequently. The county is also home to Hagerstown Community College (HCC). However, HCC does not have on-campus housing.

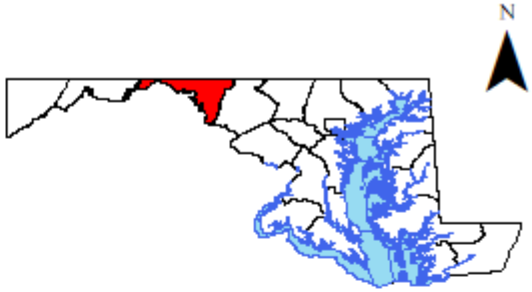
WASHINGTON COUNTY HAZARD MITIGATION PLAN

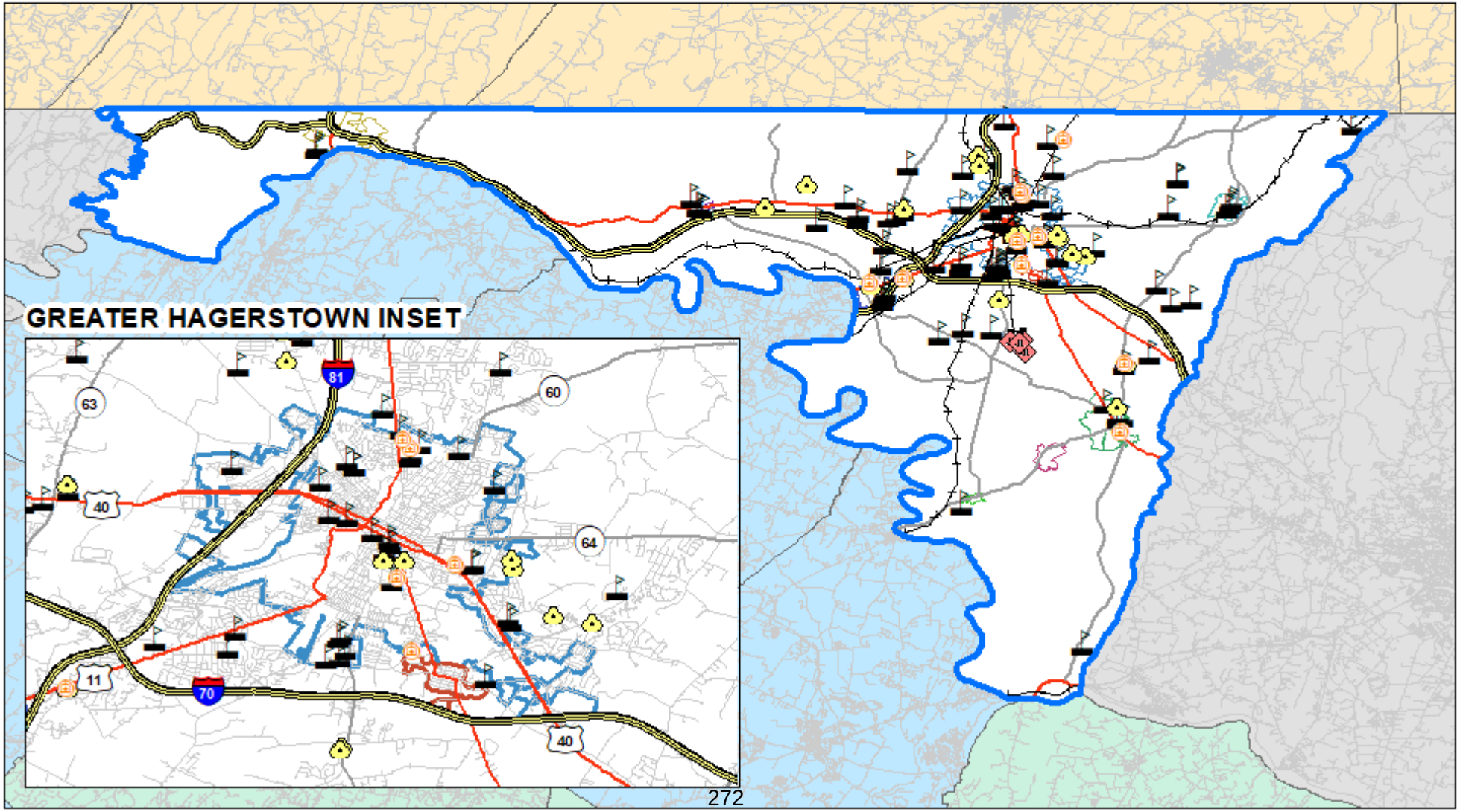
Congregate Considerations

Data Source(s):
Washington County GIS

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

- Assisted Living
- Correctional Facilities
- Long-Term Care
- Schools





Impacts and Vulnerability

Major concerns during any outbreak include the ability of local healthcare providers to provide medical attention to everyone who becomes ill and the ability to identify the source or what is causing the population to become sick. The cascading effects of epidemics and pandemics can include the following.

- Illness or death
- Civil disturbance
- Distrust of government
- Poor water quality
- Temporary loss of income

Social Vulnerability Considerations

Historically, several social vulnerability indicators have been associated with reportable disease epidemics and pandemics. These have included dense populations and persons in group quarters (see the map graphic above), along with elderly populations (see an age-distribution map in Section 1.2), those with chronic and other underlying health problems, etc. In Washington County, population density is as follows (reported as “persons per square mile”).

- Washington County (inclusive of all municipalities): 336.32
- Boonsboro: 1,227.78
- Clear Spring: 3,691.67
- Funkstown: 1,616.36
- Hagerstown: 3,424.76
- Hancock: 540.67
- Keedysville: 1,237.36
- Sharpsburg: 3,050.00
- Smithsburg: 2,574.14
- Williamsport: 1,991.84

Diseases can affect any age group; however, they often more easily affect the youngest and oldest populations. The map on the following page uses U.S. Census data to identify concentrations of younger (i.e., under 17) and older (i.e., 65 and over) populations.

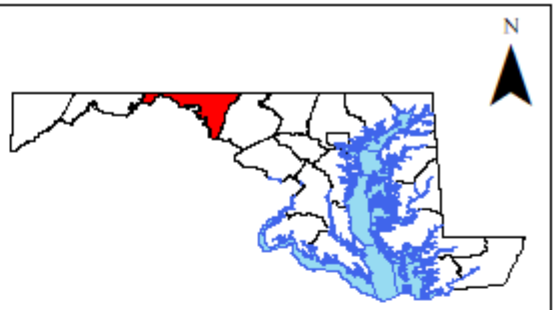
WASHINGTON COUNTY HAZARD MITIGATION PLAN

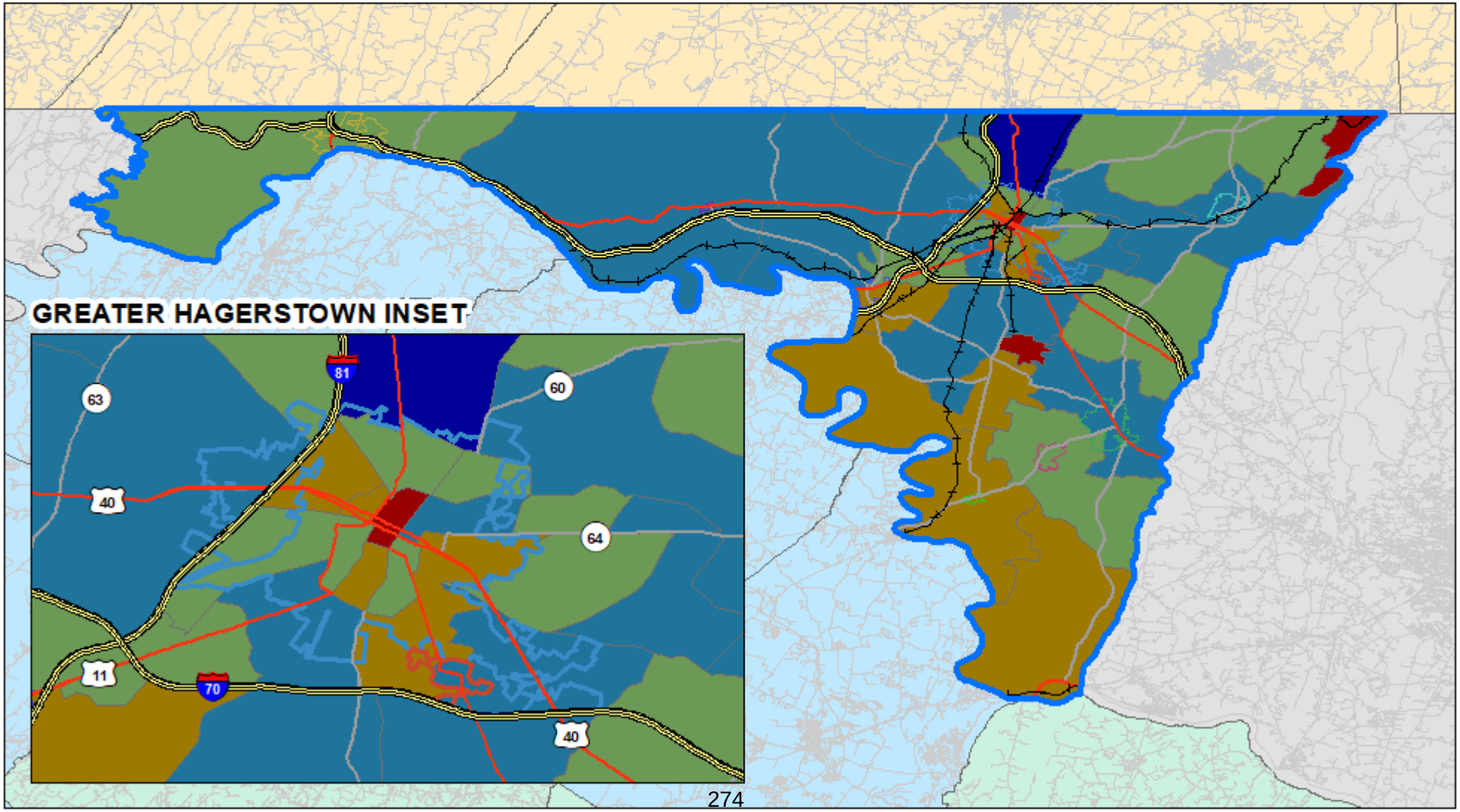
Vulnerable Populations (i.e., Under 17 and 65+)

Data Source(s):
CDC SVI Index (2020)

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

- 182 - 678 persons
- 679 - 1256 persons
- 1257 - 1834 persons
- 1835 - 2893 persons
- 2894 - 3822 persons





There are also economic impacts of a pandemic. The global COVID-19 pandemic has had sweeping effects on society; some of the direst are economic. In Maryland, stay-at-home orders enacted by Governor Hogan in March 2020 resulted in many Marylanders losing work, in part or altogether. Many communities and businesses migrated to stay-at-home situations and facilitated business through virtual means. These virtual means relied on high-speed internet connections for web/video conferences and file sharing. Thus, entire areas lacking reliable internet service were at a disadvantage. Households without internet service are at a similar disadvantage, even when located in areas with reliable service. Washington County data suggests the following (reported as "households with a broadband internet subscription").

- Washington County (inclusive of all municipalities): 48,913 (83.4%)
- Boonsboro: 1,107 (77.2%)
- Clear Spring: 123 (77.4%)
- Funkstown: 391 (77.3%)
- Hagerstown: 14,615 (79.6%)
- Hancock: 533 (74.6%)
- Keedysville: 341 (94.2%)
- Sharpsburg: 604 (91.3%)
- Smithsburg: 884 (89.0%)
- Williamsport: 706 (82.4%)

These data suggest that an approximately 16.6% of households in the county would have been at a disadvantage during virtual operations stemming from COVID-19 protective measures. Though the converse of this variable is not necessary "no internet access," it helps to contextualize the considerations that will be important to future decision-making.

The shutdowns also shifted consumption patterns, with more spending online and at grocery stores taking the place of entertainment, travel, and accommodations. To respond to the economic hardships felt by the pandemic, beginning in late March, the United States federal government issued multiple rounds of financial assistance in the form of business loans, stimulus checks, grants, and contracts.

Historical Occurrences

The following table contains data from 2011 to 2021 from the Maryland Department of Health (MDH, Center for Infectious Disease Surveillance and Outbreak Response, 2021) regarding reportable diseases in Washington County. The table summarizes the MDH annual reports on notifiable conditions. (NOTE: For space and usability within this profile, planners removed data rows where there were no reported instances during the period.)

NOTIFIABLE CONDITIONS, WASHINGTON COUNTY, 2011-2021												
Disease	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*	*2021*	*Totals*
Anaplasmosis	0	0	0	0	0	0	0	0	1	0	0	**1**
Animal Bites	363	433	384	305	319	326	293	288	333	435	335	**3,814**
Botulism	0	0	1	2	0	0	1	0	0	0	0	**4**
Campylobacteriosis	12	17	18	22	28	29	35	27	31	26	45	**290**
Chikungunya				3	0	0	0	0	0	0	0	**3**
Chlamydia	517	490	468	454	496	511	590	573	636	709	N/A	**5,444**
Cryptosporidiosis	0	3	0	2	2	2	3	4	0	0	0	**16**
Ehrlichiosis	0	0	0	0	0	0	0	1	0	0	0	**1**
Encephalitis - Non-Arboviral	3	1	0	0	0	0	0	0	0	0	0	**4**
Giardiasis	10	1	9	10	5	5	7	3	7	8	3	**68**
Gonorrhea	86	55	70	158	179	224	181	242	283	326	0	**1,804**
H. influenzae - Invasive Disease	4	1	6	4	3	7	1	4	3	0	3	**36**
Hemolytic Uremic Syndrome	0	0	0	0	0	0	0	0	0	1	0	**1**
Hepatitis A (Acute-Symptomatic)	1	0	0	0	0	0	0	9	2	1	1	**14**
Hepatitis B (Acute-Symptomatic)	6	1	2	1	3	1	0	0	0	2	0	**16**
Hepatitis C - Perinatal	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	1	3	**4**
Hepatitis C (Acute-Symptomatic)	0	6	5	0	1	1	3	1	0	2	6	**25**
Hepatitis E (Acute-Symptomatic)	0	0	0	0	0	0	0	0	0	0	1	**1**
Legionellosis	5	7	3	6	1	1	8	7	15	5	10	**68**
Listeriosis	0	0	2	0	0	0	1	0	0	0	2	**5**
Lyme Disease	72	67	71	55	34	72	64	36	37	42	38	**588**
Malaria	0	0	1	1	0	3	1	2	3	1	2	**14**
Meningitis, Aseptic	21	11	7	2	1	0	2	0	2	3	3	**52**
Meningitis, Fungal	N/A	N/A	0	0	0	1	1	1	1	0	1	**5**
Meningococcal Invasive	1	0	0	0	0	0	0	0	1	0	2	**4**
Mumps (Infectious Paro.	0	0	0	0	0	0	0	1	0	0	0	**1**
Mycobacteriosis, Other than TB & Leprosy	9	22	22	20	17	17	22	16	11	16	19	**191**
Pertussis	0	3	4	0	0	3	1	0	4	0	0	**15**
Pneumonia – Hospitalized Healthcare Worker	7	5	7	0	0	0	0	0	0	5	3	**27**
Q Fever	1	0	0	0	0	0	0	1	0	0	0	**2**
Rabies - Animal	8	11	5	9	10	9	16	10	12	15	6	**111**
Salmonellosis - Other than Typhoid Fever	25	16	6	17	16	11	19	11	20	20	21	**182**
Shiga toxin producing E. coli (STEC)	5	6	3	1	0	1	2	4	11	5	8	**46**
Shigellosis	1	0	0	3	3	1	6	2	0	1	0	**17**
Spotted Fever Rickettsiosis	0	0	0	0	0	0	0	1	0	0	0	**1**

NOTIFIABLE CONDITIONS, WASHINGTON COUNTY, 2011-2021												
Disease	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*	*2021*	*Totals*
Strep Group A - Invasive Disease	9	1	2	2	0	3	6	9	12	12	17	**73**
Strep Group B - Invasive Disease	17	19	14	20	18	23	31	23	18	16	26	**225**
Strep pneumoniae – Invasive (Drug-Resistant)	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**1**
Strep pneumoniae – Invasive Disease	18	15	16	5	5	3	6	20	20	13	9	**130**
Syphilis - Congenital	0	0	0	0	0	0	0	1	3	4	N/A	**8**
Syphilis - Primary and Secondary	0	3	0	5	10	4	6	22	58	37	N/A	**145**
Tuberculosis	1	1	0	1	0	3	2	1	2	1	2	**14**
Vibriosis (Non-Cholera)	0	0	1	1	0	2	2	2	1	1	9	**19**
West Nile Virus	0	2	0	1	0	1	0	1	0	0	0	**5**
Yersiniosis	1	0	0	0	2	1	1	2	2	1	2	**12**
Zika Virus Disease	N/A	N/A	N/A	N/A	N/A	3	0	0	0	0	0	**3**
Zika Virus Infection	N/A	N/A	N/A	N/A	N/A	0	1	0	0	0	0	**1**

Five pandemics have occurred in just over the last century. For many years, the 1918 Spanish Influenza outbreak was the worst-case pandemic on record. However, the Covid-19 pandemic of 2020 to 2023 competes with the 1918 incident in many ways. The following table identifies these previous worldwide pandemics (CDC, 2019a; CDC, 2019b; CDC, 2019c; CDC, 2019d; CDC 2022a; WHO, 2023).

PREVIOUS WORLDWIDE PANDEMIC EVENTS		
Date	*Pandemic Name/Subtype*	*Worldwide Deaths (Est.)*
1918-1920	Spanish Flu / H1N1	50 million Est. 675,000 in the U.S.
1957-1958	Asian Flu / H2N2	1.1 million Est. 116,000 in the U.S.
1968-1969	Hong Kong Flu / H3N2)	1 million Est. 100,000 in the U.S.
2009-2010	Swine Flu / H1N1	152,000 – 575,000 Est. 12,000 in the U.S.
2020-2023	Covid-19	6.9 million[1],[2] Est. 1,131,819 in the U.S.[1]

[1] Figures estimated at the time of this update.
[2] Data from the World Health Organization; all other data from the CDC.

Coronavirus Disease (Covid)-19 Pandemic

Washington County updated this plan during the latter parts of the Coronavirus Disease 2019 (COVID-19) pandemic. Both national emergency declarations expired on May 11, 2023. COVID-19 first appeared in Maryland on March 5, 2020. Before the first case, Governor Hogan and the Maryland Department of Health (MDH) took steps to prepare. As of May 2, 2023, Maryland had 1,365,297 confirmed cases, with 16,544 deaths (Johns Hopkins University & Medicine, 2023). Washington County had 40,989 confirmed cases and 643 deaths (Johns Hopkins University & Medicine, 2023).

As of May 2, 2023, there were 764,474,387 confirmed cases of the virus, resulting in over 6.9 million deaths worldwide (WHO, 2023). The virus spread to every country and continent of the world. The pandemic "shut down" the entire United States for several months in 2020 due to stay-at-home and social distancing orders and isolation and quarantine mandates. Global air travel was restricted for several months, and the pandemic harmed supply chains. Though unknown at the time of writing, the overall cost of the pandemic on the US economy is likely to be in the trillions.

H1N1 Pandemic of 2009

Additionally, Washington County felt the impacts of the 2009 swine flu pandemic caused by the H1N1 influenza virus. The World Health Organization (WHO) designated the pandemic from June 2009 through August 2010. Though its effects paled in comparison to the Covid-19 pandemic (e.g., there were substantially fewer deaths and significantly less economic disruption during the 2009 pandemic), the incident was the first widely agreed upon pandemic to impact Maryland in many years noticeably.

Loss and Damages

Losses based on historical epidemics are difficult to estimate. Epidemics rarely affect structures, but because they affect people, the operations of critical facilities, businesses, and other community assets may be impacted. According to a study, seasonal influenza results in a substantial economic impact, estimated, in part, at $16.3 billion in lost earnings (Molinari et al., 2007). By population, Washington County represents 0.047% of the United States (calculations based on Census data). Since seasonal influenza primarily impacts the human population, using the county's composition of the U.S. as a multiplier (i.e., 0.00047) and applying it to the potential economic impact, lost earnings in Washington County could reach $7,608,100 each

year. Though that number appears high, it equates to approximately $82.38 per year for each person listed by the U.S. Census Bureau as “in civilian labor force” for the county.

Comprehensive estimates of losses associated with the Covid-19 pandemic will inform this discussion in future updates. Still, at the time of this writing, reliable estimates were unavailable. Billings (1997) indicated that the impact of the 1918 pandemic was a 2% drop in the world's gross domestic product. Further, the United States Bureau of Economic Analysis indicates that a community can use its median household income multiplied by its total number of households to determine an approximate Gross Domestic Product (GDP) for its area. As such, the median household income ($67,349) and number of households (58,630) provided by the Census (U.S. Census Bureau, 2020) estimate a GDP for Washington County of $3,748,509,050. Using the 2% figure, the impact on Washington County could be as much as $74,970,181.

Future Occurrences

Seasonal influenza activity peaks every winter, generally from December to February (CDC, 2018). These spikes may reach outbreak status, particularly in congregate settings such as nursing homes, detention facilities, and schools. Other bacterial and viral sicknesses, such as the common cold, RSV, hand-foot-mouth disease, etc., may also yield localized (i.e., site-specific) outbreaks. In the United States, the CDC surveils various conditions in concert with state and local public health entities. At the global level, it coordinates with the World Health Organization (WHO) regarding outbreaks and epidemics that have the potential to evolve into a pandemic.

Future Climate Considerations

Future climate fluctuations may not seem like relevant discussions through the frame of public health crises, but there are subtle connections that one may not realize. Researchers and practitioners associated with the Harvard T. H. Chan School of Public Health note that people living in places with poor air quality can be at elevated risk from various diseases. While those professionals did not directly link pandemics, in this case the COVID-19 pandemic, with climate change, they pointed out that, “(m)any of the root causes of climate change also increase the risk of pandemics” (Harvard T. H. Chan, n.d.). A loss of animal habitats through actions like deforestation can force animals to migrate. Migration into new areas brings those animals into contact with different animals and people, which can yield a sharing of germs (Crist, 2022;

Kelland, 2023). Further, large livestock operations can be a source of "spillover of infections from animals to people" (Harvard T. H. Chan, n.d.).

Kelland's article describes climate connections to disease as a sort of "domino effect" (2023) whereby changing environments, due not *just* to warming, combine with other societal trends to contribute to disease spread. Climate change may affect "the distribution, the abundance and the spread of vectors" (Kelland, 2023), and economic, missionary, and other human travel trends help to spread diseases from one part of the world to another part that may not otherwise have occurred.

Vulnerability Assessment

This section summarizes the vulnerability of Washington County to reportable disease epidemics. The steering committee conducted an online survey for the public to share its thoughts on the hazards listed in this plan. The following table presents the results of that survey, specifically regarding reportable disease epidemics.

PUBLIC SENTIMENT, REPORTABLE DISEASE EPIDEMIC					
Hazard	*Level of Concern*				*Total Responses*
	Not at All	*Somewhat*	*Concerned*	*Very*	
Reportable Disease Epidemic	26 (20.63%)	48 (38.10%)	27 (21.43%)	25 (19.84%)	126
In the past ten years, do you remember this hazard occurring in your community?				91 (72.20%)	126
Have you noticed an increase in the occurrences or intensity of this hazard?				90 (71.43%)	126
Have you noticed a decrease in the occurrences or intensity of this hazard?				8 (6.35%)	126

Reportable disease epidemics impact the assets of Washington County and the participating municipalities in a variety of ways. The following table identifies general impacts by asset type.

GENERAL ASSET IMPACTS, REPORTABLE DISEASE EPIDEMIC	
Asset Type	*Impacts*
People	
Structures	
Community Lifelines & Other Critical Facilities	
Natural, Historic, & Cultural Resources	
Economy & Other Activities with Value	

The following table assigns point totals based on the methodology identified in Section 2.2: Profile Hazards above.

REPORTABLE DISEASE EPIDEMIC RISK RANKING			
Category	*Points*	*Description*	*Notes*
Frequency	2	Low (unlikely to occur in a year)	There have been five pandemics (i.e., the worst-case when compared to epidemics) in 105 years that impacted Washington County, yielding an estimated 0.048 events per year.
Response	5	More than one month	The response to the Covid-19 pandemic has exceeded two years in length. The response to epidemics will be much smaller; planners opted to estimate based on the worst-case.
Onset	1	Over 24 hours	Disease surveillance efforts typically suggest an escalating problem before a formal pandemic declaration. Epidemics occur somewhat more quickly but are detectable in a similar manner.
Magnitude	4	Catastrophic (more than 50% of land area affected)	The term "catastrophic" is a bit dramatic in this instance, yet the entire county is susceptible to a pandemic.
Business	1	Less than 24 hours	Even though some businesses shut down during the Covid-19 pandemic, many companies continued operations virtually; restaurants and retail establishments offered drive-through, delivery, or pick-up services, etc.
Human	4	High (multiple deaths)	The county has experienced 643 deaths from the Covid-19 pandemic.
Property	1	Less than 10% of property affected	Epidemics and pandemics impact human populations, not physical property.
Totals	**18**	**MEDIUM**	

FEMA's *Local Mitigation Planning Handbook* (2023c) directs entities compiling multi-jurisdictional plans to identify any jurisdictions within the planning area for which the identified risks or vulnerabilities are more or less prevalent as compared to the other participating jurisdictions. The following table quickly synthesizes the data to capture the jurisdiction-specific aspects of risks and vulnerabilities for each city or town.

MULTI-JURISDICTIONAL CONSIDERATIONS, REPORTABLE DISEASE EPIDEMIC		
Jurisdiction	*Comparison*	*Notes*
Washington County	**Same**	**Epidemics and pandemics are not bound by geography, and though transmission may be less in areas with a lower population density, the communities of Washington County contain mobile populations. Further, counties entities such as the health department and emergency services/emergency management heavily support responses.**
Boonsboro	Same	As noted for the county, these hazards are not bound by geography. Boonsboro maintains a higher population density than the county as a whole, but more notably, its population often travels elsewhere to work (including into the Washington, DC area).

MULTI-JURISDICTIONAL CONSIDERATIONS, REPORTABLE DISEASE EPIDEMIC		
Jurisdiction	*Comparison*	*Notes*
Clear Spring	Same	Clear Spring has the highest population density of any municipality in Washington County, owing to its small geographic footprint (0.12 square miles). However, the town is largely residential, with a workforce that travels into other (more populated) areas for work.
Funkstown	Same	As noted for the county, these hazards are not bound by geography. Funkstown maintains a higher population density than the county as a whole, but more notably, its population often travels elsewhere to work (including into the Washington, DC area).
Hagerstown	More	Hagerstown has the second-highest population density and the largest jurisdictional population in Washington County. Its workforce migrates as well, but the city represents the center of employment in the county, which means many of its residents work locally and residents of other municipalities (and, indeed, other states) migrate *to* the city for work. Hagerstown to a comparatively larger share of congregate facilities, like schools and long-term care facilities, than other participating jurisdictions.
Hancock	Same	Hancock's population density is almost as low as the county's. However, like other municipalities, Hancock's workforce travels to other areas for work (though those travel patterns may be notably different – i.e., north, south, and westward) from those employees on the eastern side of the county).
Keedysville	Same	As noted for the county, these hazards are not bound by geography. Keedysville maintains a higher population density than the county as a whole, but more notably, its population often travels elsewhere to work (including into the Washington, DC area).
Sharpsburg	Same	Sharpsburg has a high population density, but like Clear Spring, it is largely residential and covers a relatively small geographic footprint (at just 0.22 square miles). The town's workforce travels into various other areas, just as impacts the remainder of the county.
Smithsburg	Same	As noted for the county, these hazards are not bound by geography. Smithsburg maintains a higher population density than the county as a whole, but more notably, its population often travels elsewhere to work (including into the Washington, DC area).
Williamsport	Same	As noted for the county, these hazards are not bound by geography. Williamsport maintains a higher population density than the county as a whole, but more notably, its population often travels elsewhere to work (including into the Washington, DC area).

2.2.10 Severe Summer Weather

A severe thunderstorm produces a tornado (see Section 2.2.12), winds in excess of 58 miles per hour, or hail of one inch in diameter or larger. Severe hail is often a product of severe storms, producing hailstones of one inch in diameter or larger. Straight-line winds (derechos), downbursts, macrobursts, and gust fronts are all part of severe wind events.				
Vulnerability HIGHEST HIGH MEDIUM LOW LOWEST	**Period of Occurrence:**	At any time	**Washington County Risk Ranking:**	Medium
	Warning Time:	12-24 hours	**State Risk Ranking:**	Medium
	Probability:	Excessive (will occur in a year)	**Impact:**	Catastrophic (more than 50% of land area affected)
	Type of Hazard:	Natural	**Disaster Declarations:**	DR-1094-MD (1996) DR-1492-MD (2003) EM-3335-MD (2011) EM-3349-MD (2013) DR-4091-MD (2013) DR-4374-MD (2018) USDA FSA S4356 (2018) USDA FSA S4465 (2018)

Hazard Overview

Though "severe summer weather" constitutes several potential hazard events, Washington County's steering committee recognized the similar impacts of many of these instances (as well as the similarity of mitigation measures). Thus, the committee elected to profile them together, and as such, this profile includes the following types of weather hazards.

- Hail
- Heavy Rain
- High Winds
- Lightning
- Strong Winds
- Thunderstorm Winds

A thunderstorm is "severe" when it produces a tornado, winds of at least 58 mph, or hail at least one inch in diameter. Hazards associated with severe thunderstorms include lightning, heavy rain, hail, damaging wind, and tornadoes.

TYPES OF THUNDERSTORMS				
Type	*Description*	*Duration*	*Wind Speeds*	*Associated Hazards*
Single Cell	Uncommon	20 - 30 minutes	N/A	• Non-damaging hail • Microbursts • Weak tornadoes
Multi-Cell	Common, organized cluster of two or more single cells.	Each cell lasts approximately 20 minutes	Downbursts of up to 80 mph	• Heavy rainfall • Downbursts • Hail • Weak tornadoes
Mesoscale Convective System (MCS)	A well-organized system of thunderstorms	Up to 12 hours or more	55 mph or more	• Torrential rainfalls • Derechos • Tornadoes
Squall Lines	May extend over 250 to 500 miles and 10 to 20 miles wide	Individual cells last from 30 to 60 minutes	N/A	• Significant rain after the storm • Derechos
Super Cells	Most dangerous storms, visible with Doppler radars	1 - 6 hours	Updrafts and downdrafts of more than 100 mph	• Tornadoes • Hail

Lightning is a naturally-occurring spark of electricity in the air between clouds, the air, or the ground. Air acts as an insulator between the cloud and the ground, but when the charge difference becomes significant enough, this insulating capacity breaks down, allowing the rapid discharge of electricity. This electrical discharge is known as lightning.

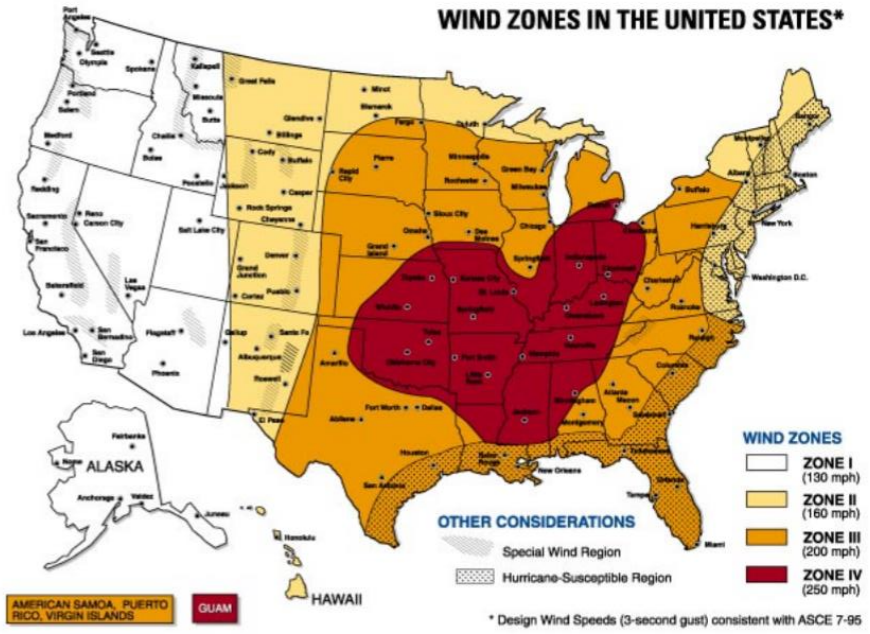
Severe wind includes non-tornadic, damaging winds from thunderstorms. There are six types of severe wind: straight-line wind, downbursts, macrobursts, microbursts, gust fronts, and derechos.

- **Straight-line Wind:** Straight-line wind is a term used to define any thunderstorm wind not associated with rotation, used mainly to differentiate from tornadic winds.
- **Downburst:** Downburst is the general term for all localized strong wind events caused by a strong downdraft within a thunderstorm.
- **Macroburst:** An outward burst of strong winds at or near the surface with a diameter larger than 2.5 miles that occurs when a strong downdraft reaches the surface.
- **Microburst:** A small, concentrated downburst that produces an outward burst of strong winds near the surface. Microbursts are small and short-lived, with a diameter of less than 2.5 miles and lasting only five to 10 minutes.
- **Gust Front:** The leading edge of rain-cooled air that clashes with warmer thunderstorm inflow. It is characterized by a wind shift, temperature drop, and gusty winds ahead of a thunderstorm.

- **Derecho:** A widespread, long-lived wind storm associated with a band of rapidly moving showers or thunderstorms. A typical derecho consists of numerous microbursts and downbursts. An event with wind speeds of at least 58 mph and a diameter of 240 miles is a derecho.

Location and Extent

Severe summer weather can affect all areas of the county (and the wider region). These events can last a few seconds (i.e., lightning), minutes (i.e., hailstorms), hours (i.e., thunderstorms), or even days (i.e., high winds). The wind is a commonplace phenomenon across the globe. Wind events can impact several jurisdictions simultaneously, with varying duration and severity. FEMA's wind zone map classifies wind zones in the United States. As shown below, Washington County includes Zone II and Zone III areas. In the Zone III areas, which cover all of the county except for the extreme eastern edge along the mountain ridge, buildings should be constructed to withstand three-second gusts of up to 200 miles per hour.



The Beaufort Wind Scale measures wind. This scale characterizes wind using a 0-12 metric based on observation rather than exact measurements. The table below outlines the scale in detail.

BEAUFORT WIND SCALE					
Force	*Wind Speed*		*Description*	*Appearance of Wind Effects*	
	Knots	*MPH*		*On Water*	*On Land*
0	>1	>1	Calm	Sea surface smooth and mirror-like	Calm, smoke rises vertically
1	1-3	1-3	Light Air	Scaly ripples, no foam crests	Smoke drift indicates wind direction, still wind vanes
2	4-6	4-7	Light Breeze	Small wavelets, crests glassy, no breaking	Wind felt on face, leaves rustle, vanes begin to move
3	7-10	8-12	Gentle Breeze	Large wavelets, crests begin to break, scattered whitecaps	Leaves and small twigs constantly moving, light flags extended
4	11-16	13-18	Moderate Breeze	Small waves 1-4 ft. becoming longer, numerous whitecaps	Dust, leaves, and loose paper lifted; small tree branches move
5	17-21	19-24	Fresh Breeze	Moderate waves 4-8 ft. taking longer form, many whitecaps, some spray	Small trees with leaves begin to sway
6	22-27	25-31	Strong Breeze	Larger waves 8-13 ft., whitecaps common, more spray	Larger tree branches moving, whistling in wires
7	28-33	32-38	Near Gale	Sea heaps up, waves 13-19 ft., white foam streaks off breakers	Whole trees moving, resistance felt walking against wind
8	34-40	39-46	Gale	Moderately high (18-25 ft.) waves of greater length, edges of crests begin to break into spindrift, foam blown in streaks	Twigs breaking off trees, wind generally impedes progress
9	41-47	47-54	Strong Gale	High waves (23-32 ft.), sea begins to roll, dense streaks of foam, spray may reduce visibility	Slight structural damage occurs, slate blows off roofs
10	48-55	55-63	Storm	Very high waves (29-41 ft.) with overhanging crests, sea white with densely blown foam, heavy rolling, lowered visibility	Seldom experienced on land, trees broken or uprooted, "considerable structural damage"
11	56-63	64-72	Violent Storm	Exceptionally high (37-52 ft.) waves, foam patches cover sea, visibility more reduced	N/A
12	64+	72+	Hurricane	Air filled with foam, waves over 45 ft., sea completely white with driving spray, visibility significantly reduced	N/A

Impacts and Vulnerability

The impacts of severe summer weather include injury and even death. In some cases, lightning has caused fires in structures and open land or forests. Heavy rains can damage vegetation and infrastructure. Hail has caused substantial damage to vehicles and buildings. Recently, some of the most damaging impacts of summer storms have been the cascading effects of long-term power outages.

Severe wind can cause a variety of secondary and tertiary hazards. In addition to damaging roofs and other home finishings, wind can cause damage to trees that may interrupt power service or block roadways. Such damages could be widespread and severe, potentially overwhelming the capacity of local responders to address the situation. Specifically, severe summer weather can impact critical infrastructure assets in the following ways. These impacts are shared by all participating jurisdictions.

- **Communications:** High winds can down trees and communications (e.g., telephone) lines. Winds can also impact communications equipment on towers and the towers themselves (which includes both emergency radio and cellular equipment on towers). Heavy rains (or the cloud cover associated with storm systems) can impact satellite systems, including communications, internet, television, etc.
- **Electricity:** High winds can similarly impact power lines (or, often, down trees which take down power lines as they fall). Additionally, high winds can damage power poles and transmission towers, as occurred during the 2012 Mid-Atlantic super derecho.

Indirectly, severe summer weather can impact critical infrastructure that is reliant on electricity, such as health and medical facilities, water and sewer systems, etc. These facilities may have auxiliary power, though if not, prolonged outages could take services offline. Heavy rains can pool water on roadways, which could impact the transportation infrastructure (though not substantially damage it). Rushing water may also wash out fills under or alongside roadways or railways, and these impacts could be more damaging.

Heavy rains and winds can damage agricultural areas and other natural assets like parks and recreational forest areas. Impacts can include downed trees, over-saturated grounds, washouts, etc. Washington County has received disaster declarations from the USDA following severe summer storms that negatively impacted the agricultural sector (e.g., S4356 and S4465, both in 2018). Whereas the impacts to critical infrastructure are typically short-lived, some summer storms can damage and ruin crop yields for an entire growing season. Though severe

summer storms can damage historic and cultural assets, damages are typically minor enough that they can be fixed.

Social Vulnerability Considerations

Severe summer weather does not discriminate amongst the geographies that it impacts, nor does it select or spare certain populations. Risk, then, is fairly universal. The way the impacts of severe summer weather manifest is where communities will see variance with respect to social vulnerability variables. For instance, households below the poverty line are often un- or under-insured. Low-income areas may see a higher concentration of structures built before 1970, when code adoption and enforcement became more common, because those older structures are often more affordable. The first of following map graphics shows the Census tracts in the county where more residents live at or below 150% of the poverty level.

Another factor somewhat related to income and housing is the presence of mobile homes. Mobile homes are affordable options for many residents, not only for those with lower incomes, but also for the elderly. While the quality of mobile home construction has improved in recent decades, data from numerous disasters (e.g., hurricanes, tornadoes, wildfires, and high-winds generally) suggests that they do not hold up as well to the elements as traditional stick-built homes. The second of the following map graphics shows the distribution of mobile homes[1] by Census tract.

[1] This data does not appear to include modular homes.

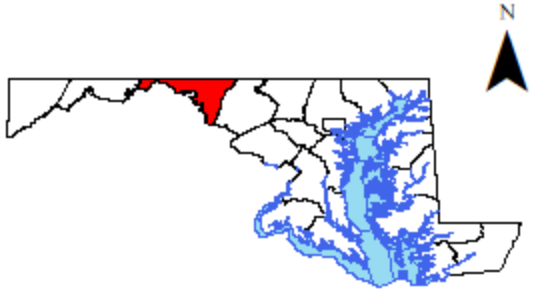
WASHINGTON COUNTY HAZARD MITIGATION PLAN

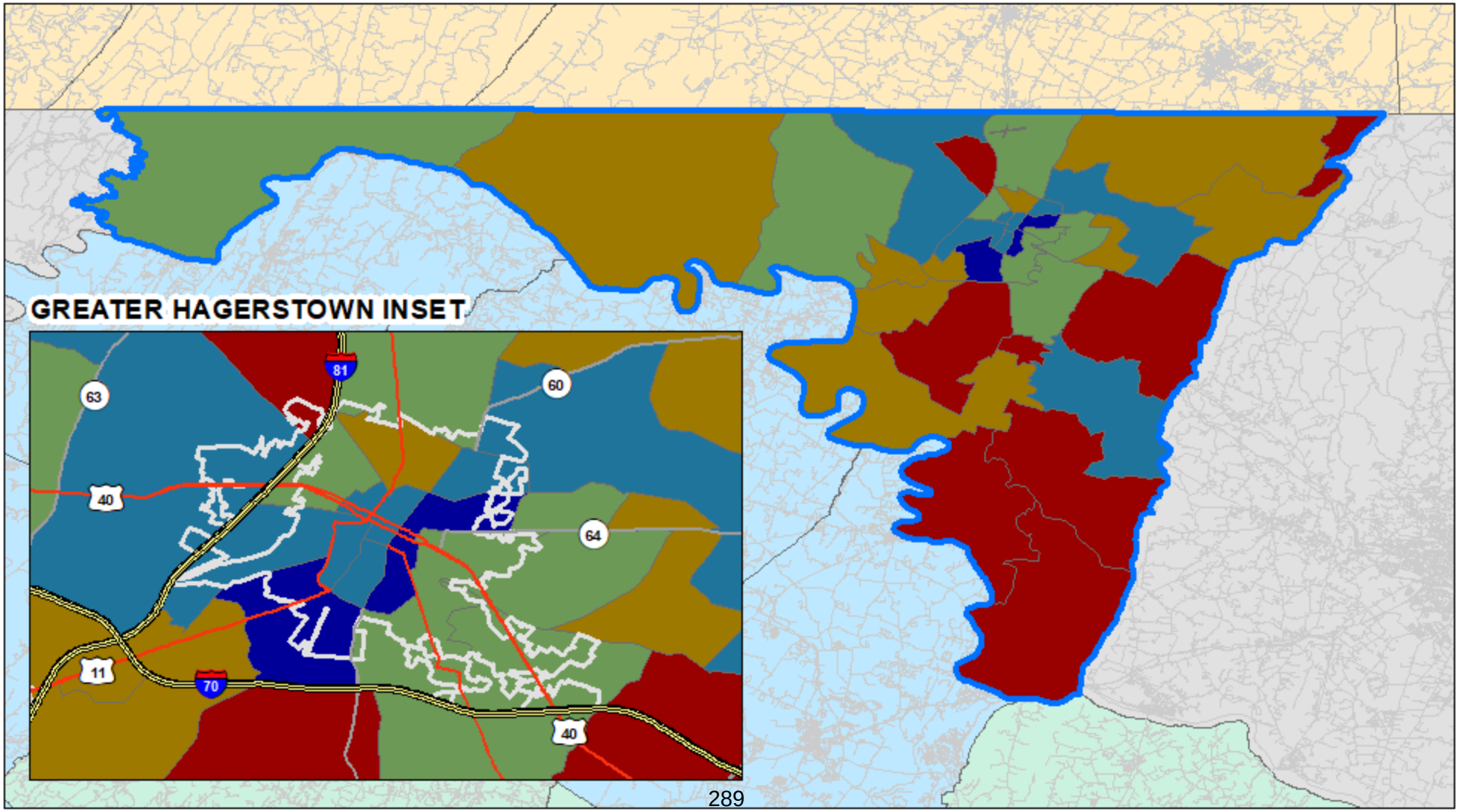
Persons below 150% of the Poverty Rate

Data Source(s):
CDC SVI Index (2020)

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

- 0 - 344 persons
- 345 - 605 persons
- 606 - 902 persons
- 903 - 1312 persons
- 1313 - 2396 persons





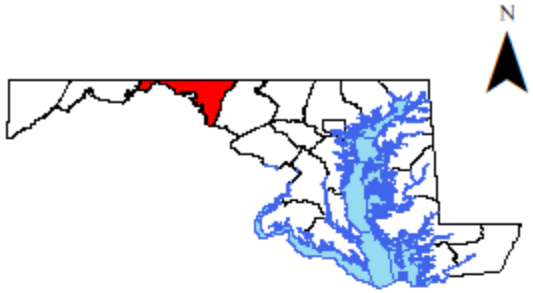
WASHINGTON COUNTY HAZARD MITIGATION PLAN

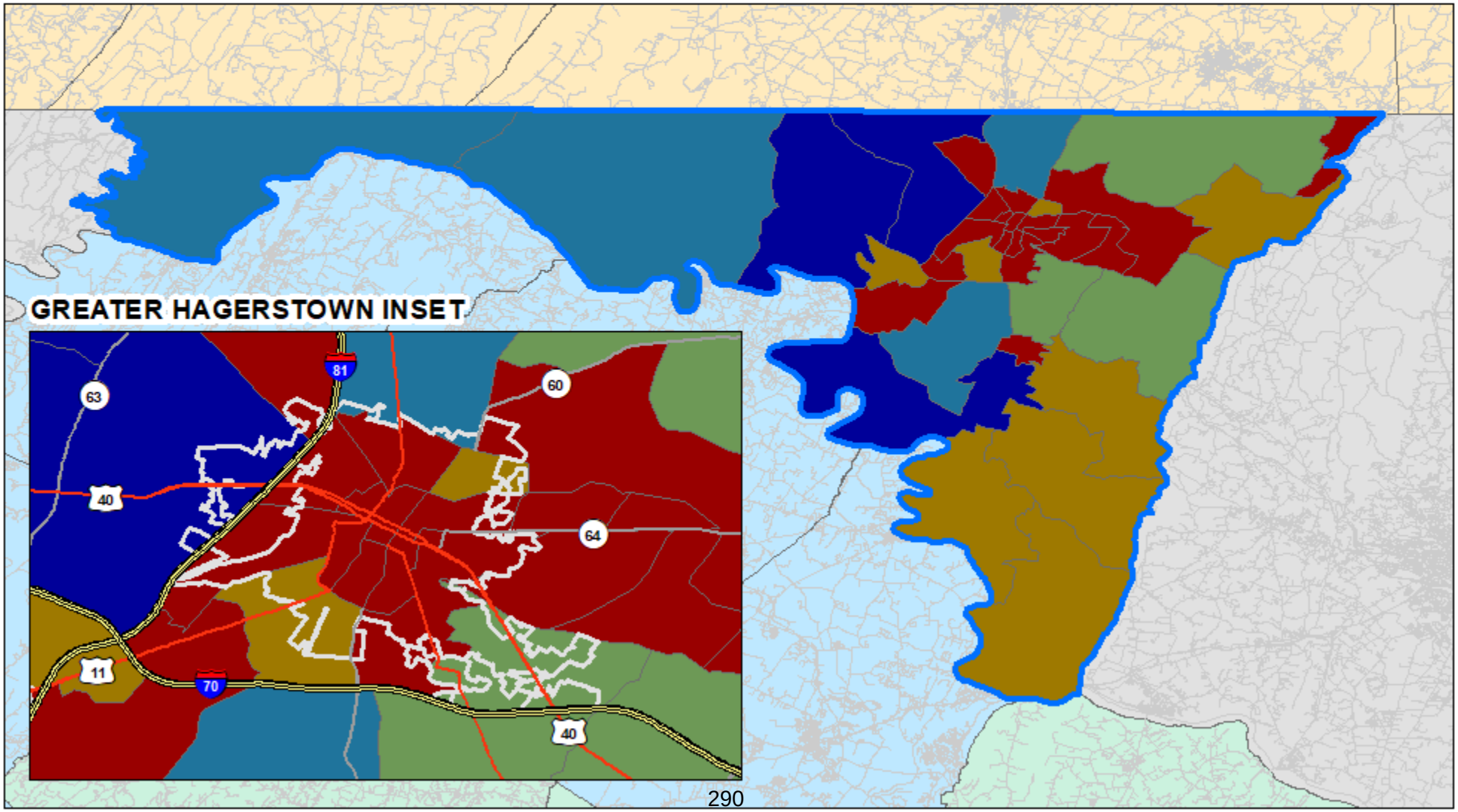
Mobile Homes in Washington County

Data Source(s):
CDC SVI Index (2020)

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

- 0 - 10 mobile homes
- 11 - 27 mobile homes
- 28 - 65 mobile homes
- 66 - 162 mobile homes
- 163 - 467 mobile homes





Other hazard profiles identify difficulties with understanding preparedness and other warning information, and those discussions are valid with respect to severe summer weather. Persons relying on durable medical equipment (e.g., oxygen concentrators) can be disadvantaged by cascading impacts like power outages, downed trees that slow the arrival of emergency services, etc.

Historical Occurrences

These hazards are some of the most frequently-occurring threats facing the county. The NOAA National Centers for Environmental Information (NCEI) Storm Events Database (2023c) lists 584 severe summer weather events since 1956.

- **Hail:** 98
- **Heavy Rain:** 87
- **High and Strong Winds:** 44
- **Lightning:** 6
- **Thunderstorms:** 349

Many of the events overlap because, for example, lightning and hail may occur during a thunderstorm. There are 302 unique dates associated with these events, which likely yields a more accurate estimate of the number of events to have happened since 1956.

The following table chronologically lists the events for which at least $5,000 of property or crop loss was reported. (NOTE: No dollar losses appeared until 1993.) There have been no deaths or injuries in Washington County as a result of severe summer weather.

HISTORICAL SEVERE SUMMER WEATHER

Area	*Date*	*Incident Type*	*Mag.*	*EF Scale*	*Deaths*	*Injuries*	*Property Damage*	*Crop Damage*
Washington Co.	8/11/1993	Thunderstorm Wind	Unk.	N/A	0	0	$5,000.00	$0.00
Washington Co.	8/28/1993	Thunderstorm Wind	Unk.	N/A	0	0	$5,000.00	$0.00
Washington Co.	11/27/1993	Thunderstorm Wind	Unk.	N/A	0	0	$5,000.00	$0.00
Washington Co.	6/11/1995	Thunderstorm Wind	Unk.	N/A	0	0	$10,000.00	$0.00
Washington Co.	6/24/1996	Thunderstorm Wind	Unk.	N/A	0	0	$120,000.00	$0.00
Washington Co.	6/24/1996	Thunderstorm Wind	Unk.	N/A	0	0	$20,000.00	$0.00
Washington Co.	7/2/1996	Thunderstorm Wind	Unk.	N/A	0	0	$20,000.00	$0.00
Washington Co.	7/19/1996	Thunderstorm Wind	Unk.	N/A	0	0	$8,000.00	$5,000.00
Washington (Zone)	9/6/1996	High Wind	Unk.	N/A	0	0	$20,000.00	$0.00
Washington (Zone)	2/27/1997	Strong Wind	Unk.	N/A	0	0	$15,000.00	$0.00
Washington (Zone)	3/31/1997	Strong Wind	Unk.	N/A	0	0	$10,000.00	$0.00
Washington Co.	7/9/1997	Thunderstorm Wind	Unk.	N/A	0	0	$8,000.00	$0.00

HISTORICAL SEVERE SUMMER WEATHER								
Area	*Date*	*Incident Type*	*Mag.*	*EF Scale*	*Deaths*	*Injuries*	*Property Damage*	*Crop Damage*
Washington Co.	8/17/1997	Thunderstorm Wind	Unk.	N/A	0	0	$5,000.00	$0.00
Washington Co.	6/16/1998	Thunderstorm Wind	60 mph	N/A	0	0	$20,000.00	$20,000.00
Washington Co.	6/16/1998	Hail	1.75”	N/A	0	0	$5,000.00	$0.00
Washington Co.	6/30/1998	Thunderstorm Wind	Unk.	N/A	0	0	$10,000.00	$0.00
Washington Co.	6/30/1998	Thunderstorm Wind	50 mph	N/A	0	0	$5,000.00	$0.00
Washington Co.	7/21/1998	Thunderstorm Wind	Unk.	N/A	0	0	$15,000.00	$5,000.00
Washington Co.	3/3/1999	Thunderstorm Wind	Unk.	N/A	0	0	$5,000.00	$0.00
Washington Co.	7/25/1999	Thunderstorm Wind	Unk.	N/A	0	0	$10,000.00	$0.00
Washington Co.	8/14/1999	Thunderstorm Wind	Unk.	N/A	0	0	$5,000.00	$0.00
Washington Co.	8/26/1999	Thunderstorm Wind	Unk.	N/A	0	0	$8,000.00	$0.00
Washington Co.	8/26/1999	Thunderstorm Wind	Unk.	N/A	0	0	$5,000.00	$0.00
Washington Co.	9/29/1999	Thunderstorm Wind	Unk.	N/A	0	0	$5,000.00	$0.00
Washington Co.	9/29/1999	Thunderstorm Wind	Unk.	N/A	0	0	$5,000.00	$0.00
Washington Co.	6/15/2000	Thunderstorm Wind	Unk.	N/A	0	0	$15,000.00	$0.00
Washington (Zone)	12/12/2000	High Wind	51 mph	N/A	0	0	$10,000.00	$0.00
Washington Co.	3/13/2001	Thunderstorm Wind	56 mph	N/A	0	0	$5,000.00	$0.00
Washington Co.	4/9/2001	Thunderstorm Wind	Unk.	N/A	0	0	$5,000.00	$0.00
Washington Co.	5/13/2002	Thunderstorm Wind	Unk.	N/A	0	0	$5,000.00	$0.00
Washington Co.	5/13/2002	Thunderstorm Wind	Unk.	N/A	0	0	$5,000.00	$0.00
Washington Co.	5/14/2002	Thunderstorm Wind	Unk.	N/A	0	0	$20,000.00	$0.00
Washington Co.	6/5/2002	Thunderstorm Wind	Unk.	N/A	0	0	$50,000.00	$0.00
Washington Co.	6/5/2002	Thunderstorm Wind	57 mph	N/A	0	0	$15,000.00	$0.00
Washington Co.	6/5/2002	Thunderstorm Wind	Unk.	N/A	0	0	$5,000.00	$0.00
Washington Co.	6/27/2002	Thunderstorm Wind	71 mph	N/A	0	0	$9,000.00	$0.00
Washington Co.	5/31/2003	Thunderstorm Wind	50 mph	N/A	0	0	$5,000.00	$0.00
Washington Co.	7/23/2003	Lightning	N/A	N/A	0	0	$50,000.00	$0.00
Washington Co.	8/16/2003	Lightning	N/A	N/A	0	0	$70,000.00	$0.00
Washington Co.	8/26/2003	Thunderstorm Wind	55 mph	N/A	0	0	$20,000.00	$0.00
Washington (Zone)	9/18/2003	High Wind	50 mph	N/A	0	0	$30,000.00	$100,000.00
Washington (Zone)	10/15/2003	Strong Wind	45 mph	N/A	0	0	$5,000.00	$0.00
Washington (Zone)	11/13/2003	Strong Wind	55 mph	N/A	0	0	$5,000.00	$0.00
Washington Co.	5/25/2004	Hail	1.75”	N/A	0	0	$10,000.00	$0.00
Washington Co.	5/25/2004	Thunderstorm Wind	70 mph	N/A	0	0	$5,000.00	$0.00
Washington Co.	6/15/2004	Thunderstorm Wind	60 mph	N/A	0	0	$5,000.00	$0.00
Washington Co.	5/14/2005	Thunderstorm Wind	55 mph	N/A	0	0	$12,000.00	$0.00
Washington (Zone)	11/22/2005	Strong Wind	38 mph	N/A	0	0	$200,000.00	$0.00
Washington Co.	11/29/2005	Thunderstorm Wind	55 mph	N/A	0	0	$50,000.00	$0.00
Washington (Zone)	1/14/2006	High Wind	50 mph	N/A	0	0	$100,000.00	$0.00
Washington (Zone)	2/17/2006	High Wind	55 mph	N/A	0	0	$120,000.00	$0.00
Washington Co.	4/3/2006	Thunderstorm Wind	50 mph	N/A	0	0	$15,000.00	$0.00
Washington Co.	7/11/2006	Thunderstorm Wind	50 mph	N/A	0	0	$10,000.00	$0.00
Washington Co.	7/18/2006	Thunderstorm Wind	50 mph	N/A	0	0	$20,000.00	$0.00
Washington (Zone)	10/28/2006	Strong Wind	45 mph	N/A	0	0	$15,000.00	$0.00
Washington (Zone)	12/1/2006	High Wind	59 mph	N/A	0	0	$12,000.00	$0.00
Washington Co.	9/26/2007	Lightning	N/A	N/A	0	0	$25,000.00	$0.00
Washington Co.	9/26/2007	Thunderstorm Wind	50 mph	N/A	0	0	$25,000.00	$0.00
Washington (Zone)	12/16/2007	High Wind	50 mph	N/A	0	0	$10,000.00	$0.00
Washington (Zone)	2/10/2008	High Wind	50 mph	N/A	0	0	$10,000.00	$0.00
Washington Co.	6/4/2008	Thunderstorm Wind	87 mph	N/A	0	0	$500,000.00	$0.00

HISTORICAL SEVERE SUMMER WEATHER								
Area	*Date*	*Incident Type*	*Mag.*	*EF Scale*	*Deaths*	*Injuries*	*Property Damage*	*Crop Damage*
Washington Co.	6/4/2008	Thunderstorm Wind	50 mph	N/A	0	0	$50,000.00	$0.00
Washington Co.	6/4/2008	Thunderstorm Wind	50 mph	N/A	0	0	$50,000.00	$0.00
Washington Co.	6/23/2008	Thunderstorm Wind	50 mph	N/A	0	0	$5,000.00	$0.00
Washington Co.	6/23/2008	Hail	1.25”	N/A	0	0	$0.00	$5,000.00
Washington Co.	7/26/2008	Thunderstorm Wind	50 mph	N/A	0	0	$5,000.00	$0.00
Washington Co.	7/26/2008	Thunderstorm Wind	50 mph	N/A	0	0	$5,000.00	$0.00
Washington Co.	7/26/2008	Thunderstorm Wind	50 mph	N/A	0	0	$5,000.00	$0.00
Washington Co.	7/26/2008	Thunderstorm Wind	50 mph	N/A	0	0	$5,000.00	$0.00
Washington Co.	7/7/2011	Thunderstorm Wind	66 mph	N/A	0	0	$40,000.00	$0.00
Washington Co.	7/19/2011	Thunderstorm Wind	61 mph	N/A	0	0	$40,000.00	$0.00
Washington Co.	7/22/2011	Thunderstorm Wind	61 mph	N/A	0	0	$5,000.00	$0.00
Washington Co.	7/22/2011	Thunderstorm Wind	56 mph	N/A	0	0	$5,000.00	$0.00
Washington Co.	8/18/2011	Thunderstorm Wind	56 mph	N/A	0	0	$5,000.00	$0.00
Washington Co.	5/27/2012	Thunderstorm Wind	52 mph	N/A	0	0	$5,000.00	$0.00
Washington Co.	5/27/2012	Thunderstorm Wind	52 mph	N/A	0	0	$5,000.00	$0.00
Washington Co.	5/27/2012	Thunderstorm Wind	52 mph	N/A	0	0	$5,000.00	$0.00
Washington Co.	5/27/2012	Thunderstorm Wind	52 mph	N/A	0	0	$5,000.00	$0.00
Washington Co.	6/29/2012	Thunderstorm Wind	57 mph	N/A	0	0	$5,000.00	$0.00
Washington (Zone)	10/29/2012	High Wind	50 mph	N/A	0	0	$693,820.00	$0.00
Washington Co.	6/2/2013	Thunderstorm Wind	56 mph	N/A	0	0	$0.00	$12,000.00
Washington Co.	5/16/2014	Thunderstorm Wind	52 mph	N/A	0	0	$10,000.00	$1,000.00
Washington Co.	7/8/2014	Thunderstorm Wind	52 mph	N/A	0	0	$5,000.00	$0.00
Washington Co.	8/1/2020	Thunderstorm Wind	60 mph	N/A	0	0	$50,000.00	$50,000.00
Washington Co.	8/1/2020	Thunderstorm Wind	55 mph	N/A	0	0	$10,000.00	$0.00
Washington Co.	11/15/2020	Thunderstorm Wind	55 mph	N/A	0	0	$12,000.00	$0.00
Washington Co.	11/15/2020	Thunderstorm Wind	50 mph	N/A	0	0	$6,000.00	$0.00
Washington Co.	3/28/2021	Thunderstorm Wind	60 mph	N/A	0	0	$30,000.00	$0.00
Washington Co.	3/28/2021	Thunderstorm Wind	50 mph	N/A	0	0	$9,000.00	$0.00
Washington Co.	5/26/2021	Thunderstorm Wind	50 mph	N/A	0	0	$10,000.00	$0.00
Washington Co.	6/21/2021	Thunderstorm Wind	65 mph	N/A	0	0	$50,000.00	$0.00
Washington Co.	6/21/2021	Thunderstorm Wind	60 mph	N/A	0	0	$15,000.00	$0.00
Washington Co.	6/21/2021	Thunderstorm Wind	55 mph	N/A	0	0	$8,000.00	$0.00
Washington Co.	6/21/2021	Thunderstorm Wind	60 mph	N/A	0	0	$6,000.00	$0.00
Washington Co.	6/21/2021	Thunderstorm Wind	55 mph	N/A	0	0	$5,000.00	$0.00
Washington Co.	7/17/2021	Thunderstorm Wind	65 mph	N/A	0	0	$50,000.00	$0.00
Washington Co.	8/11/2021	Thunderstorm Wind	60 mph	N/A	0	0	$20,000.00	$0.00
Washington Co.	8/11/2021	Thunderstorm Wind	50 mph	N/A	0	0	$6,000.00	$0.00
Washington Co.	8/28/2021	Thunderstorm Wind	50 mph	N/A	0	0	$5,000.00	$0.00
Washington Co.	9/15/2021	Thunderstorm Wind	55 mph	N/A	0	0	$10,000.00	$0.00
Washington Co.	6/22/2022	Thunderstorm Wind	55 mph	N/A	0	0	$20,000.00	$0.00
Washington Co.	7/23/2022	Thunderstorm Wind	55 mph	N/A	0	0	$20,000.00	$0.00
Washington Co.	7/23/2022	Thunderstorm Wind	55 mph	N/A	0	0	$10,000.00	$0.00
Washington Co.	7/23/2022	Thunderstorm Wind	55 mph	N/A	0	0	$10,000.00	$0.00
Washington Co.	7/23/2022	Thunderstorm Wind	50 mph	N/A	0	0	$10,000.00	$0.00
Washington Co.	7/23/2022	Thunderstorm Wind	55 mph	N/A	0	0	$10,000.00	$0.00
				Totals	**0**	**1**	**4,775,820.00**	**$293,000.00**

Loss and Damages

Planners generated loss estimates associated with severe summer weather based on historical data. With that in mind, the following table estimates losses (rounded to the nearest 50) from hail, heavy rain, high and strong winds, lightning, and thunderstorms.

LOSS ESTIMATES, SEVERE SUMMER WEATHER			
Type	*Average Events Per Annum*	*Estimated Property Damage Per Annum*	*Estimated Crop Damage Per Annum*
Hail	1.48	$200.00	$50.00
Heavy Rain	3.35	$100.00	$0.00
High and Strong Winds	1.69	$48,550.00	$3,850.00
Lightning	0.26	$6,300.00	$50.00
Thunderstorms	5.29	$30,000.00	$1,650.00
	Totals	**$85,150.00**	**$5,600.00**

Future Occurrences

Severe summer weather may impact infrastructure systems like the power grid and stormwater management features. High winds can affect electricity distribution systems, and as those systems age, they may be more prone to the effects of said weather. Thus, future summer storms may be accompanied by more frequent (and longer-duration) power outages. These changes may disproportionately impact residents relying on durable medical equipment (and, thus, electricity). Per the mapping in Section 1.2 above, many of the older population in the county (i.e., those who, on average, are more likely to rely on such medical equipment) live in rural areas outside of municipalities where restoration times may be longer. Interestingly, the National Institutes of Health suggests that the number and percent of the population aged 65 and older is occurring more rapidly in rural areas than in urban areas (Cohen & Greaney, 2023). Whether this trend holds over time is not yet known, as an anecdotal contributing variable is the tendency for younger populations (i.e., Millennials and Generation Z) to prefer more urban areas as they launch their careers and families. The influx of younger individuals into these areas (like the I-81 corridor in Washington County) lowers the percentage of those that are aging in those areas. Will Millennials and Generation Z choose to relocate to more rural communities in retirement? Or will future generations grow to prefer those rural areas at the start of their adult lives?

More intense precipitation compounded by the rapid gathering of increased runoff may strain the ability of aging dams to perform as designed. Further, changes in land use and development may impact the ways future severe summer storms manifest in Washington

County's communities. The designated growth areas are those most likely to see increased pavement and runoff. Currently, stormwater systems are outdated and can be overwhelmed (though the municipalities in the county are working diligently to upgrade systems and deal more generally [and strategically] with stormwater). The process by which existing comprehensive plans lay out future development, with relatively small designated growth areas and an intentional effort to preserve rural spaces, may contributed to lesser runoff related impacts. The outlying rural areas better manage rainfall and excess water (though, of course, the more densely-developed areas would still need to manage the rainfall falling directly in their footprints).

Future Climate Considerations

Data on the impacts of climate change suggest that severe summer weather may increase in intensity in the coming years (USGCRP, 2018), rendering loss estimates based on previous occurrences obsolete. As yet, there is no collectively agreed-upon manner of adjusting historical losses to forecast future damages accurately. Significantly, this data-supported conclusion aligns with the lived experience of local officials. Steering committee representatives frequently noted the impacts of summer weather as having changed in the past decade. Forecasts have often proved to be incorrect, as forecasted impacted areas will be spared while non-forecasted areas experience heavy downpours or strong winds. Local officials also noted the very small, "hyper-localized" impact areas from some downpours.

Vulnerability Assessment

This section summarizes the vulnerability of Washington County to severe summer weather. While discussing the summer weather hazard, the steering committee considered hurricanes, tropical storms, and nor'easters. Most of the impacts of these events are similar to those from the types of severe summer weather considered above. However, five of the presential disaster declarations for Washington County have been, in some way, because of a hurricane or tropical storm (i.e., DR-341-MD in 1972 from Tropical Storm Agnes, DR-1492-MD in 2003 from Hurricane Isabel, EM-3335-MD in 2011 from Hurricane Irene, and EM-3349-MD and DR-4091-MD in 2013 from Hurricane Sandy). Washington County also received a federal declaration (EM-3251-MD) from supporting the Hurricane Katrina evacuation in 2005. As such, the following call-out box discusses the risk of hurricanes, tropical storms, and nor'easters.

Hurricanes, Tropical Storms, and Nor'easters[2]

Hurricanes, tropical storms, and nor'easters are classified as cyclones and are any closed circulation developing around a low-pressure center in which the winds rotate counterclockwise (in the Northern Hemisphere) and whose diameter averages 10 to 30 miles across.

Washington County's eastern border sits between approximately 140 and 180 miles from the Atlantic coast. Historically, this distance has been enough to shield the county from the effects of a hurricane or tropical depression moving up the coast as well as from a direct hit along Maryland, Delaware, and New Jersey's shorelines. However, strong storms (USGCRP, 2018) may move further inland. Indeed, much of the eastern United States experienced near-tropical depression weather from Hurricane Ida's 2021 track through the mainland after striking the U.S. Gulf Coast near New Orleans, Louisiana. As such, all of Washington County (including all participating municipalities) represents the **location** of potential risks from hurricanes, tropical storms, and nor'easters. Historically, a hurricane and tropical storm's extent has been measured by sustained wind speed, with the Saffir-Simpson Hurricane Wind Scale being a common example. The Saffir-Simpson scale begins with a Category 1 designation, marking sustained wind speeds of 74-95 mph. Tropical storm wind speeds range from 39-73 mph, while tropical depression speeds are 38 mph or less. The **extent** of these events in Washington County would likely be in the tropical depression/storm range, with some future events pushing far enough inland with Category 1 speeds being possible.

The **impacts and vulnerability** discussion surrounding these events would be very similar to what appears above. After all, the potential for heavy rain, hail, high winds, and lightning is all present in each of those storm types. What might be an extension specific to hurricanes, tropical storms, and nor'easters would be the potential for *sustained* heavy downpours. Recent hurricanes (e.g., Florence, Harvey, and Michael) had lower wind speeds than many hurricanes that have hit the continental United States, but the amount of rain they poured on impact areas produced widespread overwhelming flooding. The discussion in Section 2.2.5: Flooding would be a relevant consideration.

Regarding **historical occurrences**, NOAA's National Centers for Environmental Information (NCEI) does not contain historical records of hurricanes, tropical storms, or tropical depressions for Washington County (1950-2022). Subsequently, there is no data as to **loss and damages** directly attributable to the four incidents prompting Presidential declarations. (It is possible that Washington County was the recipient of a declaration as a result of cascading impacts or providing support.) Again, though, this consideration is based more on future probability versus historical occurrences. NOTE: The NCEI does not have a category for nor'easters.

The *Fourth National Climate Assessment* (USGCRP, 2018) discusses ocean warming along the Northeast Continental Shelf extensively in its chapter on the impacts to the northeast (which includes all of Maryland). This warming impacts the strength of storms coming in from the Atlantic Ocean – hurricanes and nor'easters, in particular. The Environmental Defense Fund (2023) reports that evaporation increases as water temperatures rise, which boosts the transfer of heat from the oceans to the air. As storms travel across warm oceans, they pull in more water vapor and heat, which can yield stronger wind, heavier rainfall, and flooding when the storms make landfall. When combining the traditional hurricane (i.e., June through September) and nor'easter (September through April) seasons, the Northeast region of the U.S. may be impacted by severe storms nearly year-round (USGCRP, 2018). Though the probability of these storms remains similar, the severity of them (per the warming ocean) may increase, pushing their dangerous effects further inland, yielding **future occurrences** for communities in areas like Washington County.

The steering committee conducted an online survey for the public to share its thoughts on the hazards listed in this plan. The following table presents the results of that survey,

[2] The headings that separate the narrative of this hazard profile (e.g., "Location and Extent") will appear in bold type to ensure a comparable discussion of the called-out hazard.

specifically regarding severe summer weather. (NOTE: The original survey question included tornadoes in this category.)

PUBLIC SENTIMENT, SEVERE SUMMER WEATHER					
Hazard	*Level of Concern*				*Total Responses*
	Not at All	*Somewhat*	*Concerned*	*Very*	
Severe Summer Weather	26 (20.63%)	40 (31.75%)	45 (35.71%)	15 (11.90%)	126
In the past ten years, do you remember this hazard occurring in your community?				71 (56.30%)	126
Have you noticed an increase in the occurrences or intensity of this hazard?				60 (47.62%)	126
Have you noticed a decrease in the occurrences or intensity of this hazard?				3 (2.38%)	126

The following table assigns point totals based on the methodology identified in Section 2.2: Profile Hazards above.

SEVERE SUMMER WEATHER RISK RANKING			
Category	*Points*	*Description*	*Notes*
Frequency	5	Excessive (Will occur in a year)	The NCEI reports 584 events over 66 years (i.e., 1956-2022) for an average of 8.85 events per annum.
Response	3	One week	Most events necessitate approximately one day of response activities, but more significant events may require much longer. As such, planners selected a week for estimation purposes.
Onset	2	12-24 hours	Summer weather events are forecast days in advance, and those forecasts evolve as storm fronts near the area. The severity of summer storms can change rapidly (from forecasted data), but the impending arrival of a storm is often known reasonably accurately within 24 hours.
Magnitude	4	Catastrophic (more than 50% of land area affected)	Planners selected this criterion because severe summer weather often impacts the entire county.
Business	1	Less than 24 hours	Severe summer weather may result in brief business shut-downs, but widespread business interruptions lasting longer than a single day are not anticipated with most storm types.
Human	2	Low (some injuries)	Though there have been no injuries or deaths from severe summer weather, they are possible. Planners were more comfortable using the low range for human impacts rather than denying that impacts could occur.
Property	1	Less than 10% of property affected	Washington County has recorded $3,157,820 in property damage per the NCEI database. This figure is cumulative since 1993 (when loss numbers appeared), and even still, represents less than 10% of the total property value in the county.
Totals	**18**	**MEDIUM**	

FEMA's *Local Mitigation Planning Handbook* (2023c) directs entities compiling multi-jurisdictional plans to identify any jurisdictions within the planning area for which the identified

risks or vulnerabilities are more or less prevalent as compared to the other participating jurisdictions. The following table quickly synthesizes the data to capture the jurisdiction-specific aspects of risks and vulnerabilities for each city or town.

MULTI-JURISDICTIONAL CONSIDERATIONS, SEVERE SUMMER WEATHER		
Jurisdiction	*Comparison*	*Notes*
Washington County	**Same**	**Riskfactor.com (n.d.) lists the county's risk of wind (only) as "Minor," the lowest ranking on its scale. The website denotes severe storms as yielding the most wind-related risk.**
Boonsboro	Same	Riskfactor.com (n.d.) notes Boonsboro's wind (only) risk as "Moderate," with tropical storm winds yielding the most risk.
Clear Spring	Same	Riskfactor.com (n.d.) notes Clear Spring's wind (only) risk as "Moderate," with tropical storm winds yielding the most risk. The town is the furthest westward municipality in the county has having tropical storm winds posing the most risk, which is interesting given that Hagerstown (to the east) would be most impacted by severe storms.
Funkstown	Same	Riskfactor.com (n.d.) lists Funkstown's wind (only) risk as "Moderate," with tropical storm winds yielding the most danger. This finding is interesting, as the town is adjacent to Hagerstown, whose greatest wind risk comes from severe storms.
Hagerstown	(Slightly) More	Riskfactor.com (n.d.) lists Hagerstown's wind (only) risk as "Minor," its lowest ranking category. Severe storms yield the most likely wind risk. The comparison of "(Slightly) More" is based on two variables: (a) the higher population and population density, and (b) the Census tract coverage relative to those in poverty (as compared to the rest of the county).
Hancock	Same	Riskfactor.com (n.d.) lists Hancock's wind (only) risk as "Minor," its lowest ranking category. Severe storms yield the most likely wind risk.
Keedysville	Same	Riskfactor.com (n.d.) notes Keedysville's wind (only) risk as "Moderate," with tropical storm winds yielding the most risk.
Sharpsburg	Same	Riskfactor.com (n.d.) notes Sharpsburg's wind (only) risk as "Moderate," with tropical storm winds yielding the most risk.
Smithsburg	Same	Riskfactor.com (n.d.) notes Smithsburg's wind (only) risk as "Moderate," with tropical storm winds yielding the most risk.
Williamsport	Same	Riskfactor.com (n.d.) notes Williamsport's wind (only) risk as "Moderate," with tropical storm winds yielding the most risk.

2.2.11 Severe Winter Weather

Severe winter weather includes blizzards, heavy snowfall, blowing snow, ice storms, and dangerous wind chills that could threaten life or property.				
Vulnerability HIGHEST HIGH MEDIUM LOW LOWEST	**Period of Occurrence:**	Typically occurs from November through March.	**Washington County Risk Ranking:**	High
	Warning Time:	12-24 hours	**State Risk Ranking:**	Medium-High
	Probability:	Excessive (will occur on an annual basis)	**Impact:**	Catastrophic (more than 50% of land area affected)
	Type of Hazard:	Natural	**Disaster Declarations:**	EM-3100-MD (1993) DR-1081-MD (1996) EM-3179-MD (2003) DR-1910-MD (2010)

Hazard Overview

During winter, there are multiple instances of cold weather, snow, and storms. This profile generally includes those winter weather events damaging enough to be considered severe. These include NOAA-labeled winter storms, heavy snow, blizzards, and ice storms. Just like with other storms, the right combination of ingredients is necessary for a winter storm to develop. The three critical components of a winter storm are cold air, lift, and moisture.

- **Winter Storm:** A winter storm is a combination of heavy snow, blowing snow, and dangerous wind chills.
- **Heavy Snow:** Heavy snow refers to snowfall accumulating to four inches or more in 12 hours or less or snowfall accumulating to six inches or more in 24 hours or less.
- **Blizzard:** A blizzard is a dangerous winter storm that is a combination of blowing snow and wind and results in very low visibility. Heavy snowfall and severe cold usually, but not always, accompany blizzards. Sometimes, strong winds can pick up fallen snow, creating a ground blizzard. A blizzard produces the following conditions for three hours or longer: (a) sustained winds or frequent gusts 30 knots (35 mph) or greater, and (b) falling and blowing snow that reduces visibility to less than ¼ mile on a widespread or localized basis.
- **Ice Storm:** An ice storm is a storm that results in the accumulation of at least 0.25'' of ice on exposed surfaces. It can create hazardous driving and walking conditions, and tree branches and power lines can easily snap under the weight of the ice.

Location and Extent

All areas of Washington County are equally susceptible to severe winter weather (i.e., blizzards, heavy snowfall, ice storms, and extreme cold temperatures). The amount of snowfall varies, with slightly more occurring from west to east due to the elevation change. Still, by and large, the municipalities are similar to the county in terms of winter weather effects. The highest point in Washington County is Quirauk Mountain at 2,145 feet, located in the northeastern portion of the county just southwest of Fort Ritchie Military Reservation in the Village of Cascade. The county receives approximately 22 inches of snowfall per year.

A severe winter storm could affect the entire county *at the same time*, potentially bringing many operations to a standstill. This type of hazard creates an arduous emergency response effort; adverse road conditions can impede or prohibit vehicle movement, including emergency response vehicles.

Impacts and Vulnerability

According to the National Severe Storms Laboratory (n.d.), most deaths from winter storms are not from the storm itself. People die from traffic accidents on icy roads, heart attacks while shoveling snow, and hypothermia from prolonged exposure to cold. During severe winter storms, everyone is potentially at risk, particularly those stranded in their vehicle or outside during the storm. Recent data shows that 70% of injuries related to ice and snow occur in automobiles, and 25% are people caught out in the storm. Most victims are males over 40 years old. The weight of the snow load may lead to roof collapse or minor structural damage.

Ice accumulation can topple power lines, utility poles, and communication towers, causing electrical power outages, which for several residents, means a loss of a critical heating source. The most vulnerable structures to roof collapse include those with large-span roofs, those poorly built, or those that are dilapidated. The resultant disruption in communication and utility services can last several days. Even minimal ice accumulation can pose a serious threat to motorists and pedestrians. Bridges and overpasses are dangerous, as they freeze before other surfaces.

Health hazards from severe winter storms include frostbite and hypothermia. Frostbite is an extreme reaction to cold exposure that can permanently damage its victims. A loss of feeling and a white or pale appearance on the victim's fingers, toes, nose, and ear lobes are symptoms of frostbite. Hypothermia is a condition brought on when the body temperature drops to less than 95 degrees Fahrenheit. Signs of hypothermia include uncontrollable shivering, slow speech, memory lapses, frequent stumbling, drowsiness, and exhaustion.

The following table from the *State of Maryland Hazard Mitigation Plan* (MDEM, 2021) provides a consequence analysis regarding severe winter weather across various subjects.

SEVERE WINTER WEATHER CONSEQUENCE ANALYSIS	
Subject	*Impacts*
Health and Safety of the Public	Home and landowners in Washington County are vulnerable to impacts from severe winter weather events. Effects on the public include structural damage to homes and buildings due to roof collapses from snow weight, potential for dangerous road conditions resulting in vehicular accidents, exposure to freezing temperatures, and medical issues from over-exertion while shoveling snow.
Health and Safety of Responders	Emergency responders would be called to impacted areas to evacuate people, close roads due to dangerous conditions, perform wellness checks, and attend to injured people. During severe winter weather events, responders face the risk of personal injury while performing necessary job functions.
Continuity of Operations (delivery of services)	Winter weather events often impact entire regions and sometimes entire states. Because of this, there is a chance that the continuity of operations may be affected depending on the geographic extent and severity of the winter weather event. Delivery of services may be slowed or halted in affected areas due to snow and ice accumulations, dangerous road conditions, freezing temperatures, and momentary losses in power and communications.
Property, Facilities & Infrastructure	Home and landowners throughout the county may experience varying levels of damage to property depending upon received snow and ice loads, although damage is usually minimal. Infrastructure may experience impacts in the form of damage to roadways during snow removal and interruptions to above-ground power and communication systems.
Environment	Winter weather events impact the environment by damaging vegetation and tree limbs. Additionally, rapid snowmelt may also lead to flash flood events, which causes other environmental impacts.
Economic Condition	A significant winter weather event could be costly to the local government due to the potential for damages associated with property, storm cleanup costs, and loss of power. Some of the costs could be recouped through federal grant reimbursements; however, local governments would still feel the fiscal impacts of a significant event.

As noted in the table, infrastructure may experience impacts in the form of damage to roadways during snow removal and interruptions to above-ground power and communication systems. Damage to roadways is typically minimal and easily fixed. Most entities wait until after the winter season to fix all but the most significant of damaged areas, and this often causes frustration to residents and can potentially cause minor vehicle damage. Accidents can be severe, causing injury or death, and the slow-downs from winter weather traffic problems can be substantial. Though all transportation infrastructure is equally at risk, impacts to Interstate 81 would be the most significant to the county (and the municipalities of Hagerstown and Williamsport), followed closely by Interstate 70, particularly in the eastern portions of the county. Traffic impacts on US Routes 40 and 340 could impact commuters working in the Washington, D.C. area. US Route 11 is a heavily-traveled north-south corridor that, if impacted, would also see delays and inconveniences.

Power interruptions often stem from heavy snow downing power lines (or trees into power lines). Communications interruptions can result from similar damage or thanks to snow build-up on satellite dishes. Depending on the severity of the winter storm, infrastructure restoration may be slow. All participating jurisdictions are impacted equally.

Snow and ice can damage agricultural areas and other natural assets like parks and recreational forest areas. Impacts can include downed trees, over-saturated grounds (depending on the amount of snow that falls), freeze/thaw impacts, etc. Though severe winter storms can damage historic and cultural assets, damages are typically minor enough that they can be fixed.

Social Vulnerability Considerations

Social vulnerability discussions for severe winter weather are similar to those for summer weather. Households below the poverty line are often un- or under-insured, which makes repairing winter weather-related damage more difficult, as well as limits options for purchasing supplies and equipment like generators. Lower-income populations may live in pre-1970 housing because it can be older and more affordable (and pre-code housing may be more susceptible to winter weather phenomena like snow weight). As noted frequently in other profiles, those with lower English proficiencies may not readily understand preparedness information and warnings.

Dugan, Byles, and Mohagheghi (2023) studied social vulnerability with respect to power outages, using a case study for Colorado. This study identified increased health risks, varying (often less) power outage preparedness, and variance in the willingness and means to evacuate amongst an array of socially-vulnerable populations. The authors concluded that there is a need to identify these socially vulnerable groups for more targeted information, assistance, and resource delivery. These findings are particularly relevant to severe winter weather since power outages are common cascading effects from winter storms, and sustained harsh winter weather conditions can make the work that restores power dangerous and difficult.

Historical Occurrences

Washington County has experienced 78 severe winter weather events since 1996 (NOAA NCEI, 2023c). This rate is an average of 3.00 severe winter weather events per year. These events appear by category in the table below.

HISTORICAL SEVERE WINTER WEATHER OCCURRENCE – WASHINGTON COUNTY							
Blizzard (1996 to 2022)							
Total Events	*Areas Affected*	*Area w/ Most Events*	*Avg. Events / Year*	*Injuries*	*Fatalities*	*Damages*	
						Property	*Crop*
1	CW	N/A	0.03	150	2	$20,000	$0
Highest snowfall total = 36 inches, "Blizzard of 1996"; drifts up to 7 feet (10 feet in the mountains)							
Ice Storm (1996 to 2022)							
Total Events	*Areas Affected*	*Area w/ Most Events*	*Avg. Events / Year*	*Injuries*	*Fatalities*	*Damages*	
						Property	*Crop*
9	CW	N/A	0.3	0	0	$15,000	$5,000
Most Ice Accumulation = 1" in 1999 & 2002							
Heavy Snow (1996 to 2022)							
Total Events	*Areas Affected*	*Area w/ Most Events*	*Avg. Events / Year*	*Snow Depth*		*Injuries*	*Fatalities*	*Damages*	
				Avg.	*Highest*			*Property*	*Crop*
6	CW	N/A	0.23	9.4"	24"	0	0	$0	$0
Most heavy snow events in one year = 2 in 1996									
Winter Storm (1996 to 2022)									
Total Events	*Areas Affected*	*Month w/ Most Events*	*Avg. Events / Year*			*Injuries*	*Fatalities*	*Damages*	
								Property	*Crop*
62	CW	January	2.38			0	0	$0	$0
Most winter storm events in one year = 5 each in 1999, 2000, 2007 & 2014									
78	**CW**	**January**	**Avg. Events / Year = 3.00**			**150**	**2**	**$35,000**	**$5,000**

Countywide Blizzard – January 7, 1996 (DR-1081-MD)

A historic winter storm, known as the "Blizzard of '96," crippled all of Maryland west of the Chesapeake Bay during the first weekend of January 1996. In general, snow totals were 20 inches in lower southern Maryland, 20 to 26 inches in central Maryland, and 26 to 36 inches over the northern tier. To complicate matters, winds gusting over 35 mph produced drifts of four to seven feet and over 10 feet in the mountains. The storm had the most significant statewide storm totals since the "Megalopolitan Storm" of February 11, 1983.

The system moved slowly from South Carolina to the mouth of the Chesapeake Bay overnight on January 7. The slow movement prolonged near-blizzard conditions into the 8th. The storm finally moved towards New England on January 8, ending the snow but maintaining gusty north winds (and substantial blowing and drifting snow) until evening.

The storm effectively closed all major highways on the 7th. Still, interstates were "open" by the 8th, even though snow removal equipment fought a losing battle with the considerable blowing and drifting snow. Two persons perished directly from hypothermia the day after the blizzard. Area hospitals and clinics reported over 150 injuries shortly after the blizzard, most due to over-exertion from shoveling snow but some due to slipping on ice. All federal, state, and local governments closed Monday and Tuesday (January 8 and 9). Most school districts remained closed for the

week. The President declared a federal state of emergency the following Friday (January 12). Snow removal and damage costs exceeded $70 million (state and county combined), a state record for an individual winter storm. The weight of the snow caused several area roofs to collapse. The roof of a nursing home dining room caved in on January 8, displacing up to 120 residents. Fortunately, disaster was averted because breakfast was served in the dormitories rather than in the dining room due to staff shortages, and no injuries occurred. In Washington County, two barns collapsed in Clear Spring, and 100 cows escaped unharmed.

Countywide Ice Storm – January 14, 1999

A strong arctic cold front moved slowly southeast across the Mid-Atlantic region from late January 13 to midday on the 15th. This front brought a thick layer of subfreezing air to the lowest levels of the atmosphere, but just off the surface, warmer air moved in. The precipitation started as snow but melted into rain as it fell through the warm layer of air. Unfortunately, west of the cold front, the ground was below freezing. Hence, the rain froze on the surfaces it contacted, which created ice accumulations of nearly one inch across all of western and central Maryland.

Hundreds of car accidents, slip and fall injuries, downed trees and power outages were reported. Interstate 68 in Allegany County was closed from midnight to 3:00 a.m. due to several accidents, and a 21-year-old man died in a car crash on Interstate 70 in western Maryland, west of Conococheague Creek. The icy conditions also led to over 500 pedestrian slip and fall injuries. Winds gusted over 40 mph after the precipitation ended, and trees weighed down by the heavy ice fell on homes, across roads, and onto power lines across the area. Approximately 2,000 power lines were down in PEPCO's Maryland power service area, leading to a loss of power for 230,000 of the utility company's 680,000 customers. This event was the worst ice storm in PEPCO's service history. Over 5,000 customers across western Maryland were without power after the storm. The MARC train system had to cancel departures from Washington D.C. westward between 5:00 and 6:00 p.m. due to ice and related power outages.

Countywide Heavy Snow – February 11, 2006

A historic snowstorm occurred between February 11-12 across the Mid-Atlantic. Snowfall across much of Maryland ranged between eight and 14 inches. A period of thundersnow occurred overnight and early in the morning of February 12, where localized snowfall was between 14 and 22 inches. The highest snowfall total occurred at Columbia Hills, MD, in Howard County, at 22.5 inches. There were also numerous reports of downed trees and powerlines causing significant power outages. There were also major delays at all three major hub airports in the region:

Washington Dulles International, Washington Ronald Reagan National, and Baltimore/Washington Thurgood Marshall International. Most local, state, and federal offices closed. The additional snow load caused several structures to fail partially, and gutters were torn from numerous homes due to ice jams, which also caused interior leaks (NOAA NCEI, 2021).

Countywide Winter Storm – January 22, 2016 (Winter Storm Jonas)

On February 19, 2016, Governor Larry Hogan requested a major disaster declaration due to a severe winter storm and snowstorm from January 22-23, 2016. Coastal low pressure rapidly intensified as it tracked up the Mid-Atlantic coast. At the same time, high pressure to the north funneled cold air into the region. The strong low-pressure system was able to tap into moisture from the Gulf of Mexico and the Atlantic Ocean, resulting in heavy precipitation. The cold air caused that precipitation to fall in the form of snow. Gusty winds also accompanied this storm.

The combination of gusty winds and low visibility, along with snow and blowing snow, caused blizzard conditions across central and southern Maryland. Snowfall averaged between 22 and 38 inches across Washington County. Maugansville and Cascade reported 37.5 inches of snow. Snowfall totaled up to 32.5 inches near Long Meadow (NOAA NCEI, 2023c). The per capita impact for Washington County was $4.87; with a population of around 148,000 in 2010, the total county impact is just under $705,000.

Loss and Damages

Planners utilized a historical worst-case event to develop loss estimates for severe winter weather. The “Blizzard of 96” resulted in approximately $70 million in snow removal and damage costs, a state record for an individual winter storm in Maryland. Eleven (11) counties were under federal or state emergency declarations, creating an average of $6.4 million per county.

The table below includes loss estimations from the *State of Maryland 2016 Hazard Mitigation Plan* (MDEM, 2016) (NOTE: No information specific to Washington County was in the 2021 plan). Washington County contains three percent (3%) of the state's critical facilities that are likely to be impacted by severe winter weather and six percent (6%) of state-owned assets.

WINTER STORM LOSS ESTIMATIONS – CRITICAL FACILITIES / STATE ASSETS				
Jurisdiction	*Critical Facilities Totals*	*Critical Facilities Loss Estimations*		
		Building Value	*Content Value*	*Total Loss*
Washington County	87	$772,391,000	$257,463,700	$1,029,854,700
Maryland	2,774	$18,819,182,837	$6,658,765,500	$26,616,634,000
Jurisdiction	*State Asset Totals*	*State Assets Loss Estimations*		
		Building Value	*Content Value*	*Total Loss*
Washington County	367	$517,704,700	$47,365,500	$565,070,100
Maryland	5,818	$28,380,273,500	$3,505,440,000	$31,884,761,900

Future Occurrences

Anecdotally, the winter season appears to be changing (per steering committee experiences). In decades past, the winter months were typically December, January, and February, with winter storms not uncommon in November and March. In recent years, though, late January, February, and often March have been more wintry months. Though this apparent shift changes overall risk and vulnerability very little, it may take time for the populace to shift its thinking to align with this timeline. Changes in population patterns and land use and development are not likely to exacerbate or limit severe winter weather impacts; per lived experiences, the impacts shift to different points in time.

Though severe summer weather can impact infrastructure (the power grid, in particular) as does winter weather, winter weather impacts various infrastructure systems in different ways. Investments in the power grid, transportation systems, etc., can make those systems more resilient to weather hazards. Conversely, under-investment in those systems can arguably make the impacts to weather more acute.

Future Climate Considerations

As the frequency and intensity of local hazards change, it is essential to protect communities and local habitats. According to information obtained from *Community Climate Outlook Washington County, MD*, seasons are changing in length and timing in Washington County, with earlier springs, delayed falls, and shorter winters (MARISA, 2022). While a more extended frost-free period can benefit some crops or allow for double cropping, it can limit plant diversity, encourage invasive species, and threaten human and ecosystem health.

Milder winters help more ticks and mosquitos survive the winter. Earlier springs also cause trees and flowers to bloom earlier, leading to a more extended allergy season. During a false spring, warm weather in later winter or early spring causes crops and plants to grow too early,

exposing them to frost. Reduced snow cover from warm winters and longer summers increases the risk of drought.

Vulnerability Assessment

This section summarizes the vulnerability of Washington County to severe winter weather events. The steering committee conducted an online survey for the public to share its thoughts on the hazards listed in this plan. The following table presents the results of that survey, specifically regarding severe winter weather.

PUBLIC SENTIMENT, SEVERE WINTER WEATHER					
Hazard	*Level of Concern*				*Total Responses*
	Not at All	*Somewhat*	*Concerned*	*Very*	
Severe Winter Weather	23 (18.25%)	47 (37.30%)	39 (30.95%)	17 (13.49%)	126
In the past ten years, do you remember this hazard occurring in your community?				71 (56.35%)	126
Have you noticed an increase in the occurrences or intensity of this hazard?				35 (27.78%)	126
Have you noticed a decrease in the occurrences or intensity of this hazard?				14 (11.11%)	126

The following table assigns point totals based on the methodology identified in Section 2.2: Profile Hazards above.

SEVERE WINTER WEATHER RISK RANKING			
Category	*Points*	*Description*	*Notes*
Frequency	5	Excessive (Frequent – will occur in a year)	There have been 83 severe winter weather events since 1996. Washington County can expect an average of 3.19 severe winter weather events per year.
Response	3	One week	The response to most severe winter weather events typically occurs over one day; however, several do require a minimum of one week.
Onset	2	12-24 hours	Forecasters can predict all types of severe winter weather up to 12 hours in advance.
Magnitude	4	More than 50% of land area affected	Severe winter weather events typically affect large portions of the county simultaneously.
Business	2	One week	Businesses may close for up to one week due to poor road conditions and inability to get to the business.
Human	3	Medium (multiple severe injuries)	Several people could be injured in vehicle accidents, exposed to frigid temperatures, or suffer heart attacks while shoveling snow.
Property	2	10-25% of property affected	Though impacting large land areas, severe winter weather events often result in minimal property damage.
Totals	**21**	**HIGH**	

FEMA's *Local Mitigation Planning Handbook* (2023c) directs entities compiling multi-jurisdictional plans to identify any jurisdictions within the planning area for which the identified risks or vulnerabilities are more or less prevalent as compared to the other participating jurisdictions. Geographically, all participating jurisdictions are at equal risk of severe winter weather. Most historical occurrences have been region-wide, and future occurrences are likely to be as well.

Washington County sits in western Maryland, and it, along with Allegany and Garrett Counties are often considered the state's mountain counties. This designation is a bit of a misnomer for Washington County, as its elevation changes are far less drastic than those in its westward neighbors. The towns of Hancock (in the west, at the base of Sideling Hill) and Boonsboro, Smithsburg, and, to an extent, Keedysville and Sharpsburg (at the base of South Mountain) sit at the foots of mountains, but that does not influence the types of winter weather impacts they experience in measurably different ways than the other jurisdictions in the county. Therefore, the discussion above applies equally to the ten jurisdictions participating in this plan.

2.2.12 Tornado

A tornado is a narrow, violently rotating column of air that extends from the base of a thunderstorm to the ground.				
Vulnerability  HIGHEST HIGH MEDIUM LOW LOWEST	**Period of Occurrence:**	They can occur at any time but are most likely to occur during thunderstorms from March to September	**Washington County Risk Ranking:**	Medium
	Warning Time:	Less than 6 hours	**State Risk Ranking:**	Medium-High
	Probability:	Low (unlikely to occur in a year)	**Impact:**	Localized (less than 10% of land area affected)
	Type of Hazard:	Natural	**Disaster Declarations:**	N/A

Hazard Overview

Tornadoes form when warm, humid air collides with cold, dry air. Tornadoes can also occur along a "dryline," which separates very warm, moist air to the east from hot, dry air to the west. They are vertical funnels of rapidly spinning air that extend from a thunderstorm cloud to the ground. Tornadoes can have wind speeds up to 250 miles per hour and a width of approximately 660 feet. They occur in the U.S. more than anywhere else in the world. Tornadoes originate from rotating thunderstorms called "supercells" or quasi-linear convective systems (QLCS).

Location and Extent

Tornadoes are a site-specific hazard, but communities cannot readily identify specific geographic features that allow them to anticipate where tornadoes may occur. Put generally, areas that are subject to high winds and thunderstorms may experience tornadoes. Historic data (see below) suggest that the areas along the Interstate 81 corridor and eastward toward South Mountain have experienced more tornadoes than the western portions of the county. Though the reasons are unknown, it could be due to differences in topography. The areas that have experienced tornadoes are generally less mountainous than the western portions of Washington County.

Officials utilize the Enhanced Fujita (EF) Scale to classify tornadoes. This scale uses a rating system based on wind speeds and related damages. The EF scale was adapted from the original Fujita Scale, designed by Dr. Theodore Fujita, to estimate wind and storm damage better. The table below describes the EF Scale.

ENHANCED FUJITA (EF) SCALE		
EF Rating	*3-second Gust Speed (mph)*	*Possible Damage*
0	**65-85**	**Light Damage.** Some damage to chimneys; break branches off trees; push over shallow-rooted trees; damage to signboards.
1	**86-110**	**Moderate Damage.** Surface peeled off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off roads.
2	**111-135**	**Considerable Damage**. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.
3	**136-165**	**Severe Damage**. Roofs and some walls torn off well-constructed houses; trains overturned; most trees in the forest uprooted; cars lifted off the ground and thrown.
4	**166-200**	**Devastating Damage**. Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.
5	**200+**	**Incredible Damage**. Strong frame houses lifted off foundations and carried a considerable distance to disintegrate; automobile-sized missiles fly through the air more than 100 yards; trees debarked; incredible phenomena will occur.

The original Fujita Scale appears below. This table is a reference for those historical events measured by the original scale.

FUJITA TORNADO SCALE		
Scale	*Wind Estimate (MPH)*	*Typical Damage*
F0	**< 73**	**Light Damage**. Some damage to chimneys; branches broken off trees; shallow-rooted trees pushed over; sign boards damaged.
F1	**73 – 112**	**Moderate Damage**. Peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos blown off roads.
F2	**113 – 157**	**Considerable Damage**. Roofs torn off frame houses; mobile homes demolished; boxcars overturned; large trees snapped or uprooted; light-objects missiles generated; cars lifted off the ground.
F3	**158 – 206**	**Severe Damage**. Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; heavy cars lifted off the ground and thrown.
F4	**207 – 260**	**Devastating Damage**. Wall-constructed houses leveled; structures with weak foundations blown away some distance; cars thrown and large missiles generated.
F5	**261 – 318**	**Incredible Damage**. Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air over 109 yards; trees debarked; incredible phenomena will occur.

Impacts and Vulnerability

While tornadoes are typically short-lived, they are intensely focused and destructive. Tornadoes are the most violent of all atmospheric storms. Damage from tornadoes comes from the strong winds they contain. Wind speed in tornadoes can reach 250 miles per hour; winds of that speed can destroy homes, uproot trees, cause automobiles to become airborne, and turn glass and debris into high-velocity projectiles. Secondary and tertiary impacts from tornadoes

include damage to roofs and other home finishings. Additionally, fallen trees can interrupt power service or block transportation access. The following table outlines potential tornado impacts on Washington County's assets. The impacts apply to all participating jurisdictions equally.

GENERAL ASSET IMPACTS, TORNADOES	
Asset Type	*Impacts*
People	Because tornadoes are somewhat unpredictable (i.e., they occur with little to no warning), the human effects can include emotional distress such as overwhelming anxiety, trouble sleeping, and other depression-like symptoms. These impacts are similar to the notion of disaster writ large. Still, they can be heightened around "tornado" because of its occurrence with little to no warning (USHHS SAMHSA, 2022). See the "Social Vulnerability Considerations" discussion below.
Structures	Structural damage from significant tornadoes can be quite obvious. The size of most historical tornadoes in Washington County (i.e., F0, F1, or EF1) may cause minor damage. The county has experienced one event at an F2 magnitude, and that event resulted in $400,000 of structural damage. EF2 and larger tornadoes can range from substantial, yet fixable damage, to complete destruction of a facility. When considerable damage occurs, since tornadoes impact a relatively small area, tradespersons are typically available to address the repairs quickly.
Community Lifelines & Other Critical Facilities	Powerful tornadoes can destroy pipelines, chemical containers, tanks, etc. Though these occurrences could result in a hazardous material incident, in Washington County, the probability of a tornado with the intensity to cause this damage is low. The most vulnerable lifelines and critical facilities locally are power and communications systems. Damage would be similar to that noted for high winds, though affected areas (and the resultant number of impacted assets) would be smaller. Health and medical and utility assets that rely on power could be negatively impacted during a prolonged outage. Communications impacts are also similar to those noted for high winds, though in more localized areas.
Natural, Historic, & Cultural Resources	Two historical events have impacted crops, with the aforementioned F2 causing approximately $75,000 in crop damage. Tornadoes can also cut through large swaths of forest, destroying trees and wildlife habitats. According to a 2019 article in Science News, these impacts can allow invasive species to gain ground in an area. In Washington County, forested areas (i.e., the non-agricultural natural asset most at risk) are in the steep and mountainous portions of the county that are least susceptible to tornadoes. Tornadoes may include dust and debris, which stays behind as pollution following the tornado (some of which may be contaminated). If a historic or cultural resource is in the path of a tornado, it could be heavily damaged if not destroyed. Historic/cultural natural sites may be somewhat less at risk.
Economy & Other Valuable Activities	If a tornado were to occur during an outdoor activity (e.g., a Hagerstown Suns game, etc.), it could result in injury and loss of life or, at minimum, cancellation of the event. Though damage-related impacts could be significant, tornadoes would not likely disrupt long-term economic activity in the county or region.

Social Vulnerability Considerations

Many of the social vulnerability variables discussed under severe summer weather apply to the tornado discussion as well, particularly those regarding comprehension of warnings, ability to evacuate, etc. The mobile home discussion is also particularly relevant, so much so that the

map of mobile home distribution throughout the county appears again. The National Weather Service suggests that mobile home residents are 15 to 20 times *more likely* to be killed by a tornado that strikes the home in comparison to those in stick-built structures. “On average, a total of 72 percent of all tornado-related fatalities are in homes and 54 percent of those fatalities are in mobile homes” (NWS, n.d.). EF-1 tornadoes (as well as high-end severe thunderstorm winds) can severely damage or destroy mobile homes.

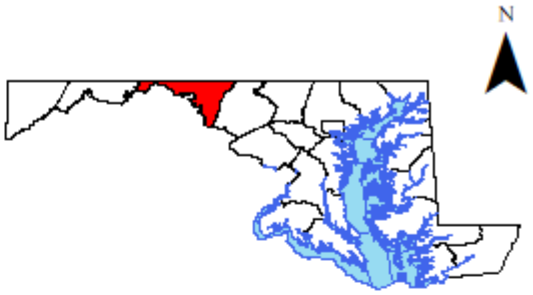
WASHINGTON COUNTY HAZARD MITIGATION PLAN

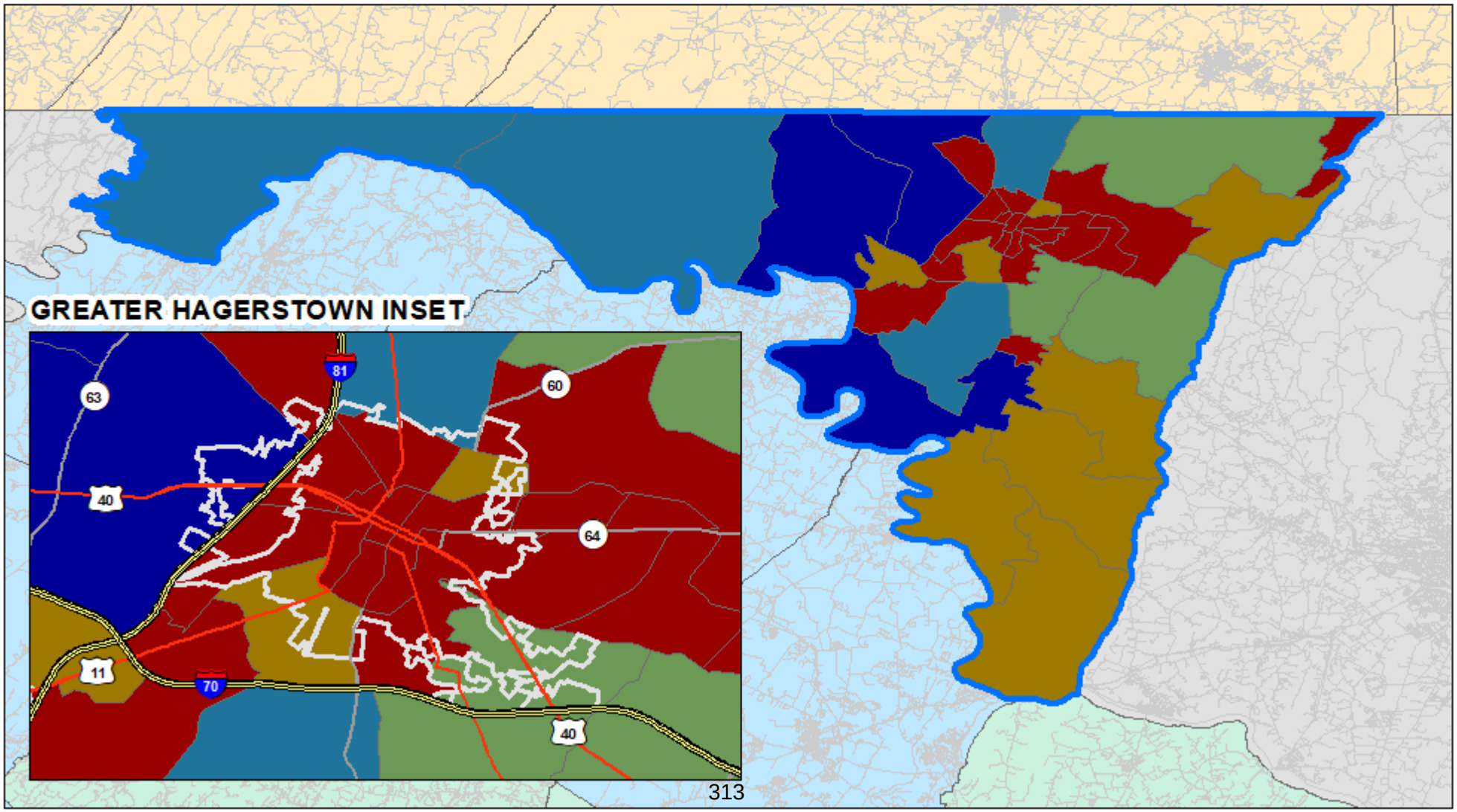
Mobile Homes in Washington County

Data Source(s):
CDC SVI Index (2020)

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

- 0 - 10 mobile homes
- 11 - 27 mobile homes
- 28 - 65 mobile homes
- 66 - 162 mobile homes
- 163 - 467 mobile homes





By examining those areas with high concentrations of mobile homes, local officials can strategically consider the placement of designated tornado shelters, the selection of facilities to serve as weather shelters, etc. Though there is a need for adequate sheltering options in all areas of the county, those areas with higher number of mobile homes may need those options more.

Historical Occurrences

These hazards are some of the most frequently-occurring threats facing the county. The NOAA National Centers for Environmental Information (NCEI) Storm Events Database (2023c) lists 14 tornadoes since 1961. There has only been one injury (and no deaths) in Washington County as a result of tornadoes, but there has been $1,618,000 in property damages and $95,000 in crop damages.

HISTORICAL TORNADOES

Area	*Date*	*Incident Type*	*Mag.*	*EF Scale*	*Deaths*	*Injuries*	*Property Damage*	*Crop Damage*
Washington Co.	7/24/1961	Tornado	N/A	F1	0	0	$25,000.00	$0.00
Washington Co.	09/05/1979	Tornado	N/A	F0	0	0	$0.00	$0.00
Washington Co.	7/19/1996	Tornado	N/A	F2	0	0	$400,000.00	$75,000.00
Washington Co.	7/19/1996	Tornado	N/A	F0	0	0	$15,000.00	$0.00
Washington Co.	6/18/1997	Tornado	N/A	F0	0	0	$10,000.00	$0.00
Washington Co.	6/16/1998	Tornado	N/A	F1	0	1	$200,000.00	$0.00
Washington Co.	6/16/1998	Tornado	N/A	F1	0	0	$200,000.00	$0.00
Washington Co.	6/16/1998	Tornado	N/A	F1	0	0	$10,000.00	$20,000.00
Washington Co.	6/19/1998	Tornado	N/A	F0	0	0	$8,000.00	$0.00
Washington Co.	8/26/1999	Tornado	N/A	F1	0	0	$75,000.00	$0.00
Washington Co.	5/25/2004	Tornado	N/A	F1	0	0	$250,000.00	$0.00
Washington Co.	9/17/2004	Tornado	N/A	F0	0	0	$120,000.00	$0.00
Washington Co.	9/17/2004	Tornado	N/A	F0	0	0	$5,000.00	$0.00
Washington Co.	5/17/2011	Tornado	N/A	EF1	0	0	$300,000.00	$0.00
				Totals	**0**	**1**	**$1,618,000.00**	**$95,000.00**

Tornadoes are a somewhat unique hazard within the severe summer storms category. The following map illustrates the touchdown points and, if applicable, paths of the tornadoes that have impacted the county.

WASHINGTON COUNTY HAZARD MITIGATION PLAN

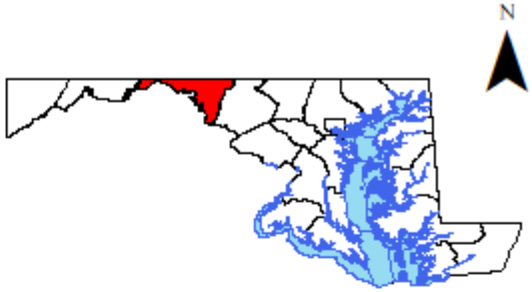
Historic Tornadoes in Washington County

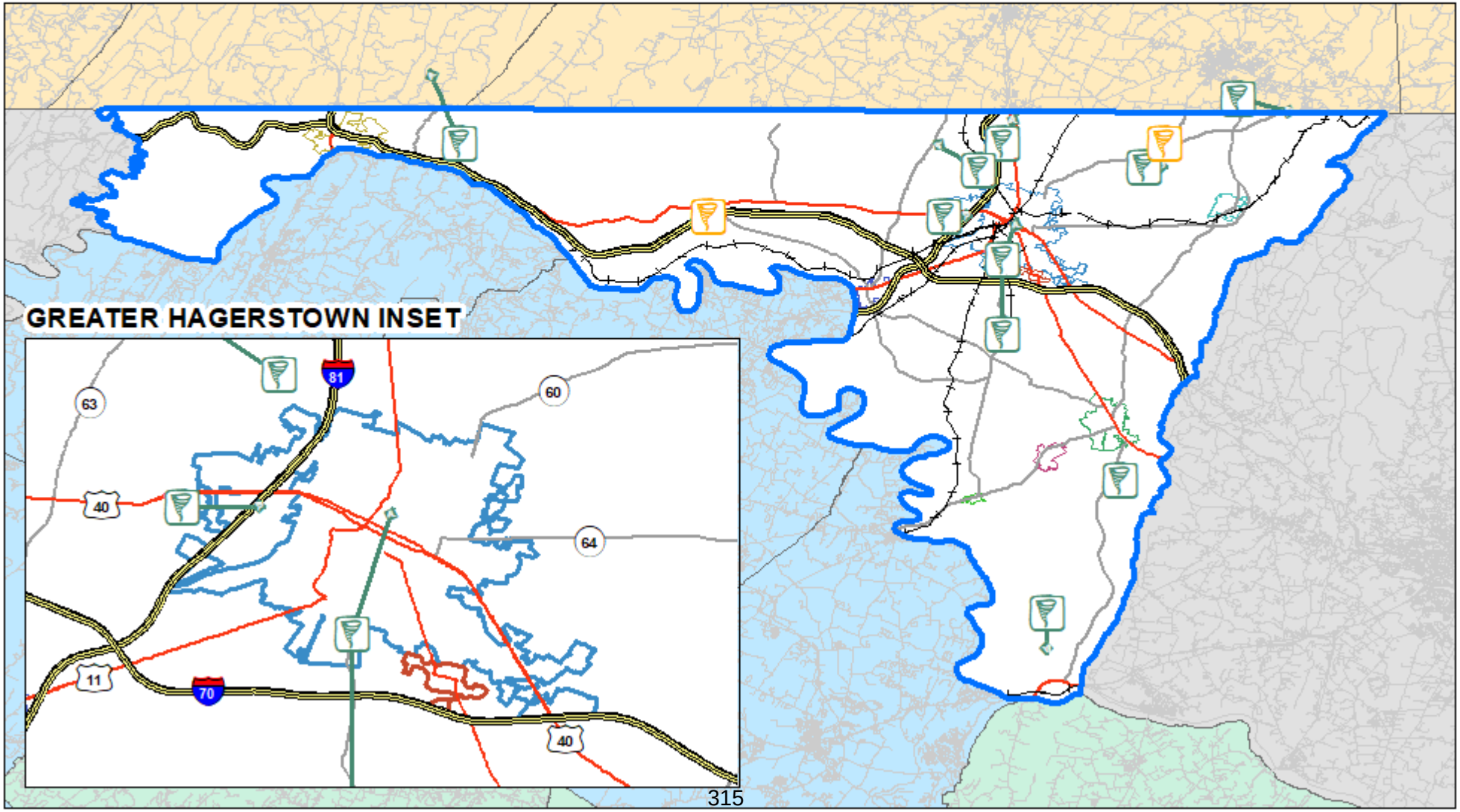
Data Source(s):
NOAA NCEI, 2023

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

Tornadoes (TD only)

Tornadoes (w/ Paths)



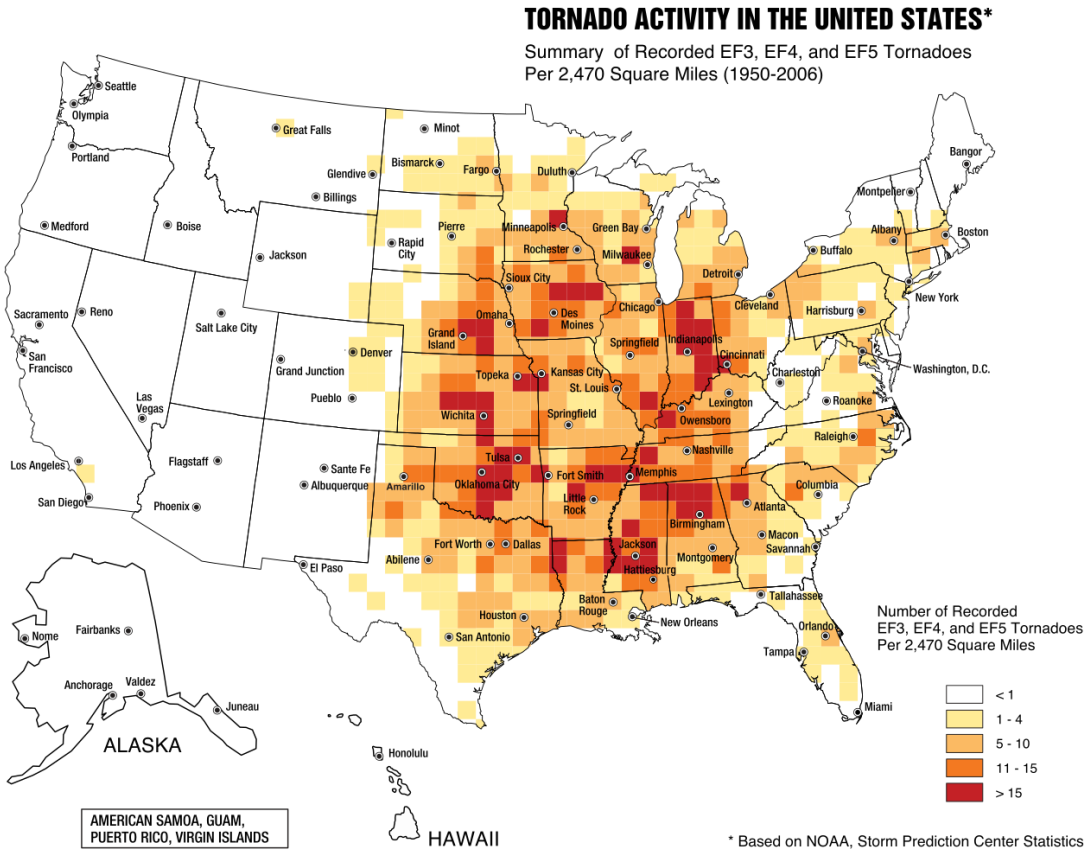


Loss and Damages

Planners generated loss estimates associated with tornadoes based on historical data. There has been an average of 0.20 incidents annually, accounting for an average of $115,600.00 in property damage and $6,800.00 in crop damage. The largest loss associated with a tornado was in 1996 ($475,000.00 – combined property and crop damage).

Future Occurrences

Traditionally, tornadoes impacted areas in the Midwest known as “Tornado Alley” in states like Iowa, Kansas, Missouri, Nebraska, Oklahoma, and northern Texas. While those areas still see frequent tornadoes, southern areas in Alabama, Arkansas, Georgia, Kentucky, and Mississippi are seeing them. (Reference the incredibly destructive tornadoes to strike Tuscaloosa, Alabama in 2011 as well as Mayfield, Kentucky in 2022). Tornadoes have been regular occurrences in Indiana and Ohio, but even events in those states appear to be gaining strength. Put simply, tornado alley appears to be shifting to the east (Gensini & Brooks, 2018). The following graphic shows the eastward movement of EF-3 through EF-5 events in the United States through 2006.



Further, in states like Maryland, Pennsylvania, and West Virginia, there was a common notion that mountainous terrain "broke up" tornadoes before they could do damage after touching down. Many damage assessments would label wind impacts as "straight line winds," "downbursts," or "macrobursts," with seemingly little consideration of tornadic activity. Recently, though, those reports have been classifying events as tornadic in those states. Washington County contains mountainous areas, but those that are most heavily-populated and comprise the majority of the designated growth areas in the county are in central portions, where the terrain is more gently sloping. As these areas develop, the natural topography of the area will not as easily break up tornadoes that touch down.

For Washington County, local officials will need to monitor tornado occurrences carefully along with any shifts in design wind speed resources. If tornadoes increase measurably across longer time periods, it may be necessary to update building codes to account for the increased risk. Until that point, and after that point for existing structures, buildings not build to withstand tornadic activity may be at extra risk. Unfortunately, socio-economically disadvantaged populations are often not able to afford to finance and occupy new structures (including newer, more resilient apartments thanks to higher rents). These populations will continue to be more vulnerable to hazards like tornadoes.

Future Climate Considerations

Finding consensus on the level to which a changing climate is impacting tornadoes has been elusive. A hotter atmosphere can hold more moisture, which increases atmospheric instability (which is necessary for storm systems that form tornadoes). Other elements, like wind shear, appear to decrease as a result of said instability. This push-and-pull factor within the data makes it difficult to accurately assess climate changes with respect to tornadoes (National Geographic, n.d.). Further, tornadoes are too geographically small to be well-simulated by climate models (C2ES, n.d.B). Put very generally, evidence suggests there will be a more favorable environment overall to severe weather (i.e., there will be more severe weather, including tornadoes) (Berardelli, 2023).

Vulnerability Assessment

This section summarizes the vulnerability of Washington County to tornadoes. The steering committee conducted an online survey for the public to share its thoughts on the hazards listed in this plan. The following table presents the results of that survey, which specifically

identified "tornadoes" as an example of a severe summer weather (along with other thunderstorm, hail, etc., conditions).

PUBLIC SENTIMENT, SEVERE SUMMER WEATHER (INCLUDING TORNADO)					
Hazard	*Level of Concern*				*Total Responses*
	Not at All	*Somewhat*	*Concerned*	*Very*	
Severe Summer Storms	26 (20.63%)	40 (31.75%)	45 (35.71%)	15 (11.90%)	126
In the past ten years, do you remember this hazard occurring in your community?				71 (56.30%)	126
Have you noticed an increase in the occurrences or intensity of this hazard?				60 (47.62%)	126
Have you noticed a decrease in the occurrences or intensity of this hazard?				3 (2.38%)	126

The following table assigns point totals based on the methodology identified in Section 2.2: Profile Hazards above.

TORNADO RISK RANKING			
Category	*Points*	*Description*	*Notes*
Frequency	2	Low (Unlikely to occur in a year)	The NCEI reports 14 tornadoes over a 61 year period, for an average of 0.20 events per annum.
Response	3	One week	Most events necessitate approximately one day of response activities, but more significant events may require much longer. As such, planners selected a week for estimation purposes.
Onset	4	Less than 6 hours	Though weather conditions may suggest the formation of a tornado is possible, the time between spotting a tornado and it touching down is often very short.
Magnitude	1	Localized (less than 10% of land area affected)	Tornadoes are very destructive, but in comparison to the total land area of the county, they affect a small area (as evidenced by the path map graphic above).
Business	3	At least two weeks	If an F2 tornado impacted a business, for example, that business might be closed for an undetermined period; however, community-wide business closures would be minimal.
Human	3	Medium (multiple severe injuries)	Though casualty numbers have been low, the potential for multiple casualties during tornadoes.
Property	3	25-50% of property affected	The historical tornadoes in the county have averaged six figures l property damage. If a tornado was to touch down in a densely-constructed area, that figure could be much higher.
Totals	**19**	**MEDIUM**	

FEMA's *Local Mitigation Planning Handbook* (2023c) directs entities compiling multi-jurisdictional plans to identify any jurisdictions within the planning area for which the identified risks or vulnerabilities are more or less prevalent as compared to the other participating jurisdictions. The following table quickly synthesizes the data to capture the jurisdiction-specific aspects of risks and vulnerabilities for each city or town.

MULTI-JURISDICTIONAL CONSIDERATIONS, TORNADO		
Jurisdiction	*Comparison*	*Notes*
Washington County	**(Slightly) More**	**There is historical precedent for tornadic activity in the planning area, though there is no reliable means of predicting where tornadoes will strike, nor is there any consensus on the spatial conditions that make tornadoes more likely. The county jurisdiction appears as "(Slightly) More" at risk because of the unincorporated Census tracts with higher numbers of mobile homes.**
Boonsboro	Same	There is historical precedent for tornadic activity in the planning area, though there is no reliable means of predicting where tornadoes will strike, nor is there any consensus on the spatial conditions that make tornadoes more likely. Thus, the town is just as much at risk of tornadoes as the other participating jurisdictions.
Clear Spring	Same	There is historical precedent for tornadic activity in the planning area, though there is no reliable means of predicting where tornadoes will strike, nor is there any consensus on the spatial conditions that make tornadoes more likely. Thus, the town is just as much at risk of tornadoes as the other participating jurisdictions.
Funkstown	Same	There is historical precedent for tornadic activity in the planning area, though there is no reliable means of predicting where tornadoes will strike, nor is there any consensus on the spatial conditions that make tornadoes more likely. Thus, the town is just as much at risk of tornadoes as the other participating jurisdictions.
Hagerstown	(Slightly) More	There is historical precedent for tornadic activity in the planning area, though there is no reliable means of predicting where tornadoes will strike, nor is there any consensus on the spatial conditions that make tornadoes more likely. Hagerstown is listed as "(Slightly) More" at risk because of its urban development pattern. If a tornado were to touch down in the city, it could result in far more structural damage than in other areas of the county.
Hancock	Same	There is historical precedent for tornadic activity in the planning area, though there is no reliable means of predicting where tornadoes will strike, nor is there any consensus on the spatial conditions that make tornadoes more likely. Thus, the town is just as much at risk of tornadoes as the other participating jurisdictions.
Keedysville	Same	There is historical precedent for tornadic activity in the planning area, though there is no reliable means of predicting where tornadoes will strike, nor is there any consensus on the spatial conditions that make tornadoes more likely. Thus, the town is just as much at risk of tornadoes as the other participating jurisdictions.
Sharpsburg	Same	There is historical precedent for tornadic activity in the planning area, though there is no reliable means of predicting where tornadoes will strike, nor is there any consensus on the spatial conditions that make tornadoes more likely. Thus, the town is just as much at risk of tornadoes as the other participating jurisdictions.
Smithsburg	Same	There is historical precedent for tornadic activity in the planning area, though there is no reliable means of predicting where tornadoes will strike, nor is there any consensus on the spatial conditions that make tornadoes more likely. Thus, the town is just as much at risk of tornadoes as the other participating jurisdictions.

MULTI-JURISDICTIONAL CONSIDERATIONS, TORNADO		
Jurisdiction	*Comparison*	*Notes*
Williamsport	Same	There is historical precedent for tornadic activity in the planning area, though there is no reliable means of predicting where tornadoes will strike, nor is there any consensus on the spatial conditions that make tornadoes more likely. Thus, the town is just as much at risk of tornadoes as the other participating jurisdictions.

2.2.13 Transportation Accidents

Transportation accidents are technological hazards involving the nation's system of land, sea, and air transportation infrastructure. A flaw or breakdown in any component of this system can and often does result in a significant disaster involving loss of life, injuries, property and environmental damage, and economic consequences.				
Vulnerability HIGHEST HIGH MEDIUM LOW LOWEST	**Period of Occurrence:**	At any time	**Washington County Risk Ranking:**	Medium
	Warning Time:	Less than 6 hours	**State Risk Ranking:**	Medium-High
	Probability:	Excessive (will occur in a year)	**Impact:**	Medium (multiple severe injuries)
	Type of Hazard:	Technological	**Disaster Declarations:**	N/A

Hazard Overview

Transportation accidents can result from air, rail, water, or road travel. It is unlikely that minor accidents would significantly impact the larger community. However, certain accidents could have secondary regional impacts, such as a hazardous materials release or a disruption to critical supply/access routes, especially along vital transportation corridors and at critical junctions. Traffic congestion, in certain circumstances, can also be hazardous. This profile focuses on major accidents on roadways, railways, and airways. See Section 2.2.6: Hazardous Materials for information on transportation accidents resulting in the release of chemicals or other hazardous materials.

Location and Extent

According to the Maryland Department of Transportation (MDOT), Washington County has 279.18 miles of state-owned highways, 847.30 miles of county-owned roads, and 214.17 miles of municipal-owned highways (MDOT, 2022a). The primary thoroughfares in Washington County include Interstates 68, 70, and 81, as well as US Routes 11, 40, 340, and 522. There are also multiple state routes in Washington County.

Though traffic accidents can happen anywhere along roadways, there are several areas of interest in Washington County. In the western portion of the county, Interstate 68 terminates at its intersection with Interstate 70 just outside Hancock's corporate limits. The signage is adequate, but the ingress/egress exits for US Route 522 make this area somewhat confusing for those unfamiliar with the area. According to MDOT traffic volume maps (2021), between

20,000 and 40,000 vehicles travel the interstates near this intersection, with another 12,000 on US 522 (over 24-hour periods).

The intersection of Interstates 70 and 81 just outside of Hagerstown also represents a heavily traveled, often congested area, with 74,000+ vehicles north on I-81 (just above I-70) and 64,000 south on I-81 (MDOT, 2021). The entire I-81 corridor through Washington County, which enters the county at Williamsport and exits near the Hagerstown Regional Airport, is heavily traveled, with a substantial amount of truck traffic. Several portions of I-81 running through Berkeley County, West Virginia, are under construction, and when (and if) this construction reaches the state line, additional congestion could occur.

Traffic accidents can range from minor inconveniences for those involved to major, community-wide events. The MDOT defines crashes as per the following list (2022b).

- **Aggressive Driver Crash:** A crash in which a driver has one of the following values in both the first and second contributing circumstance fields of the Maryland crash report: failed to yield the right of way; failed to obey stop sign; failed to obey traffic signal; failed to obey other traffic control; failed to keep right of center; failed to stop for school bus; exceeded speed limit; too fast for conditions; followed too closely; improper lane change; improper passing; failure to obey traffic signs, signals, or officer; disregarded other road markings; other improper action; or operated motor vehicle in erratic/reckless manner.
- **Distracted Driving Crash:** At least one driver in the crash was reported to be distracted, defined by having values of either 'failure to give full time and attention' or 'cell phone in use' or 'inattentive' in the contributing circumstance field, or any of the following values in the driver distracted by field: looked but did not see; other electronic device (tablet, GPS, MP3 player, etc.); by other occupants; by moving object in vehicle; talking or listening on cellular phone; dialing cellular phone; adjusting audio and/or climate controls; using other device controls integral to vehicle; using device/object brought into vehicle (non-electronic); distracted by outside person, object, or event; eating or drinking; smoking-related; other cellular phone related; lost in thought; or texting from a cellular phone.
- **Impaired Driving Crash (Driver-Involved Alcohol or Drugs):** At least one driver in the crash was reported to be under the influence of alcohol and/or drugs. (Please note that this number includes drug impairment and will not match alcohol-impaired fatality figures provided by NHTSA FARS. FARS also includes imputation to account for missing/unknown data.) Impairment is determined through the driver's condition, blood

alcohol content, substance use detected, and contributing factor fields on the Maryland crash report. A driver in a crash is considered impaired if the report indicates.

- Person condition of 'had been drinking,' 'using drugs,' or 'influenced by medications and/or drugs and/or alcohol'; or
- Blood alcohol concentration (BAC) between .01 and .50; or
- Substance use of 'alcohol contributed,' 'illegal drugs contributed,' 'medication contributed,' or 'combination contributed'; or
- Contributing circumstances of 'under the influence of drugs', 'under the influence of alcohol,' 'under the influence of medication,' or 'under combined influence.'

- **Motorcycle-Involved Crash:** Crashes involving at least one motorcycle, defined as a 'motorcycle' in the vehicle body type field.
- **Older/Mature Driver (Age 65+) Crash:** At least one driver in the crash was reported to be between the ages of 65 and 110.
- **Speed-Involved Crash:** At least one driver in the crash was reported to be speeding, defined by having values of either 'exceeded speed limit' or 'too fast for conditions' in the first or second contributing circumstance fields.
- **Young Driver (Age 16-20) Crash:** At least one driver in the crash was reported to be between the ages of 16 and 20.

Bridges are another aspect of the transportation system. The following map shows 1,335 bridges in Washington County. Though not directly attributable to transportation accidents, bridges can be a contributing variable. For instance, during severe winter weather, bridges often freeze before other roadways, making them more treacherous than the surrounding roadways.

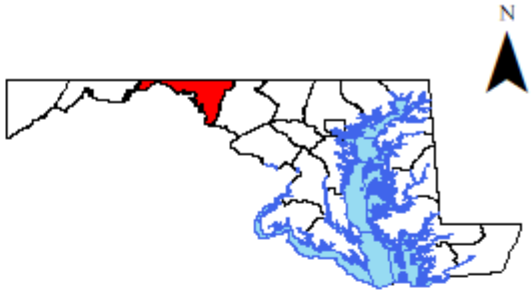
WASHINGTON COUNTY HAZARD MITIGATION PLAN

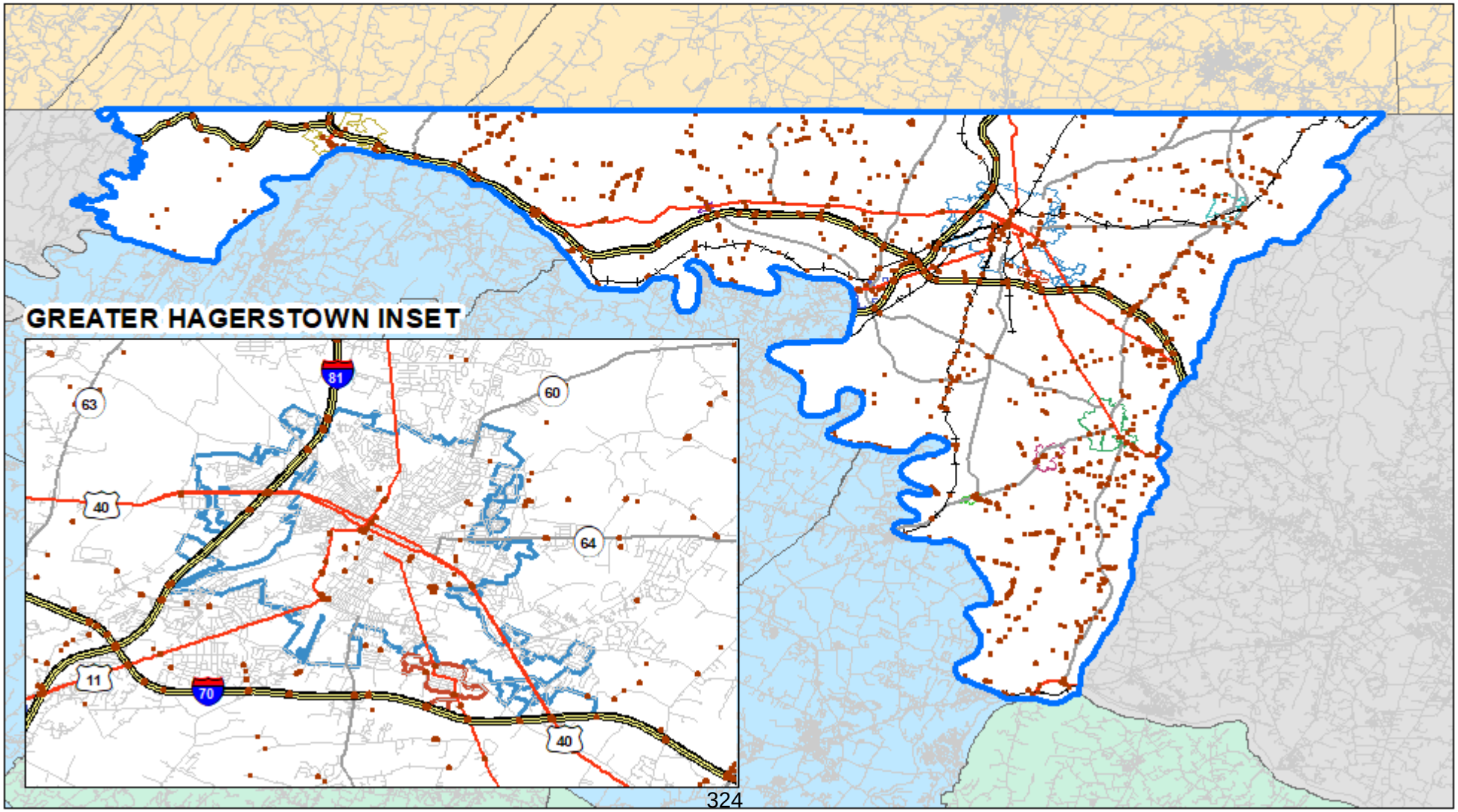
Bridges in Washington County

Data Source(s):
MDOT, Washington County GIS

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

Bridges





According to the Federal Railroad Administration (FRA), rail transportation accidents are generally one of three types (USDOT FRA, 2020).

- **Derailment:** An accident on a railway in which a train leaves the rails
- **Collision:** An accident in which a train strikes something, such as another train or highway motor vehicle
- **Other:** Accidents caused by other circumstances like obstructions on rails, fire, or explosion

Derailments are rare, but they can be particularly damaging. They are usually high-profile events, and when they occur, they highlight the challenges associated with maintaining the vast railway infrastructure. During the final drafting of this plan, three high-profile derailments occurred: (a) a Norfolk Southern train just outside of East Palestine, Ohio (February 3, 2023), (b) a Union Pacific train in Nebraska (February 21, 2023), and (c) a collision between a freight and passenger train in Tempi, Greece (February 28, 2023). The ASCE grades Maryland's rail infrastructure at a C+, one of the highest-graded infrastructure systems in the state (2020). (Only Aviation [B-], Ports [B-], Solid Waste [B-], and Bridges [B] rank higher.)

The Federal Aviation Administration's (FAA) guideline on aircraft accident and incident notification, investigation, and reporting defines an aircraft accident as "an occurrence associated with the operation of an aircraft which takes place between the time any person boards the aircraft with the intention of flight and until all such persons have disembarked, and in which any person suffers death or serious injury, or in which the aircraft receives substantial damage. All aspects of the exceptions to substantial damage should be considered before making a final substantial damage determination that would classify the occurrence as an accident" (8020.11D, 2018, p. 2). Washington County is home to three runways, two of which are (i.e., 2-20 and 9-27) at the Hagerstown Region Airport (HGR). There is also a small runway at the Potomac Airpark. Maryland's aviation-related infrastructure received a grade of B- from the ASCE's infrastructure report card (2020).

Impacts and Vulnerability

At a minimum, transportation accidents damage vehicles and cause minor injuries to passengers and drivers. At worst, significant transportation accidents can result in death or severe injury, extensive property damage, traffic congestion, and temporary business interruption. Most car accidents in Washington County result in injury or property damage only. Between 2018 and 2022, 0.65% of all accidents in Washington County involved a fatality.

The effects of a transportation accident are exacerbated if the vehicles (either motor vehicles or trains) carry hazardous materials. An accident of this nature could cause environmental and human harm and property damage. See Section 2.2.6 for more information.

Social Vulnerability Considerations

Direct links to social vulnerability from transportation accidents are not readily available. However, a discussion of transportation more generally offers insight. A potential contributing variable to accidents is traffic congestion. A more robust public transit system may alleviate some congestion and decrease accidents, while at the same time opening up opportunities for those households without a vehicle.

Historical Occurrences

MDOT provides annual accident reports that show the number of vehicle accidents per county. The table below indicates accidents in Washington County from 2018-2022 (Maryland's Open Data Portal, 2023).

MOTOR VEHICLE CRASHES IN WASHINGTON COUNTY, 2018-2022

Year	*Total Crashes*	*Fatal Crashes*	*Injury Crashes*	*Property Damage Only Crashes*
2022	2,490	21	707	1,762
2021	2,439	12	662	1,765
2020	2,299	11	656	1,632
2019	2,500	22	776	1,702
2018	2,636	14	768	1,854
Totals	**12,364**	**80**	**3,569**	**8,715**
Averages	**2,472.8**	**16.0**	**713.8**	**1,743.0**

The Federal Railroad Administration provides county-specific information about railway accidents in the United States. Between 2018 and 2021, the FRA reported three derailments involving no fatalities or injuries but $181,470 in damages (USDOT FRA, 2022). Washington County has also experienced air incidents. The National Transit Safety Bureau (NTSB) provides data on aviation incidents by county. According to the NTSB, there have been three fatalities related to aviation incidents. The table below shows aviation accidents in Washington County since 1982 (n.d.).

AVIATION ACCIDENTS IN WASHINGTON COUNTY		
Date	*Make/Model*	*Event Severity*
2/15/1982	PIPER PA-28R-180	Non-Fatal
4/1/1984	CESSNA 172H	Non-Fatal
7/5/1985	CESSNA 172H	Non-Fatal
8/27/1989	BEECH C50	Fatal (2)
3/7/1991	PIPER PA-24-250	Non-Fatal
3/22/1991	PIPER PA-24-250	Non-Fatal
1/30/1993	CESSNA 150K	Non-Fatal
3/17/1993	PIPER PA-28R-200	Non-Fatal
11/17/2000	Cessna 172K	Non-Fatal
4/13/2001	Piper PA-34-200	Non-Fatal
6/20/2002	Mooney M20	Non-Fatal
7/26/2002	Beech S-35	Fatal (1)
5/30/2006	Classic Aircraft Corp. Waco YMF	Non-Fatal
7/23/2009	Robinson Helicopter R44	Fatal (4)
7/17/2014	CESSNA 172P	Non-Fatal

Loss and Damages

Nationally, the National Highway Traffic Safety Administration (NHTSA) estimated the total economic costs of motor vehicle crashes in 2019 at $339.8 billion. Medical expenses constituted $30.9 billion of that estimate, property damage $115.3 billion, lost productivity $106.3 billion, and congestion impacts at $36 billion (with all other crash-related costs at $51.4 billion) (2023, p. 5). Within these totals, approximately 4.5 million people were injured. The NHTSA estimated 14.2 million motor vehicle crashes in 2019 (2023, p. 2).

Using the NHTSA data as a foundation, planners calculated the per-incident economic impact as $23,900 (i.e., $339.8 billion in losses / 14.2 million crashes). This per-crash calculation, when combined with local data (noted above), suggests the following.

- **2018:** 2,636 crashes X $23,900 in losses = $63,000,400
- **2019:** 2,500 crashes X $23,900 in losses = $59,750,000
- **2020:** 2,299 crashes X $23,900 in losses = $54,946,100
- **2021:** 2,439 crashes X $23,900 in losses = $58,292,100
- **2022:** 2,490 crashes X $23,900 in losses = $58,511,000

Future Occurrences[1]

Based on the number of past occurrences, a transportation accident is likely to occur in Washington County. Most accidents will likely involve motor vehicles, though a train or airplane accident is possible. The ASCE's infrastructure report card (2020) connects the state of the transportation infrastructure system to the individual transportation accident. Without investment, especially in bridges, the number of transportation accidents impacting more than a small number of vehicles related to a failing infrastructure may increase. While overall, the number of bridges in Maryland listed in poor condition is lower than the national average, the average age of Maryland bridges is 48 (bridges have a 50-year lifespan), with over 25% being over 60 years old.

Spatially, the site of future occurrences of transportation accidents and infrastructure issues is simple to determine. The existing infrastructure will be the location, and officials plan upgrades to these systems years ahead, allowing for the estimation of future sites not yet served by a transport system.

Vulnerability Assessment

This section summarizes the vulnerability of Washington County to transportation accidents. The steering committee conducted an online survey for the public to share its thoughts on the hazards listed in this plan. The following table presents the results of that survey, specifically regarding transportation accidents.

PUBLIC SENTIMENT, TRANSPORTATION ACCIDENTS					
Hazard	*Level of Concern*				*Total Responses*
	Not at All	*Somewhat*	*Concerned*	*Very*	
Transportation Accidents	13 (10.32%)	44 (34.92%)	39 (30.95%)	30 (23.81%)	126
In the past ten years, do you remember this hazard occurring in your community?				57 (45.20%)	126
Have you noticed an increase in the occurrences or intensity of this hazard?				66 (52.38%)	126
Have you noticed a decrease in the occurrences or intensity of this hazard?				2 (1.59%)	126

The following table assigns point totals based on the methodology identified in Section 2.2: Profile Hazards above.

[1] Future climate considerations are not included because transportation accidents are a technological hazard.

TRANSPORTATION ACCIDENTS RISK RANKING			
Category	*Points*	*Description*	*Notes*
Frequency	5	Excessive (will occur in a year)	Washington County averages 1,743 vehicle accidents per year.
Response	2	One day	Most vehicle accidents are cleared in under an hour. However, federal agencies responsible for rail and air accidents may take up to 24 hours to respond.
Onset	4	Less than 6 hours	Accidents can occur with no warning at any time.
Magnitude	1	Localized (less than 10% of land area affected)	Most transportation accidents are usually localized events.
Business	1	Less than 24 hours	
Human	3	Medium (multiple severe injuries)	There have been 80 fatal accidents and 3,569 accidents with injuries in five years representing approximately 30% of all vehicle accidents.
Property	1	Less than 10% of property affected	Transportation accidents are usually localized events.
Totals	**17**	**MEDIUM**	

FEMA's *Local Mitigation Planning Handbook* (2023c) directs entities compiling multi-jurisdictional plans to identify any jurisdictions within the planning area for which the identified risks or vulnerabilities are more or less prevalent as compared to the other participating jurisdictions. The following table quickly synthesizes the data to capture the jurisdiction-specific aspects of risks and vulnerabilities for each city or town.

MULTI-JURISDICTIONAL CONSIDERATIONS, TRANSPORTATION ACCIDENTS		
Jurisdiction	*Comparison*	*Notes*
Washington County	**More**	**All participating jurisdictions contain transportation infrastructure; however, the majority of the transportation infrastructure is in unincorporated areas, including roadways, bridges, rail lines, and the airport.**
Boonsboro	(Slightly) Less	The town has numerous municipal streets and a small number of larger thoroughfares that provide access to the area. It includes only a small number of bridges and no rail lines.
Clear Spring	(Slightly) Less	The town has numerous municipal streets and a small number of larger thoroughfares that provide access to the area. It includes only a small number of bridges and no rail lines.
Funkstown	Same	Funkstown, like the other participating towns, has municipal streets and US 40 in its corporate limits. It also has a handful of bridges. Funkstown's southern corporate limit, though, borders I-70. Though there is not an exit into the town, an accident along the stretch bordering the town could impact it.
Hagerstown	(Slightly) More	The city contains the most compact transportation infrastructure of any participating municipality. Its transportation network includes bridges, extensive roadways (including a portion of I-81), and railways. Additionally, its emergency services may be called upon to support major transportation accident responses elsewhere in the county.

MULTI-JURISDICTIONAL CONSIDERATIONS, TRANSPORTATION ACCIDENTS		
Jurisdiction	*Comparison*	*Notes*
Hancock	(Slightly) More	Hancock has municipal streets and several bridges; however, it sits at the interchange of I-68 and I-70, which is also the point at which US 522 merges with the interstates. This interchange is busy and potentially difficult to navigate for travelers unfamiliar with the area.
Keedysville	Less	The town has numerous municipal streets and a small number of larger thoroughfares that provide access to the area. It includes only a small number of bridges and no rail lines.
Sharpsburg	Less	The town has numerous municipal streets and a small number of larger thoroughfares that provide access to the area. It includes only a small number of bridges and no rail lines.
Smithsburg	Same	Smithsburg has a small number of bridges and predominantly municipal-style streets. However, it has a rail line in its corporate limits.
Williamsport	(Slightly) More	Williamsport's corporate limits include US routes, state routes, municipal streets, and a portion of I-81 adjacent to its eastern corporate limits. Though there are no rail lines in the town, there are two lines, one north and one south, near to the corporate limits. The town also houses several small bridges.

2.2.14 Wildfire

Wildland fires involve uncontrolled fires that spread rapidly through vegetative fuels (i.e., forests, grasslands, and prairies), exposing and possibly consuming structures.				
Vulnerability HIGHEST HIGH MEDIUM LOW LOWEST	**Period of Occurrence:**	At any time, but most commonly in the spring and fall	**Washington County Risk Ranking:**	Medium
	Warning Time:	Less than 6 hours	**State Risk Ranking:**	Medium-High
	Probability:	Excessive (will occur during a year)	**Impact:**	Localized (less than 10% of land area affected)
	Type of Hazard:	Natural	**Disaster Declarations:**	N/A

Hazard Overview

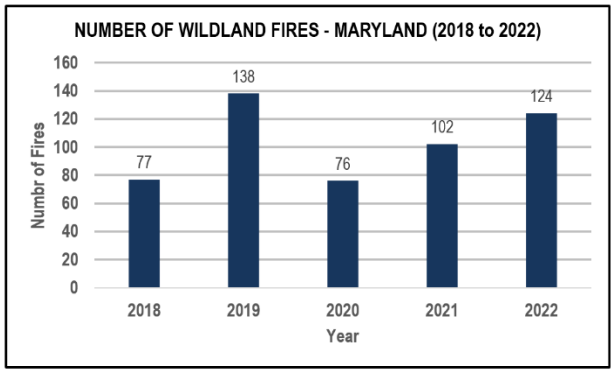
Fire is the state, process, or instance of combustion in which fuel or other material is ignited, combines with oxygen, and gives off heat, light, and flame. A wildland fire is an unplanned, uncontrolled fire that spreads rapidly through vegetative fuels (i.e., forests, grasslands, and prairies), exposing and possibly consuming structures. Wildland fires often begin unnoticed and can spread quickly, creating dense smoke visible for miles.

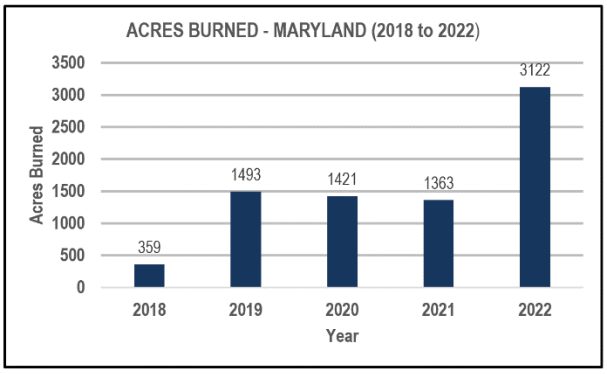
Wildland fires can happen at any time of the year; however, they mainly occur during prolonged, dry, windy, hot spells with low humidity. Maryland's wildland fire seasons are in the spring (i.e., March, April, and May) before vegetation has matured and greened, and in the fall (i.e., October and November) when leaf drop occurs. Any small fire in a wooded area, if not quickly detected and suppressed, can get out of control. Human carelessness, negligence, and ignorance cause most wildland fires (i.e., debris burning, arson, equipment fires, smoking, campfires, etc.). In some instances, lightning strikes can precipitate spontaneous combustion.

The National Park Service (NPS) lists causes of wildfires as either human-caused or nature-caused. Human-caused fires "result from campfires left unattended, the burning of debris, negligently discarded cigarettes and intentional acts of arson," which account for up to 90% of fires. Lightning or lava causes the remaining 10% of fires (NPS, 2022).

The Maryland Department of Natural Resources (MDNR) maintains annual wildland fire reports, which illustrate the number of wildland fires and acres burned, as well as the cause of wildland fires. Per the table and graphics below, 517 wildland fires occurred between 2018 and 2022, burning approximately 7,760 acres, caused mainly by people burning debris. Debris burning was the cause of roughly 37% of all fires reported over the five-year period (MDNR, n.d.).

WILDLAND FIRES & ACRES BURNED BY CAUSES – MARYLAND (2018 to 2022)		
Cause	*Number of Fires*	*Acres Burned*
Arson	93	6,278
Campfire	22	32
Children	12	9
Debris Burning	193	352
Equipment Use	55	302
Lightning	21	268
Miscellaneous	89	251
Railroads	8	9
Smoking	24	258
Totals	**517**	**7,759**





The MDNR Forest Service enforces open-air burning regulations within the state. These regulations apply to activities within 200 feet of woodlands or those adjacent to flammable materials that could ignite and carry fire to woodland areas. The regulations state that adequate personnel and equipment must be present to prevent fires from escaping and that at least one responsible person remains at the location of a fire until the last spark is out. Burning must occur during the hours of 4 p.m. and 12 a.m.

Location and Extent

The National Fire Danger Rating System (U.S. Forest Service, n.d.) is a system that allows fire officials to estimate current fire danger for a given area based on available fuels, weather, topography, and other risks.

- **Low:** When the fire danger is “low,” fuels do not ignite easily, and a more intense heat source is necessary to start fires. Dry grasslands may burn quickly, but wood fires will spread slowly, and controlling these fires is typically not difficult.
- **Moderate:** When the fire danger is "moderate," fires can start from accidental causes. Still, the number of fire starts is generally low. If a fire does start on open, dry grassland,

it can spread quickly on windy days. Most wood fires spread slowly or moderately. The average fire intensity will be moderate, except in heavy concentrations of fuel. Fires are still not likely to become severe and are typically easy to control.

- **High:** When the fire danger is "high," fires can start quickly from most fuel sources. Unattended campfires and brush fires are likely to escape and can spread rapidly. Fires can become serious and difficult to control unless extinguished while small.
- **Very High:** When the fire danger is "very high," fires will start quickly from most fuel sources, spread rapidly, and increase in intensity following ignition. These fires can be challenging to control and will often become much more extensive and longer-lasting than fires in lower categories.
- **Extreme:** When the fire danger reaches “extreme,” fires of all types can start quickly and burn intensely. All fires are potentially dangerous and can spread rapidly with intense burning. Small fires become larger much faster than at the “very high” level. Long-distance fire spotting is likely. These fires can become dangerous and often last for several days.

“Wildland fires are a common occurrence in Maryland. In an average year, the Maryland Forest Service responds to an average of 123 wildland fires, which burn more than 1,780 acres of land. Each year, hundreds of homes and structures are threatened, and dozens are damaged or destroyed by wildfires across the state” (MDNR, n.d.). Because forests cover more than 35% of Washington County's land surface, wildfire is a significant concern. With 22,000 acres of forest in high fire risk areas owned by the State of Maryland, particularly in the mountains between Sideling Creek and Clear Spring and on South Mountain, the MDNR may take a leading role in wildland fire suppression throughout the county.

Scholars refer to an area called the "wildland-urban interface," or WUI when discussing wildfire risk. (See MDNR, n.d., for additional information.) Radeloff and colleagues (2005) defined the WUI as "…the area where houses meet or intermingle with undeveloped wildland vegetation" (citing the USDA and USDI, 2001, p. 800). Critically, the WUI does not recognize an area where wildfires are more or less prone to occur. Instead, it identifies areas that can expect higher wildfire-related damages should an incident occur. It is difficult to understand that the WUI, even in a single county, is not a place, per se, but conditions that exist. Thus, the WUI can be a rural subdivision in a wooded or vegetative area or three to four homes on an open range (wildlandfirersg.org, 2020).

The map below illustrates the areas in Washington County that could be susceptible to wildland fires. It shows areas with potential fuels (i.e., brushy areas, coniferous forests, deciduous

forests, and mixed forests) in relation to human development. The building footprints identified on the map are those within 2.4 kilometers (Radeloff et al., 2005) of those woodland fuel areas. Since wooded areas (and, by extension, structures within 2.4 kilometers of those areas) are interspersed throughout the county, the pink structure outlines identify those within an estimated *primary* wildland-urban interface area.

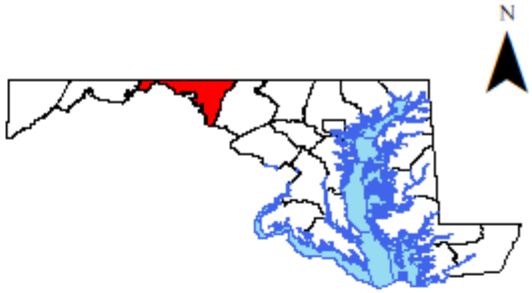
WASHINGTON COUNTY HAZARD MITIGATION PLAN

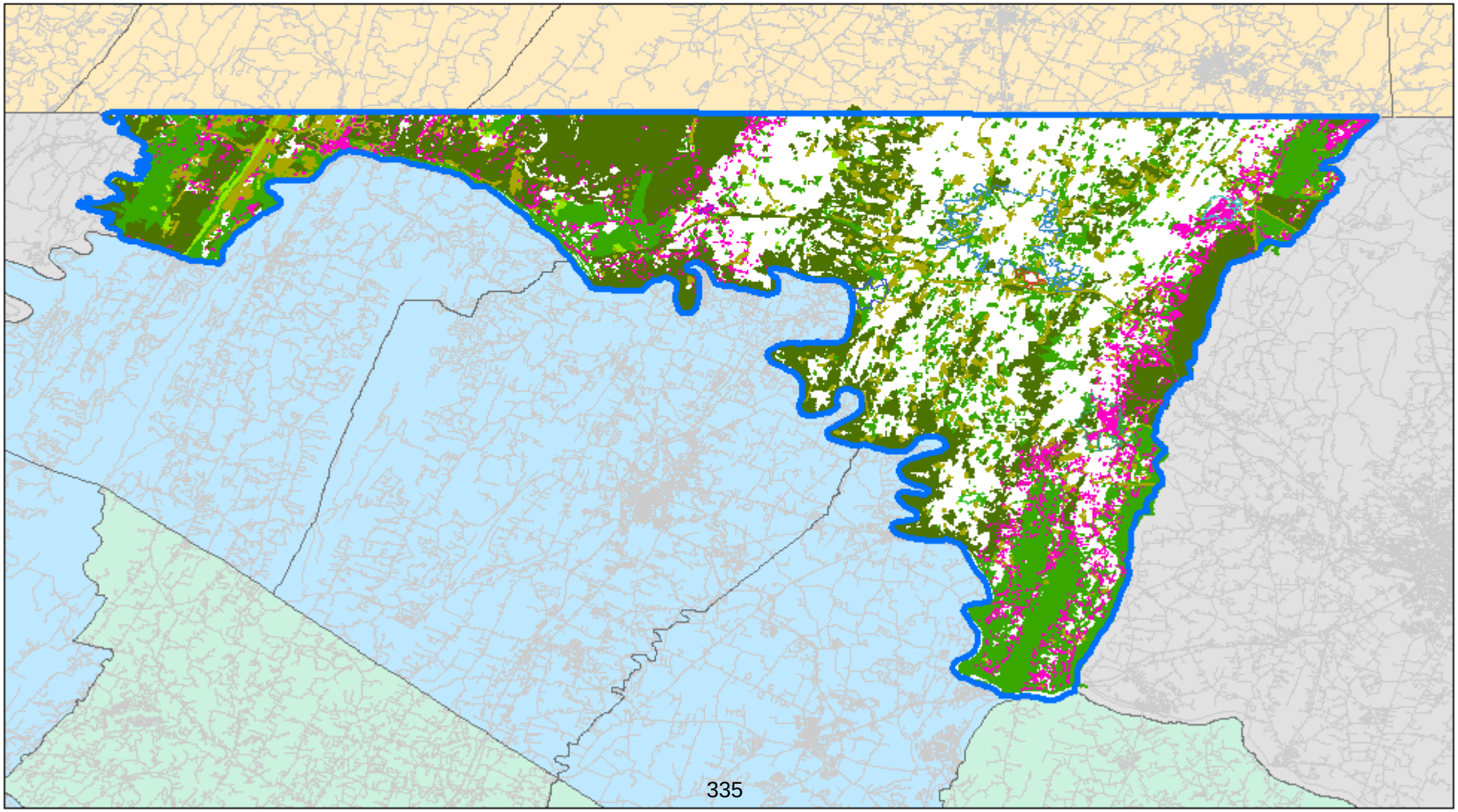
Wildfire Risk Areas w/ Estimated WUI

Data Source(s):
USGS NLCDt (2019), Washington County GIS

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

- Structures, Primary WUI
- Brush
- Coniferous Forest
- Deciduous Forest
- Mixed Forest





Impacts and Vulnerability

A common cause of wildland fires in Maryland is debris burning. These fires typically start small but spread by wind to dead grass and leaves bordering woodlands. The number and severity of wildfires depend on external factors such as drought, human activity, wind activity, and the amount of available fuel. Wildland fires can burn less than one acre up to thousands of acres in a short period. These fires can destroy recreational areas, community infrastructure, cultural and economic resources, timber, forage, wildlife habitats, scenic vistas, and watersheds. Secondary effects of wildfires include erosion, increased landslide potential, the introduction of invasive species, and changes in air and water quality.

The demographic effects of wildland fires can be high depending on the location of the fire. Many communities within Washington County border larger forested areas and are within wildland-urban interfaces. In addition, the large number of tourist attractions, including parks, forests, and campgrounds, depending on the time of year, can increase the demographic effect as temporary population densities increase well within the forest boundaries. The fiscal effects can be considerable due to the disruption of infrastructure (i.e., roads, rails, and bridges) or loss of commercial and industrial facilities. A wildfire could also have a devastating effect on the timber and forest product industries.

Social Vulnerability Considerations

Wigtil and colleagues (2016) studies the intersection of wildfire potential and social vulnerability in the coterminous United States. Their study identified a number of variables that could be relevant, such as owner-occupied vs. renter-occupied homes, poverty, unemployment, etc. Other social variables, such as land use trends, housing development, vegetative management practices, etc., factored into the overall discussion surrounding wildfires. Ultimately the variables they used to create a custom social vulnerability index included the following.

- Median gross rent
- Median house value
- Median age
- Per capita income
- People per unit
- Percentage of population under 5 and over 65
- Percentage female in labor force
- Percentage female-headed households
- Percentage mobile homes
- Percentage of housing units w/ no cars
- Percentage of congregate populations
- Percentage poverty

- Percentage of various minority statuses
- Percentage civilian unemployment
- Percentage of population aged 25+ with less than 12th grade education
- Percentage with English as a second language
- Percentage employment in extraction industries
- Percentage female
- Percentage renters
- Percentage of households earning $200,000+ annually
- Percentage employment in service industry
- Percentage of households receiving social security
- Percentage unoccupied housing units

Their analysis led to the creation of the following two graphics. The first graphic shows a social vulnerability score (p. 901).

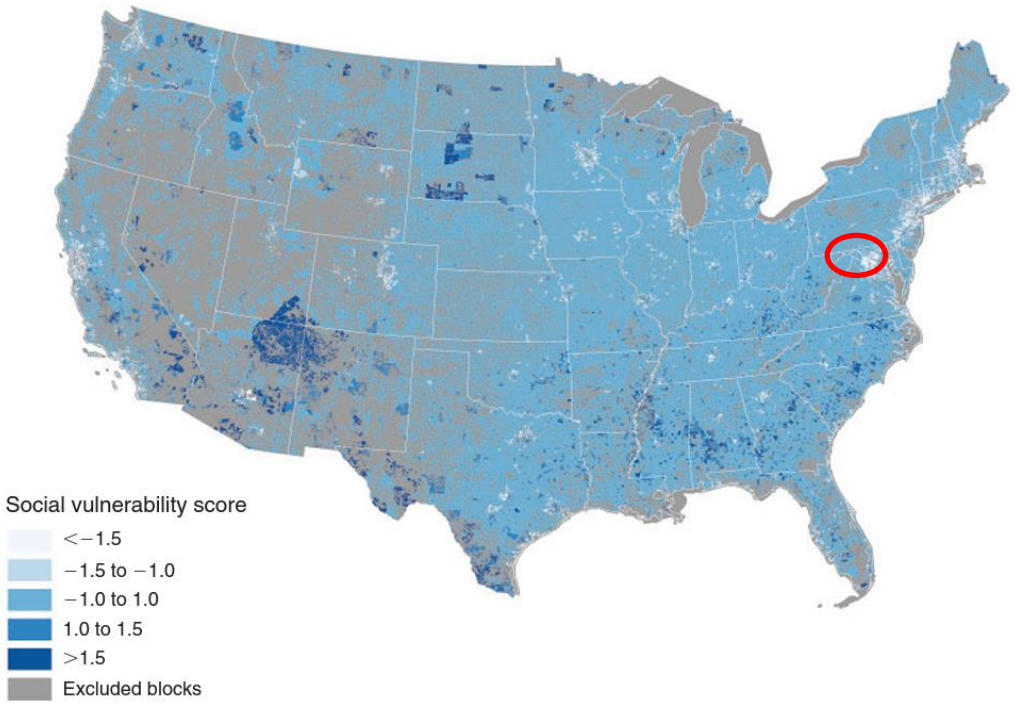


Fig. 1. Social vulnerability scores for the coterminous US.

The second graphic integrated the social vulnerability and wildfire potential data (p. 903). Though it is difficult to see, when zooming into the image, there are portions of the map near Washington

County's location with a slightly brighter pink color, indicating "Moderate" in both wildfire potential and social vulnerability.

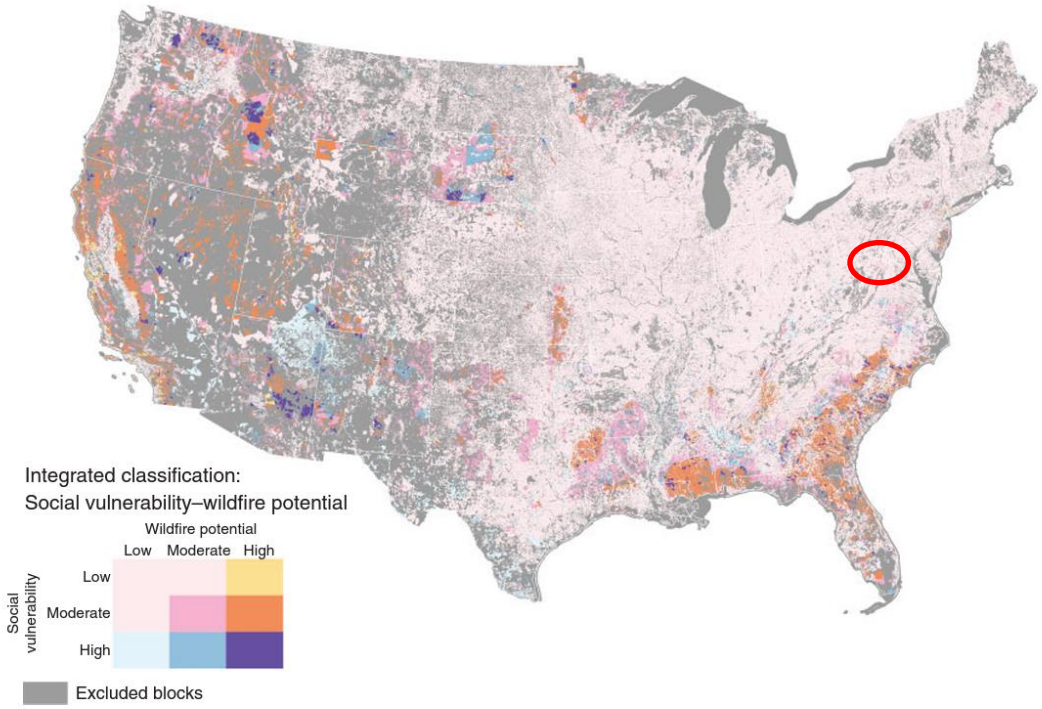


Fig. 4. Intersection of social vulnerability and wildfire potential.

Historical Occurrences

As noted, the MDNR maintains annual wildland fire reports for the state. The most current reports are between the years of 2018 and 2022. These reports present data by region; Washington County is part of the state's western region. Generally, wildfires in the western region occur during March and April, often caused by burning debris. Calendar Year 2018 was the year that most acres burned. From 2018 to 2022, 82 wildfires in the western region burned a reported 174 acres (MDNR, n.d.).

WILDLAND FIRES – WESTERN REGION						
Year	*Must Active Months*			*Total Fires Western Region*	*Total Acres Burned Western Region*	*Main Fire Cause across the State*
	Month	*# Fires*	*Acres*			
2018	April	44	296	20	56.2	Debris Burning
	May	12	13			
2019	Sept.	30	89	18	41.5	Debris Burning
	October	33	148			
2020	March	19	58	16	36.5	Debris Burning
	April	17	41			
2021	March	25	89	16	22	Debris Burning
	Dec	17	211			
2022	March	34	65	12	18	Debris Burning
	April	26	96			
			Totals	**82**	**174.2**	

April 2023 Forest Fire

A forest fire started on Thursday, April 13, 2023, near Blair's Valley Lake. Units from Washington County, as well as Franklin County (Pennsylvania) and Frederick County, responded, along with the MDNR. The MDNR Forest Service attributed the fire to extremely dry spring weather (Simmons, 2023).

Loss and Damages

Estimating monetary losses to wildland fire is difficult as the vast majority of wildland fires in Maryland occur in open land or fields. However, regarding exposure (i.e., potential losses), the greater the number of people and property in an area and the more variables for wildland fire severity of that area, the greater the potential loss.

The data that is consistently available are the number of acres burned per event. For this estimate, planners divided the total number of acres burned from 2018 to 2022 for the western region of Maryland by the number of events. An average of 2.1 acres were burned per event in western Maryland between 2018 and 2022 (MDNR, n.d.). According to information obtained from the U.S. Department of the Interior and the U.S. Forest Service (Hurst, 2023), since 1985, the entities have spent $1.1 billion per year on fighting wildfires for a total of $41 billion. These figures amount to approximately $15,500 for every fire.

Future Occurrences

The wildland urban interface map above shows areas in Washington County that are currently in interfacing areas, and of course, future construction in those regions would be subject to the same type of concern. The largest designated growth areas along the I-81 corridor

(including Funkstown, Hagerstown, and Williamsport) are already more urbanized and located well away from the areas that interface with densely-wooded parcels, steep terrain, etc. Changes in land use and development in these areas will not likely affect wildfires impact significantly. The western portions of the growth areas surrounding Boonsboro and Smithsburg, though, are adjacent to more wooded and steeply sloping areas heading up the western face of South Mountain. Local officials must remain mindful of the potential for wildfire risk, particularly as some developers may accentuate a wooded, more secluded element to future residential development in these areas. Development around Clear Spring is on the edge of the more densely-wooded western third of the county; again, mindfulness of risk for development in that area will be key. The growth area surrounding Hancock is the most impacted by the wildfire risk.

Changes in population patterns, with respect to wildfire, are more subtle. Though the entire county's population has steadily increased, Hancock's population in the western portion of the county has fluctuated and, per the 2020 Census, is down 22% from a high of 2,004 residents in 1960. Migration patterns seem to suggest that growth on the eastern side of the county is more pronounced (particularly given more general growth in the National Capital Region). Though risk is not absent in these eastern areas, as suggested by the preceding paragraph, the central and eastern portions of Washington County are less at risk of devastating wildfire impacts.

Seasons are changing in length and timing in Washington County, with earlier springs, delayed falls, and shorter winters (NOAA MARISA, 2022). This seasonal shift could lengthen the fire season.

Future Climate Considerations

Warmer temperatures mean higher evaporation rates, and thus, things dry out more quickly. Drier vegetation is more likely to burn if something sparks a flame. In many cases, the spark is accidental, but stronger storm events (often attributed to a changing climate) may include more lightning. As such, a changing climate may impact two variables of the fire risk (i.e., drier fuel and potential spark) rather than directly causing fires.

According to FEMA (2023b), "(c)limate change is already causing an increase in the scale and total burn area of wildfires across the United States" (p. B-14). Wildfire incidence occurs thanks to a range of variables, both natural and human, including temperature, soil moisture, relative humidity, wind speed and direction, and vegetative fuels (USGCRP, 2018). The Cybersecurity & Infrastructure Security Agency (CISA) reports that increases in surface air vapor pressure deficit levels are driving more frequent wildfire occurrences (n.d.). Further, forest management practices popular in the United States have yielded forests with higher fuel densities,

which is having a notable impact in the western portions of the country (USGCRP, 2018). Though most data examining the relationship between climate change and wildfires is (understandably) from the western U.S., the *Fourth National Climate Assessment* finding that warmer spring temperatures, longer summer dry seasons, drier soils, and drier vegetation have altered the wildfire season (timing and length) has implications for forested communities across the country (USGCRP, 2018).

Vulnerability Assessment

This section summarizes the vulnerability of Washington County to wildfires. The steering committee conducted an online survey for the public to share its thoughts on the hazards listed in this plan. The following table presents the results of that survey, specifically regarding structural, industrial, and wildland fires (which were combined for the purposes of the survey).

PUBLIC SENTIMENT, FIRE (STRUCTURAL / INDUSTRIAL / WILDLAND)					
Hazard	*Level of Concern*				*Total Responses*
	Not at All	*Somewhat*	*Concerned*	*Very*	
Fire	28 (22.22%)	56 (44.44%)	24 (19.05%)	18 (14.29%)	126
In the past ten years, do you remember this hazard occurring in your community?				25 (19.84%)	126
Have you noticed an increase in the occurrences or intensity of this hazard?				15 (11.90%)	126
Have you noticed a decrease in the occurrences or intensity of this hazard?				5 (3.97%)	126

For site-specific hazards like wildfire, planners can identify specific facilities sitting within risk areas. The following table lists the assets (taken from the asset inventory listed in Section 1.2 above) located in the county's forested areas.

ASSETS LOCATED IN SPECIAL WILDFIRE HAZARD AREAS								
Critical Facility	*Economic Asset*	*Historic Consideration*	*Special Consideration*	*Vulnerable Population*	*Asset Type*	*Name*	*Address*	*City*
		X			Site	Antietam Furnace Complex Archeological Site	22043 Mt. Aetna Rd.	Hagerstown (unincorporated)
				X	School	Clear Spring Middle School	12628 Broadfording Rd.	Clear Spring (unincorporated)

ASSETS LOCATED IN SPECIAL WILDFIRE HAZARD AREAS								
Critical Facility	*Economic Asset*	*Historic Consideration*	*Special Consideration*	*Vulnerable Population*	*Asset Type*	*Name*	*Address*	*City*
X					Fire	Fire Training Center	940 Bowman Ave.	Hagerstown
X					Infrastructure	Hagerstown WWTP	1 Cleanwater Circle	Hagerstown
X					Infrastructure	Keedysville WTP	33 Mt. Hebron Rd.	Keedysville
		X			Building	Marsh Mills	17426 & 17432 Spielman Rd.	Fairplay (unincorporated)
X					Infrastructure	Spring House	33 Mt. Hebron Rd.	Keedysville

The following table assigns point totals based on the methodology identified in Section 2.2: Profile Hazards above.

WILDFIRE RISK RANKING			
Category	*Points*	*Description*	*Notes*
Frequency	5	Excessive (Will occur during a year)	There were 82 fire events reported in the western region of the state over five years (i.e., 2018 to 2022), for a regional average of 16.4 incidents per annum. The total acreage burned from the 82 events was 174 acres for an average of 2.1 acres burned per fire event.
Response	3	One week	Wildland fires in the region are typically small and easily contained; however, they may still require a small-scale response for up to a week.
Onset	4	Less than 6 hours	Officials can easily predict wildland fire conditions, but fires occur with no notice.
Magnitude	1	Localized (Less than 10% of land area affected)	The average wildland fire is typically small in size and is less than 10% of Washington County's land area.
Business	2	One week	Most wildland fires in Washington County are small; however, there is the possibility of some businesses being impacted for up to one week.
Human	2	Low (Some injuries)	Generally, the risk of injury or death due to wildland fires is low. First responders to the event may experience adverse health effects.
Property	1	Less than 10% of property affected	The average wildland fire in Washington County would burn less than 10% of the county's land area. By proxy, wildland fires would impact less than 10% of the property in the county.
Totals	**18**	**MEDIUM**	

FEMA's *Local Mitigation Planning Handbook* (2023c) directs entities compiling multi-jurisdictional plans to identify any jurisdictions within the planning area for which the identified risks or vulnerabilities are more or less prevalent as compared to the other participating jurisdictions. The following table quickly synthesizes the data to capture the jurisdiction-specific aspects of risks and vulnerabilities for each city or town.

MULTI-JURISDICTIONAL CONSIDERATIONS, WILDFIRE		
Jurisdiction	*Comparison*	*Notes*
Washington County	**More**	**Riskfactor.com (n.d.) lists the county's wildfire risk as "Minor," the lowest category in its rating system. However, the vast majority of the forested wildfire risk areas are unincorporated, as are the WUI areas.**
Boonsboro	(Slightly) More	Riskfactor.com (n.d.) indicates Boonsboro's wildfire risk as "Minor." Though only portions of the town are wooded, Boonsboro sits at the edge of what planners estimated as a wildland-urban interface.
Clear Spring	Same	Riskfactor.com (n.d.) indicates Clear Spring's wildfire risk as "Minor." Clear Spring is located close to estimated wildland-urban interface areas, but it is not within them.
Funkstown	Less	Riskfactor.com (n.d.) indicates Funkstown's wildfire risk as "Minor." Funkstown is minimally wooded and not located within a wildland-urban interface area.
Hagerstown	Less	Riskfactor.com (n.d.) indicates Hagerstown's wildfire risk as "Minor." Hagerstown is minimally wooded and not located within a wildland-urban interface area. Further, a paid fire department serves the city.
Hancock	More	Riskfactor.com (n.d.) indicates Hancock's wildfire risk as "Minor." Hancock, sitting in the western portion of the county, is entirely surrounded by forested areas, many of which are in corporate limits.
Keedysville	(Slightly) More	Riskfactor.com (n.d.) indicates Keedysville's wildfire risk as "Minor." Though only portions of the town are wooded, Keedysville sits at the edge of what planners estimated as a wildland-urban interface.
Sharpsburg	(Slightly) Less	Riskfactor.com (n.d.) indicates Sharpsburg's wildfire risk as "Minor." Sharpsburg is minimally wooded (less so than Williamsport), but it is in a more rural area, which means mutual aid support for fire response may take longer to arrive.
Smithsburg	(Slightly) More	Riskfactor.com (n.d.) indicates Smithsburg's wildfire risk as "Minor." Though only portions of the town are wooded, Smithsburg sits at the edge of what planners estimated as a wildland-urban interface.
Williamsport	Less	Riskfactor.com (n.d.) indicates Williamsport's wildfire risk as "Minor." Williamsport is minimally wooded and not located within a wildland-urban interface area.

2.0 RISK ASSESSMENT

2.3 Risk & Vulnerability Implications from Development Trends

§201.6(c)(2)(ii)(C)	[The plan should describe vulnerability in terms of] providing a general discussion of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.

Section 1.2 above presents information about development trends in Washington County. This section revisits those trends and applies lessons learned from the risk assessment (i.e., Section 2.0) to the trend discussion.

The mapping in the "analyzing development trends" subsection of Section 1.2 calls out "growth areas," and the narrative explains that local officials target these areas for commercial and industrial development as well as large-scale residential development. The majority of Washington County is not a designated growth area, which is a strategic decision made by local officials. The county and the participating municipalities value their rurality, as do residents (based on sentiments shared via the public survey). The use of growth areas and the intentional down-zoning of the non-growth areas (allowing for much less dense single-family residential development and the preservation of open space) preserves much of this character. From the perspective of risk reduction, it maintains areas throughout the county for naturalized mitigation (e.g., green space that can absorb water from heavy precipitation, naturalized streams, etc.).

Proactive mitigation considerations for the growth areas will likely be necessary. Construction and development can change natural drainage paths and create or increase flood risks. Industrial companies may impound water for their operations, causing land disturbances. Timbering processes may alter natural drainage paths or change the vegetation available to absorb rainwater. Changes to wetlands and erosion are other land disturbances that impact the permeability of areas.

Though most of the growth areas lie outside of special flood hazard areas (SFHAs) related to riverine flooding, flash floods from runoff during heavy precipitation events may be a concern, particularly as new commercial and industrial developments pave more and more of the land in growth areas with impervious surfaces. New buildings, parking lots, and roads (i.e., impervious surfaces) mean less land to absorb excess precipitation forcing water into places it previously would not reach. Additionally, the Intergovernmental Panel on Climate Change (IPCC) suggests that areas in the Northeast (including Maryland) could see an increased risk of extreme precipitation and flooding. At the first steering committee meeting, attendees noted the increased

frequency of severe, hyper-local storms. Some areas of the county may experience heavy rain in a short period, while other nearby areas may experience little precipitation. Further, storms forecasted to be minor have in them pockets of heavy precipitation, leading to relatively small areas (in geographic terms) of severe damage. These changing weather conditions often interact with the built environment to create damage related to runoff.

The following map identifies the areas of the county listed as "Developed, High Intensity," with greater than 80% of the land area consisting of impervious surfaces, as well as “Developed, Medium Intensity,” which have between 50 and 79% of land areas covered with impervious surfaces.

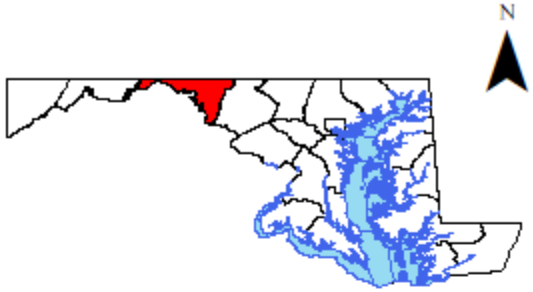
WASHINGTON COUNTY HAZARD MITIGATION PLAN

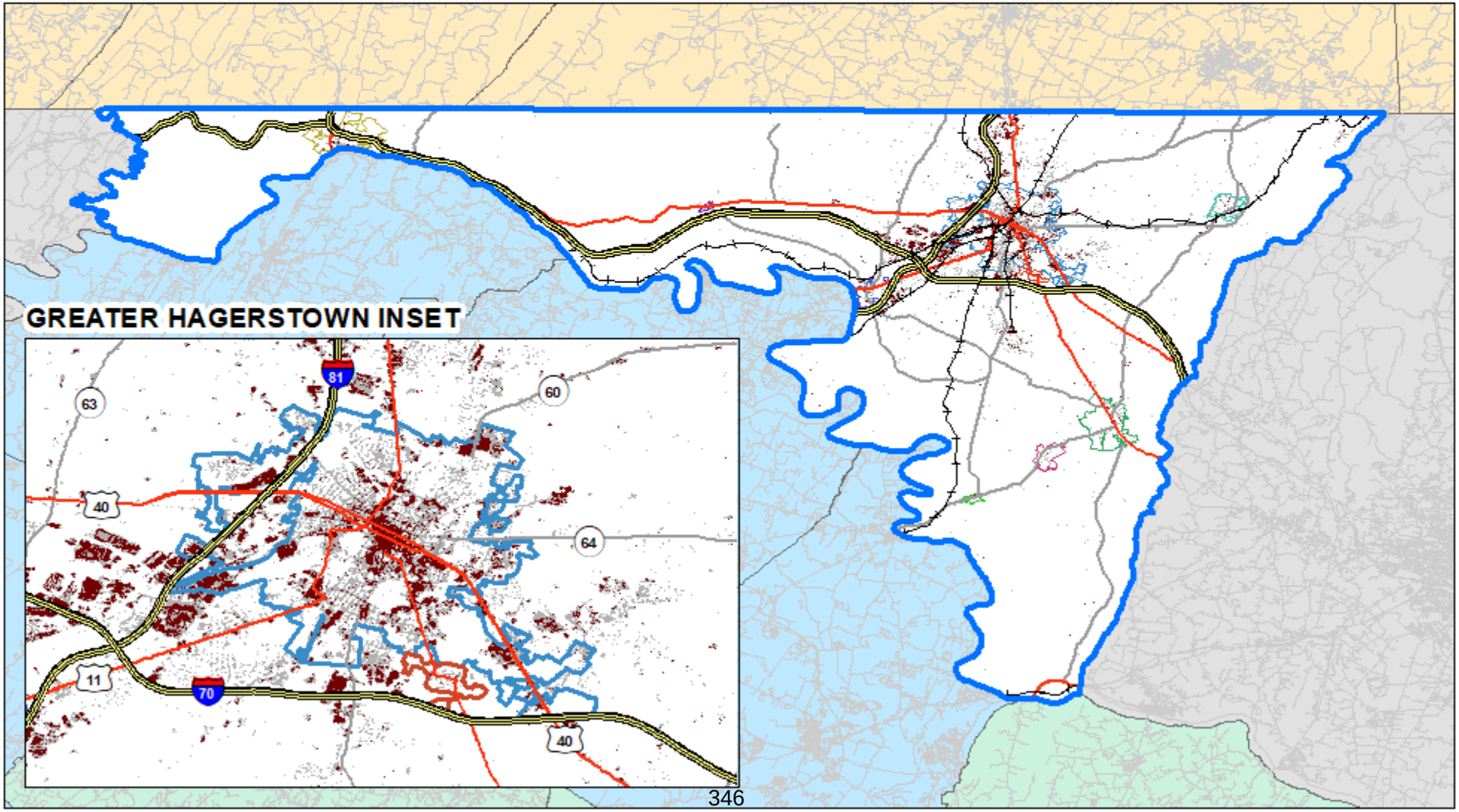
Impervious Surfaces

Data Source(s):
USGS National Land Cover Dataset (2019)

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

50-79% Impervious
80%+ Impervious





The intersection of these areas with SFHAs may provide local leaders with insights as to where to concentrate hazard mitigation efforts related to stormwater management and flash flooding. The map below identifies places in the county greater than 50% impervious *and* in a special flood hazard area.

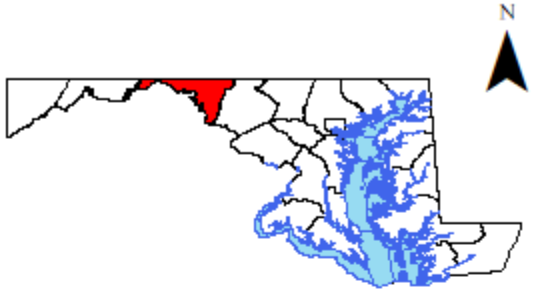
WASHINGTON COUNTY HAZARD MITIGATION PLAN

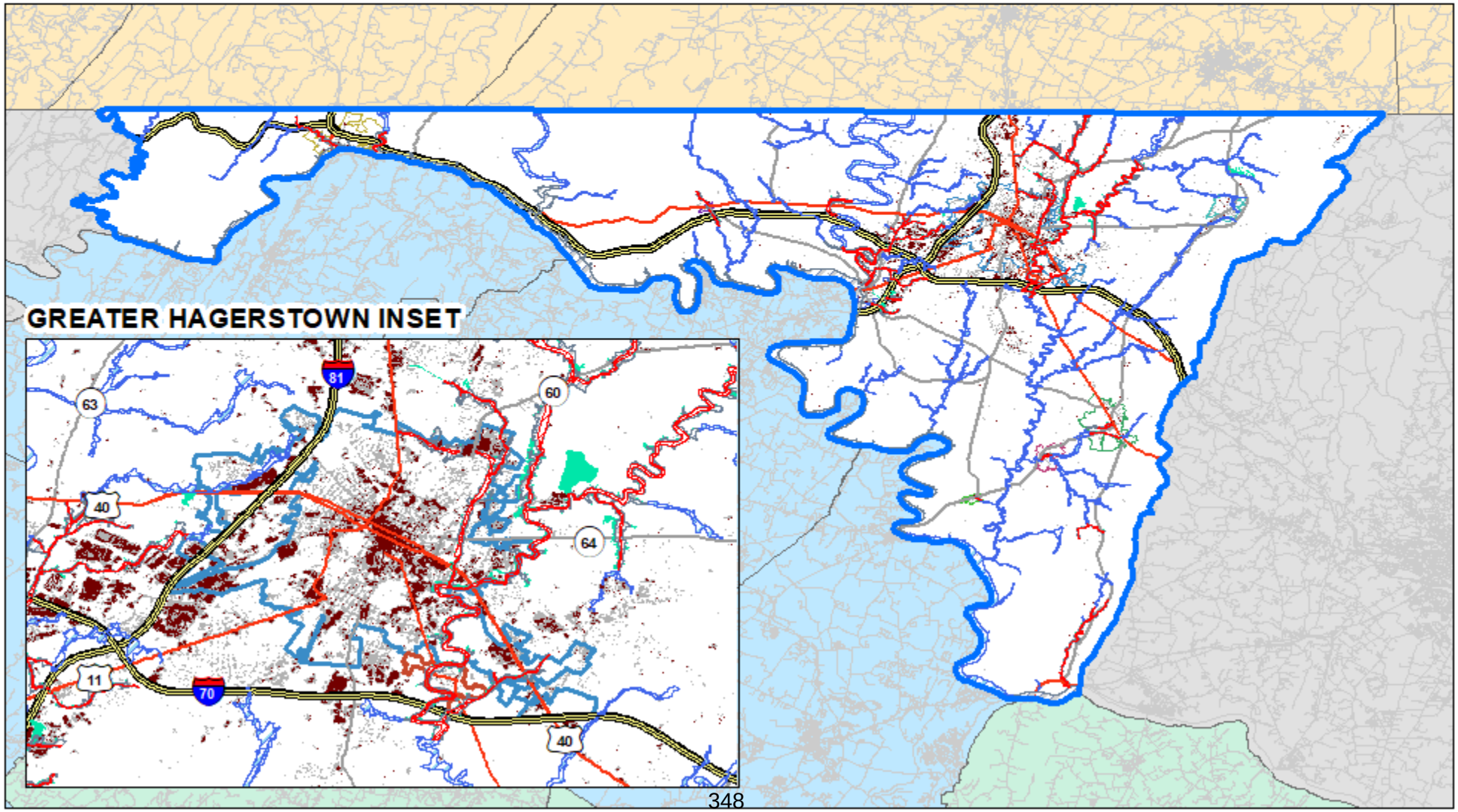
Intersection of Growth Areas and SFHAs

Data Source(s):
FEMA Region III, Washington County GIS

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

- SFHA Floodway
- SFHA (Zone AE)-1% Annual Chance
- SFHA (Zone A)-1% Annual Chance
- SFHA-0.2% Annual Chance
- 50-79% Impervious
- 80%+ Impervious





To date, there has been permitted development in *some* special flood hazard areas; it has not been significant, and there is no evidence of *significant* changes to waterflow patters as a result. There has been development (e.g., large warehouse facilities and associated parking/delivery areas, additional small commercial developments with paved parking areas, etc.) that has changed runoff patterns, particularly in the greater Hagerstown area, and there is a need to further study the nature of these changes.

The answer is not always to limit development, and this narrative does not advocate restricting development within the growth areas. Instead, the governmental bodies for the municipal areas (and the county government for the unincorporated areas) within the designated growth areas may encourage (or consider requiring) mitigation measures like on-site stormwater management through retention basins and other green infrastructure solutions as part of future development projects. Many of the existing stormwater management regulations that are in place (e.g., the Washington County Grading, Stormwater Management, Soil Erosion, and Sediment Control Ordinance and the City of Hagerstown stormwater management permit) already encourage these measures. Their necessity may become more evident in the future.

A unique concern related to development for Washington County is the issue of land subsidence. Sinkholes plague many areas of Washington County and may impact commercial, industrial, and large residential developments. The primary growth area – i.e., the urban core emanating off of Interstate 81 that includes Funkstown, Hagerstown, and Williamsport – and areas around the towns on the eastern side of the county are on top of dolomite and limestone, which are known features of Karst geology. The following map shows the geologic features alongside the designated growth areas.

WASHINGTON COUNTY HAZARD MITIGATION PLAN

Intersection of Growth Areas and Karst Geology

Data Source(s):
USGS SSURGO, Washington County GIS

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

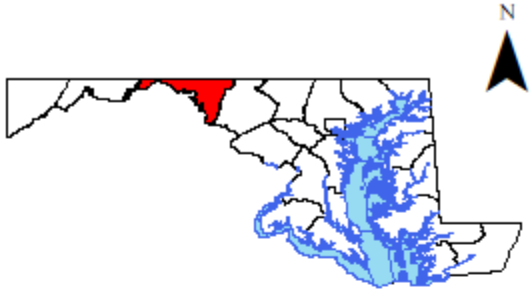
Growth Areas

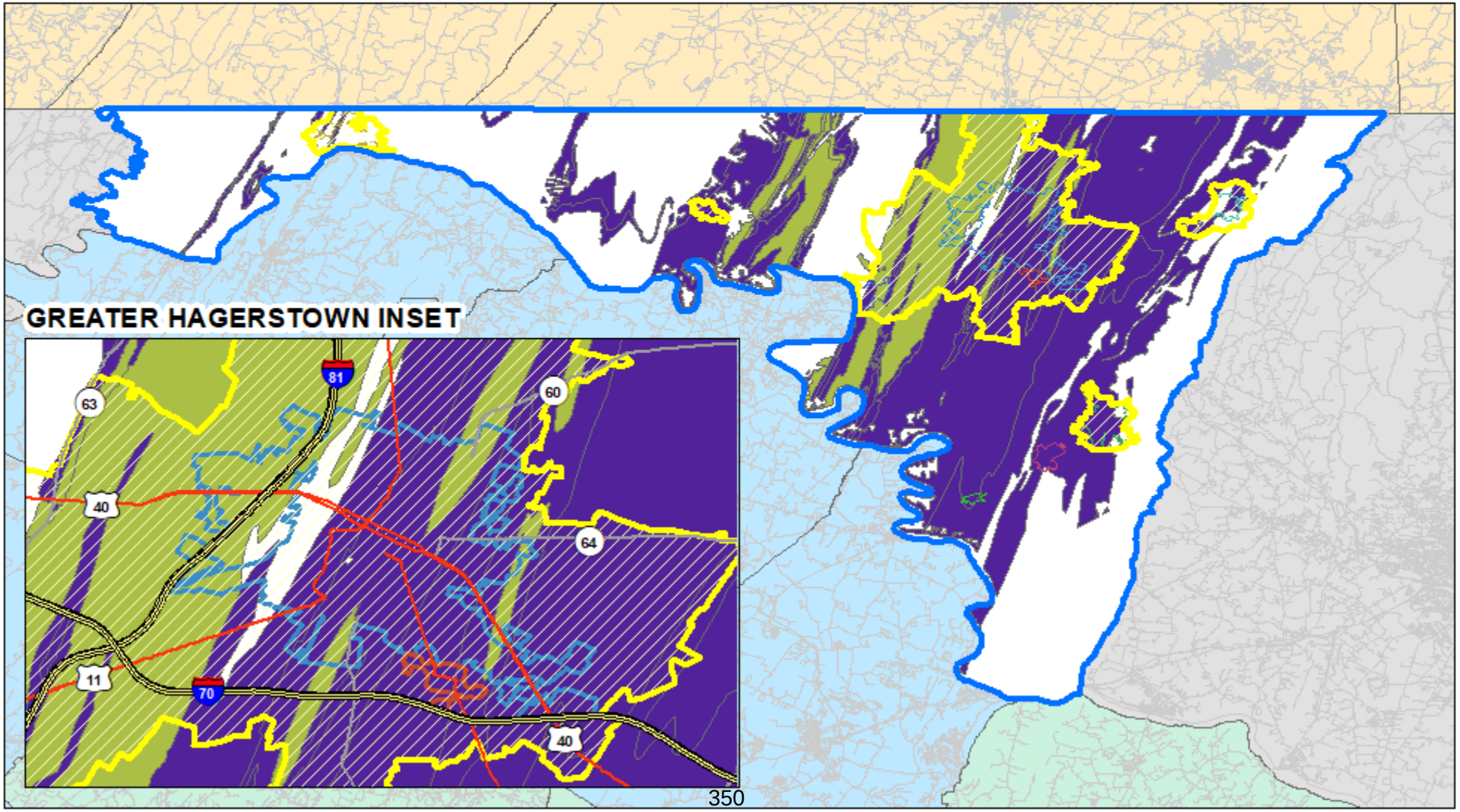
Karst Geology

Dolomite

Limestone

N





Several areas within the urban growth area are also underlain by soil types prone to shrinking and swelling. So-called expansive soils are well-known hazards for residential homes, sometimes causing extensive problems for foundations (Tabassum & Bulut, 2023). Additionally, many homeowners' insurance policies do not cover damage from expansive soils (King, n.d.). To conclude this section of the risk assessment, the following map shows the areas within designated growth areas potentially at-risk of expansive soil hazards. For development in these areas – commercial, industrial, or residential – local officials may consider working with insurers to ensure disclosure of subsidence risks. The governmental jurisdictions covering these areas (i.e., the county, Boonsboro, Clear Spring, Funkstown, Hagerstown, Smithsburg, and Williamsport) may consider the implications of subsidence for their building codes.

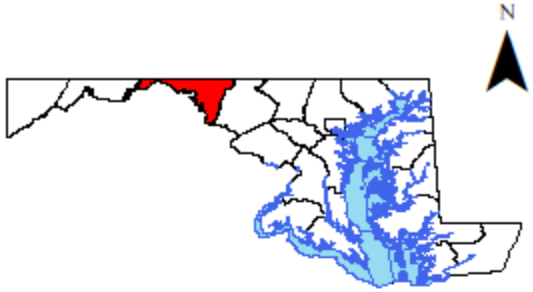
WASHINGTON COUNTY HAZARD MITIGATION PLAN

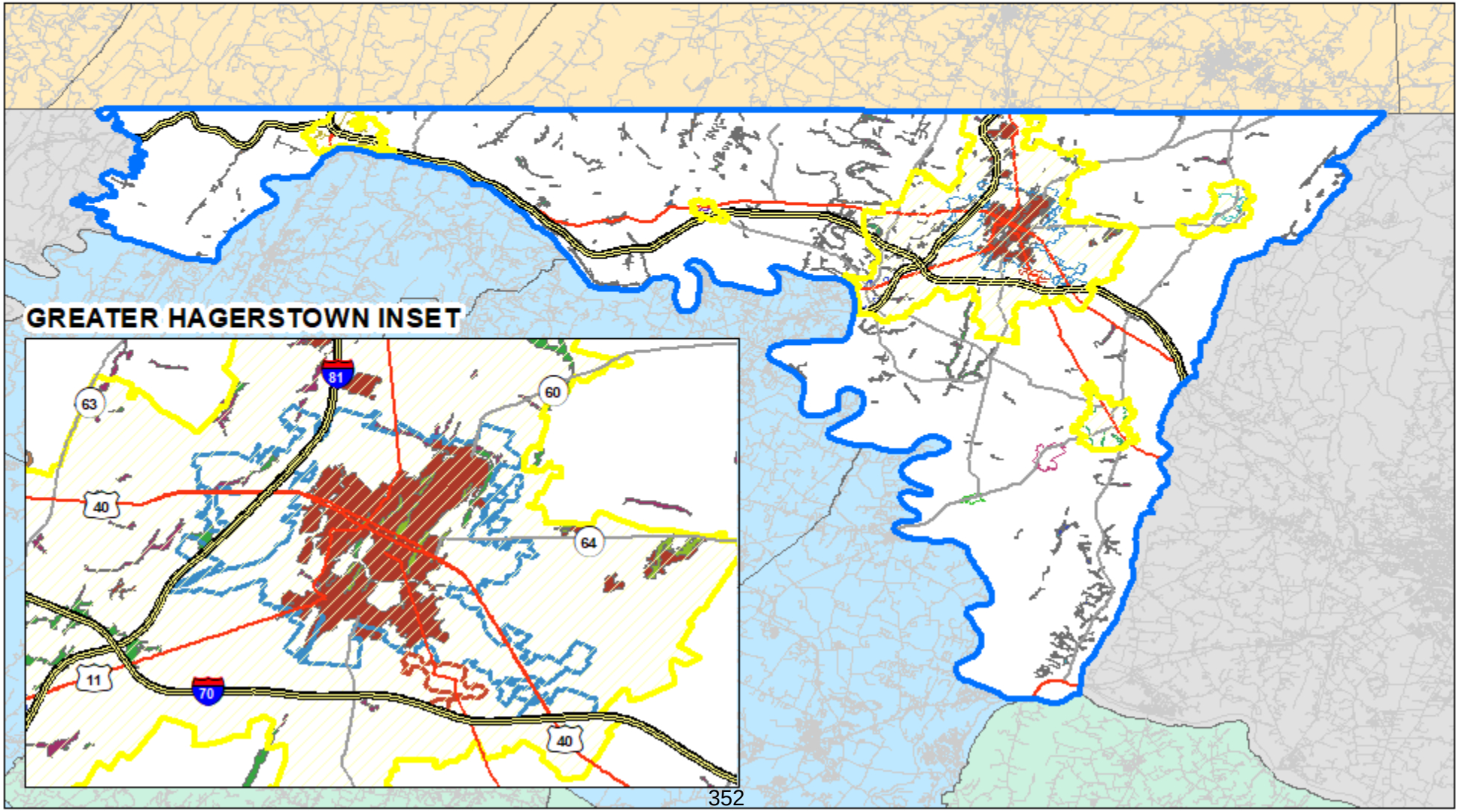
Intersection of Growth Areas and Expansive Soils

Data Source(s):
USGS SSURGO, Washington County GIS

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

- Growth Areas
- AnB
- At
- BtB
- Fa
- Hh
- LaB
- Me
- RhB
- TyA
- TyB
- UrB
- UrD





Washington County's steering committee discussed structural and industrial fires in the preceding risk assessment. There has been considerable development of large warehouse facilities along I-70 and I-81 near Hagerstown. The locations of these facilities take advantage of the robust transportation network. Steering committee members expressed concern, not for the fact that these developments came to the area, but rather of the challenges posed to firefighting (at facilities with significant fuel loads, for example). Other steering committee members noted the increased tractor trailer traffic associated with them. The impact of these facilities on the industrial fire and transportation accident risks should be carefully monitored during the upcoming cycle.

Direct, measurable consequences of disasters can include fatalities, injuries, and damages to humans, animals, or property. Disasters do not end there; there are several indirect effects, tangible and intangible, associated with them. Some examples of these include loss of livelihood and income, loss of community and population, mental and psychological impacts, costs of rebuilding, repair or replacement, loss of inventory, wages and tax revenue, etc. (Bullock, Haddow, & Coppola, 2017). All of these also have a cost associated with them. Still, it is much more challenging to assign a specific dollar value and quantify them accurately. Often, disasters exacerbate risks already in a community (Comfort et al., 1999; Raker, Arcaya, Lowe, Zacher, Rhodes, & Waters, 2020). For instance, in areas where poverty is a concern, a disaster makes the challenges faced by those living in poverty much more difficult. In areas where access to public services is a concern, disasters may highlight how segments of the population cannot access assistance. Local leaders in areas where public trust in governmental systems is low may have difficulty rallying residents to follow the community's response strategy.

In Washington County, Census tracts with socially vulnerable populations (e.g., persons below 150% of the poverty rate, persons with no high school diploma, single-parent households, persons speaking English "less than well," households with no vehicle available, etc.) overlap designated growth areas. Local officials should remain mindful of the challenges these populations face regarding access to information and resources as well as in participating in community initiatives. Ensuring their ability to participate in decision-making about risk reduction will be vital to ensuring the community remains inclusive, responsive, and resilient.

Countless instances of the hazards identified in Section 2.2 could disrupt critical infrastructure systems throughout the county. Loosely-related variables, often considered *cascading hazards*, can complicate some events. For example, high winds may cause sporadic damage but usually do not become a significant countywide concern until a large number of residents are without power. In addition to weather-related power outages, cascading hazards in Washington County could include (but not be limited to) the following.

- Damage to infrastructure (i.e., roads, bridges, pipelines, utility poles, etc.) and residences following flooding
- Flooding of downstream or protected areas in the event of a dam failure
- Drinking water supply shortages and contamination following severe and prolonged drought conditions or floods
- Power outages, ruptured gas lines, etc. following severe weather
- Public health concerns following flooding conditions
- Permanent or temporary population displacement before, during, or after an event

The following table summarizes these development trends for the jurisdictions participating in this plan. It utilizes the definition of "changes in development" from the FEMA's *Local Mitigation Planning Police Guide* (2022c), and provides space for descriptions to briefly explain the reasoning for identified increases and decreases. The key for the table is as follows.

- Changes have resulted in an **Increase** in vulnerability for the jurisdiction (↑)
- Changes have resulted in **No Change** in vulnerability for the jurisdiction (↔)

There were no instances of a recognized decrease in vulnerability. The policy guide definitions appear in the table as follows (2022c, p. 31).

- **Recent Development:** For example, construction completed since the last plan was approved.
- **Potential Development:** For example, development planned or under consideration by the jurisdiction.
- **General Trends:** Conditions that may affect the risks and vulnerabilities of the jurisdictions (for example, climate change, declining populations or projected increases in population, or foreclosures).
- **Social Vulnerability:** Shifts in the needs of underserved communities or gaps in social equity. This can also include changes in local policies, standards, codes, regulations, land use regulations, and other conditions.

Participating jurisdictions marked several hazards with "No Change" regarding social vulnerability because there is a growing understanding of the social impacts related to the hazards that affect the area, yet that growing awareness does not indicate a similarly-increasing risk.

SUMMARY OF DEVELOPMENT TREND IMPLICATIONS FOR RISK & VULNERABILITY											
Change Type	*WC*	*BOO*	*CLE*	*FUN*	*HAG*	*HAN*	*KEE*	*SHA*	*SMI*	*WIL*	*Notes*
DAM FAILURE											
Recent Development Potential Development General Trends Social Vulnerability	**Development trends have not caused increases or decreases in vulnerability to dam failure for any participating jurisdictions**										
DROUGHT											
Recent Development Potential Development General Trends Social Vulnerability	**Development trends have not caused increases or decreases in vulnerability to drought for any participating jurisdictions**										
EXTREME TEMPERATURES											
Recent Development	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	N/A
Potential Development	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	N/A
General Trends	↔	↔	↔	↔	↑	↔	↔	↔	↔	↔	The climate data shown in 2.2.3 suggests the county is currently an outlier to larger national trends; however, Hagerstown may experience issues surrounding urban heat islands.
Social Vulnerability	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	N/A
FIRE (STRUCTURAL / INDUSTRIAL)											
Recent Development	↑	↔	↔	↑	↑	↔	↔	↔	↔	↑	Recent large warehouse development near the I-70/I-81 interchange was noted throughout the update process.
Potential Development	↑	↔	↔	↑	↑	↔	↔	↔	↑	↑	See preceding note on warehouse development. Smithsburg was added per planned residential developments and necessary upgrades to the water system (i.e., pressures per fire protection).
General Trends	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	N/A
Social Vulnerability	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	N/A
FLOODING											
Recent Development Potential Development General Trends Social Vulnerability	**Development trends have not caused increases or decreases in vulnerability to flooding for any participating jurisdictions.** Despite this "No Change" indication, there is a growing awareness of the impacts of runoff as new areas develop.										

SUMMARY OF DEVELOPMENT TREND IMPLICATIONS FOR RISK & VULNERABILITY											
Change Type	*WC*	*BOO*	*CLE*	*FUN*	*HAG*	*HAN*	*KEE*	*SHA*	*SMI*	*WIL*	*Notes*
HAZARDOUS MATERIALS											
Recent Development	**Development trends have not caused increases or decreases in vulnerability to hazardous materials for any participating jurisdictions.**										
Potential Development											
General Trends											
Social Vulnerability											
LAND SUBSIDENCE											
Recent Development	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	N/A
Potential Development	↔	↔	↔	↑	↑	↔	↔	↔	↔	↔	The map earlier in this section identifies concentrations of areas with expansive soils in the growth areas that include Funkstown and Hagerstown.
General Trends	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	N/A
Social Vulnerability	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	N/A
OPIOID EPIDEMIC											
Recent Development	**Development trends have not caused increases or decreases in vulnerability to the opioid epidemic for any participating jurisdictions.**										
Potential Development											
General Trends											
Social Vulnerability											
REPORTABLE DISEASE EPIDEMIC											
Recent Development	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	N/A
Potential Development	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	N/A
General Trends	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	N/A
Social Vulnerability	↔	↔	↔	↔	↔	↑	↔	↔	↔	↔	Hancock appears as an "increase" here simply because it is the jurisdiction with lowest percentage of households without a broadband subscription (per correlations with digital options during the COVID-19 pandemic).
SEVERE SUMMER WEATHER											
Recent Development	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	N/A
Potential Development	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	N/A
General Trends	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	Representatives from all participating jurisdictions noted the greater intensity and variability of summer weather in recent years. See the climate discussion in 2.2.10.
Social Vulnerability	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	N/A

SUMMARY OF DEVELOPMENT TREND IMPLICATIONS FOR RISK & VULNERABILITY											
Change Type	*WC*	*BOO*	*CLE*	*FUN*	*HAG*	*HAN*	*KEE*	*SHA*	*SMI*	*WIL*	*Notes*
SEVERE WINTER WEATHER											
Recent Development Potential Development General Trends Social Vulnerability	**Development trends have not caused increases or decreases in vulnerability to severe winter weather for any participating jurisdictions.**										
TORNADO											
Recent Development	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	N/A
Potential Development	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	N/A
General Trends	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	Though the county (generally) has seen steady growth and development, there are structures in all participating jurisdictions that are aging (i.e., built pre-building codes) that may be at more and more risk.
Social Vulnerability	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	N/A
TRANSPORTATION ACCIDENTS											
Recent Development	↑	↔	↔	↑	↑	↑	↔	↔	↔	↑	Recent developments within and external to Washington County have yielded more traffic. The highlighted jurisdictions are those that include (or are adjacent to) interstate highways.
Potential Development	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	N/A
General Trends	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	N/A
Social Vulnerability	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	N/A
WILDFIRE											
Recent Development	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	N/A
Potential Development	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	N/A
General Trends	↑	↔	↔	↔	↔	↔	↔	↔	↔	↔	Climate changes may alter the dry periods of the year, which may impact the availability of fuel for wildfires. The unincorporated areas of the county contain more densely-wooded areas.
Social Vulnerability	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	N/A

Perhaps one of the most significant trends has to do with the climate changes that communities are experiencing. “Climate change” is a divisive topic, and it has garnered substantial political attention in recent years. However, changes to the climate, regardless of the root cause, carry implications for risk and vulnerability to natural hazards. There is an important distinction between weather and climate. Weather refers to the atmospheric conditions of a geographical region over a short period, such as days or weeks. Climate, in contrast, refers to the atmospheric conditions of a geographic area over long periods, such as years or even decades (Keller & Devecchio, 2015, pp. 406-407). According to the U.S. Global Change Research Program (2018), there are weather and climate changes already observed in the United States.

- Since recordkeeping began in 1895, the average U.S. temperature has increased by 1.3°F to 1.9°F, with most of the increase happening since 1970. Also, the first decade of the 2000s was the warmest on record.
- The average precipitation across the U.S. has increased since 1900, with some areas experiencing higher than the national average and others lower. Heavy downpours are increasing, especially over the last 30 to 50 years.
- Drought events have increased in the West. Changes in precipitation and runoff, combined with changes in consumption and withdrawal, have reduced surface and groundwater supplies in many areas.
- Some types of severe weather events have experienced changes. Heat waves are more frequent and intense, and cold waves have become less frequent and intense overall.
- The intensity, frequency, and duration of North Atlantic hurricanes have increased since the early 1980s.

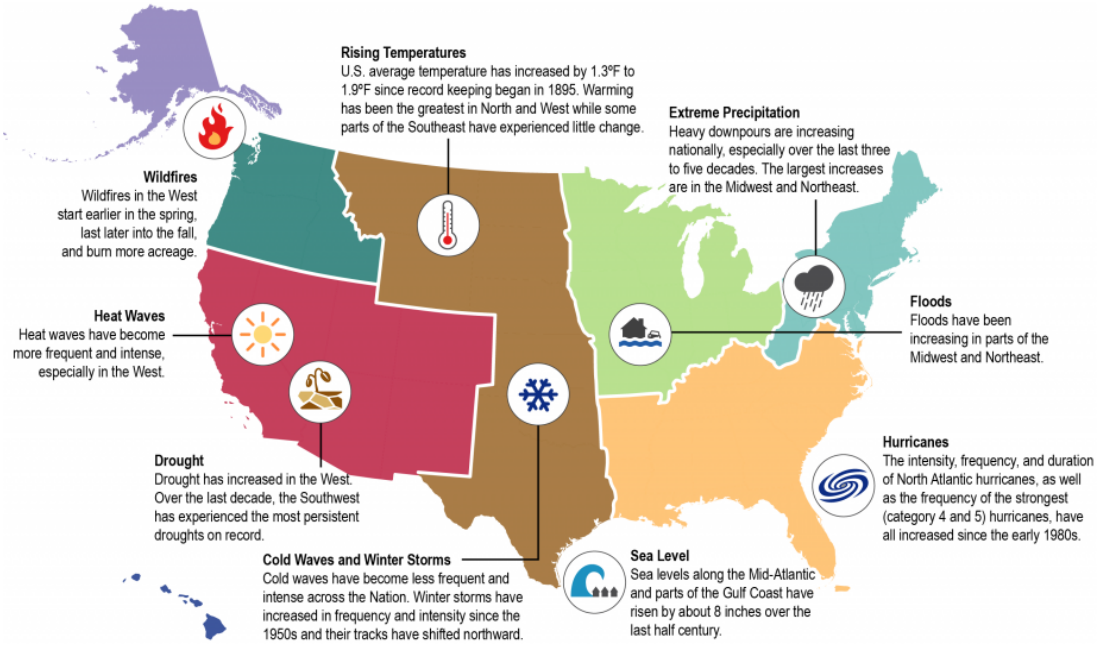
Climate change can have a significant impact on human health and the environment. The changes mentioned above can affect the environment by leading to changes in land use, ecosystems, infrastructure conditions, geography, and agricultural production. Extreme heat, poor air quality, reduced food and water supply and quality, changes in infectious agents, and population displacement can lead to public health concerns such as heat-related illnesses, cardiopulmonary illnesses, food, water, and vector-borne diseases and have consequences on mental health and stress (USGCRP, 2018).

The *Fourth National Climate Assessment* (NCA) (USGCRP, 2018) defined the following major climate trends:

- wildfires and heat waves on the west coast,

- rising temperatures and increased severity and frequency of winter storms in the middle of the country,
- more rain and flooding in the Midwest and northeastern parts of the country, and
- an increase in sea levels in the mid-Atlantic with a rise in hurricane activity in the southeastern states.

The Intergovernmental Panel on Climate Change (IPCC) largely concurs with the above list (IPCC, n.d.). In Maryland, the trend will likely be an increase in extreme precipitation, as noted in the graphic below.



The hazard profiles in Section 2.2 contain a narrative that identifies future climate considerations for all of the natural hazards considered by this risk assessment. Those sections are hazard-specific, but they serve as contextual extensions of the conversation. Climate change appears here as a sort of summary discussion. Further, the profiles discuss social vulnerability variables. Social vulnerability and climate change impacts often intersection. For example, as part of The Climate Explorer (NEMAC, n.d.) “Neighborhoods at Risk” project, seven tracts in the Hagerstown area appeared as those in which vulnerabilities to climate change “exceeded the community median.” The climate exposure variables were minimal, but three social variables contributed to the designation. In these tracts, approximately 72.1% of housing units are rentals,

26.8% of households have no vehicle, and 30% of families live in poverty. These findings support the various social vulnerability discussions in Sections 1.2 and 2.2 above.

A balanced assessment of climate change trends recognizes areas of emerging scholarship alongside more thoroughly-researched data. For instance, scientific research supports many of the talking points in the IPCC data. Still, it is crucial to understand that vast numbers of studies are currently underway. As those studies conclude, new ones begin, and more longitudinal approaches contribute to the knowledge base; what informs our understanding today may change, and perhaps significantly. Put more directly within the context of this hazard mitigation plan, evidence linking temperature extremes with climate is more substantial than the evidence linking the rise in extreme precipitation, increased flooding, increased wildfires, etc. (C2ES, n.d.A; Myhre et al., 2019; Rajkovich & Schwarz, 2022; Tabari, 2020; USEPA, 2022a). The evidence supporting the latter is more emergent than the former.

Additionally, communities may experience climate-related impacts that are very different from weather-related risks. There is a growing body of research examining whether climate migration will strain communities in various parts of the United States. For instance, sea level rise is an oft-noted impact of climate change and will necessitate a series of visible adaptations. People may move away from coasts or migrate to other areas besides coastal communities. Former Rust Belt communities along the Great Lakes, for example, may be a destination for the climate migrants because they have established infrastructures and they are in areas that are relatively climate stable (as compared to coastal communities) (Hakala, 2022; Van Berkel, Kalafatis, Gibbons, Naud, & Lemos, 2022). Though not a “Great Lakes community,” western Maryland is perhaps perceived as more climate stable than coastal communities, near traditional manufacturing, commercial, and government centers, accessible via a variety of transportation means, etc. Communities may be faced with re-envisioning development decisions that have, for decades, focused on slowing out-migration toward a rapid escalation of growth to handle the in-migration of individuals seeking relief from climate-related impacts.

2.0 RISK ASSESSMENT

2.4 Hazard Rankings

Section 2.2: Profile Hazards outlines a means for describing the probability and severity of the hazard effects on Washington County. The individual profiles in Section 2.2 calculate the probability and severity of the hazard in question. The following table summarizes that data and presents a ranked list of anticipated hazard impacts. (NOTE: In the event of tie scores, planners first alphabetized natural hazards and then alphabetized technological and human-caused hazards.)

SUMMARY OF RISK RANKINGS									
Hazard	*Risk Ranking*	***Total***	*Frequency*	*Response*	*Onset*	*Magnitude*	*Business*	*Human*	*Property*
Opioid Epidemic	High	**24**	5	5	4	4	1	4	1
Fire (Structural/Industrial)	High	**22**	5	2	4	1	4	2	4
Severe Winter Weather	High	**21**	5	3	2	4	2	3	2
Flooding	Medium	**19**	5	4	3	2	2	2	1
Tornado	Medium	**19**	2	3	4	1	3	3	3
Land Subsidence	Medium	**18**	5	3	5	1	2	1	1
Reportable Disease Epidemic	Medium	**18**	2	5	1	4	1	4	1
Severe Summer Weather	Medium	**18**	5	3	2	4	1	2	1
Wildfire	Medium	**18**	5	3	4	1	2	2	1
Hazardous Materials	Medium	**18**	5	2	4	1	1	2	3
Drought	Medium	**17**	2	4	1	3	2	3	2
Transportation Accident	Medium	**17**	5	2	4	1	1	3	1
Dam Failure	Low	**14**	2	2	3	1	4	1	1
Extreme Temperatures	Low	**12**	5	1	1	1	1	2	1

The Federal Emergency Management Agency (FEMA) created the National Risk Index (NRI) in 2021 to illustrate risk in the communities of the United States from a dataset of 18 natural hazards. The tool is an interactive online map ranking risk variables such as expected annual loss, social vulnerability, and community resilience (which produce an aggregated risk score). For the hazards that appear in both this plan and the NRI, a comparison with the rankings in the preceding table can validate the findings of this risk assessment. The hazards in both the NRI and this plan are as follows.

- Cold wave (as "extreme temperatures")
- Drought
- Hail (as "severe summer weather")
- Heat wave (as "extreme temperatures")
- Ice storm (as "severe winter weather")
- Lightning (as "severe summer weather")
- Riverine flooding (as "flooding")
- Strong wind (as "severe summer weather")
- Tornado
- Wildfire
- Winter weather

Washington County's NRI scores[1] for overall risk, expected annual loss, social vulnerability, and community resilience appear below. Scoring is on a scale of 0 to 100. Per the NRI, lower risk is driven by lower loss, lower social vulnerability, and higher community resilience.

WASHINGTON COUNTY RISK INDEX				
County	*Risk Index*	*Expected Annual Loss*	*Social Vulnerability*	*Community Resilience*
Washington County	69.6 (Relatively Low)	68.1 (Relatively Low)	59.9 (Relatively Moderate)	71.1 (Relatively High)

The following table compares the risk index scores for the hazards in this plan and the NRI and ranks them from highest to lowest. The far-right column describes the variance from the overall hazard rankings table above (derived from the hazard profile analysis).

[1] To ensure that hazard categories aligned, for this table, planners averaged the NRI scores for "cold wave" (68.5) and "heat wave" (89.3) into a composite score for "extreme temperatures" (78.9). Planners also averaged scores for "hail" (6.9), "lightning" (40.6), and "strong wind" (58.1) into a score for "severe summer weather" (35.2) as well as the scores for "ice storm" (65.3) and "winter weather" (81.9) into a "severe winter weather" category (73.6).

NRI AND HAZARD PROFILE RANKINGS COMPARISON					
Hazard	*Risk Index (Average of Scores)*	*Absolute NRI Ranking*	*Hazard Profile Vulnerability Assignment*	*Absolute Hazard Profile Ranking*	*Change (from Hazard Profile Absolute Ranking Placement)*
Flooding	80.3	1	Medium (19)	4	↓ 3
Extreme Temperatures	78.9	2	Low (12)	14	↓ 12
Severe Winter Weather	73.6	3	High (21)	3	↔
Drought	68.4	4	Medium (17)	T-11	↓ 7
Tornado	64.1	5	Medium (19)	T-4	↑ 1
Wildfire	40.4	6	Medium (18)	T-6	↔
Severe Summer Weather	35.2	7	Medium (18)	T-6	↑ 1

When comparing these data, the first acknowledgment should be that the mitigation plan and the NRI considered different variables. For example, this document analyzed extreme cold and heat side-by-side, whereas the NRI considered them separately. The two calculations also considered variables in various combinations. Thus, comparisons are for planning purposes only.

The variance in the sources looks extreme, but a closer look is necessary. The National Risk Index only considers natural hazards, while the mitigation plan added technological and human-caused hazards. In the mitigation plan, each hazard (i.e., natural, technological, and human-caused) received a risk ranking, which planners ultimately ranked in absolute order. By removing the technological and human-caused hazards from the mitigation plan ranking, the variance from the risk index comes more into focus.

- Flooding → Tied as 2nd ranked natural hazard by risk ranking
- Extreme temperatures → No change (i.e., lowest ranked natural hazard)
- Severe winter weather → Highest ranked natural hazard by risk ranking
- Drought → Tied as 5th ranked natural hazard by risk ranking
- Severe summer weather → Tied as 4th ranked natural hazard by risk ranking
- Tornado – Tied as 2nd ranked natural hazard by risk ranking
- Wildland fire → Tied as 4th ranked natural hazard by risk ranking

The difference becomes “down four” for extreme temperatures, “down two” for flooding, “up two” for severe winter weather, “down one” for drought, “up one” for severe summer weather, “up two” for tornado, and “up two” for wildfire. While variance remains, this reconciliation renders the scores more consistent.

The most significant sources of difference between the rankings lies with the extreme temperatures hazard. The hazard profile identifies the phenomenon as frequently-occurring, and it situates the impacts firmly within the human/social category. The lack of historical losses, though, decreased the overall risk ranking. Absent significant losses, property and business impacts appear to be minimal, and the response to these incidents appears to have been non-taxing. Put differently, the lived experiences of the stakeholders in Washington County depict extreme temperatures as a serious hazard, but not one that warrants more risk reduction attention than the other 13 hazards considered in this plan.

Event frequency and lived experience also impacted the severe summer weather score in the hazard profiles above. Data show at least 302 unique events, with many of those accompanied by quantifiable property or crop losses. Steering committee members also recognized the increased intensity of summer weather, and there was a recognition of the many cascading incidents (e.g., flash flooding, power outages, etc.) emanating from instances of severe summer weather. However, the frequency of events and their perception as “just rain” or “just wind” may limit the concern amongst local decision-makers.

Finally, this plan considered the opioid epidemic as a hazard worthy of profiling (and, thus, risk reduction) for the second consecutive planning cycle. (As a human-caused hazard, the opioid epidemic does not appear in the NRI.) The opioid crisis is impacting Washington County (and many other communities) in profound ways. These impacts are economical, as communities realize lost productivity in business sectors and increased costs in emergency response and healthcare. Drug-related deaths are severely impacting families, and drug-related incarcerations, along with more general addiction issues, are putting strains on foster care systems and other social services sectors. All of these impacts resulted in the opioid epidemic being the highest-ranked risk for Washington County. Thus, all possible hazards considered by both this plan and the NRI would be ranked below the opioid epidemic, which creates a measurable difference before any analysis could begin.

3.0 MITIGATION STRATEGY

§201.6(c)(3)	A mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools.

According to FEMA (2013b), "the mitigation strategy is made up of three main required components: mitigation goals, mitigation actions, and action plan for implementation. These provide the framework to identify, prioritize, and implement actions to reduce risk to hazards." This section contains those items. It describes the updated goals and objectives for this mitigation plan; it outlines the action items (or projects) for each participating jurisdiction within Washington County; and each project identifies the agency responsible for completing it, as well as a general timeline for completion.

To update this section, the steering committee considered and revised the mitigation goals at its first meeting, and then the participating jurisdictions updated their project lists (to include adding new projects). Generally, the committee kept the existing goals list, though it tweaked some wording with them for clarity. For instance, in Goal 2, the term "education" could better represent the efforts needed to build an understanding of and support for hazard mitigation initiatives. Also, Goal 4 could include a nod to resilience and sustainable development. The goals in Section 3.1 below include the steering committee's revisions. The existing plan also contained several objectives for each goal, which the committee also largely kept with edits to make them more measurable. To prioritize mitigation actions, the steering committee developed a ranking methodology at its fourth meeting. It directed the county's consultant to score the projects according to that methodology. During the draft review, participating jurisdictions reviewed their projects with priorities.

3.0 MITIGATION STRATEGY

3.1 Mitigation Goals and Objectives

Hazard mitigation goals and objectives represent what the community wants to achieve by implementing risk reduction projects. These goals work together to lessen the loss of life, injury, and damage to property, the economy, and the environment from the hazards identified in Section 2.2 above.

Over the past two plan updates, Washington County's steering committee has revised the goals and objectives list to make it more usable, manageable, and quantifiable. These goals and objectives intend to make noticeable and measurable progress toward lessening risk throughout the county. The following table presents the goals and objectives for the 2023 update.

2023-2028 MITIGATION GOALS AND OBJECTIVES	
Goals	*Objectives*
1. Maximize Washington County's jurisdictions' capabilities to make the county less vulnerable to hazards.	1.1 Increase data layers within Washington County's GIS system to graphically depict risk and vulnerability. 1.2 Increase collaboration between responder agencies, other relevant organizations, and jurisdictions with each other and the public. 1.3 Increase jurisdictional capabilities (e.g., staff, equipment, programs) to support risk reduction.
2. Provide education for local officials and the public as to the benefits of and opportunities for mitigation, both on community and personal levels.	2.1 Increase awareness and knowledge of hazard mitigation principles and practices among local and municipal public officials. 2.2 Increase awareness of and access to funding programs that can support mitigation planning and project activities. 2.3 Increase public awareness of natural hazards, including the indirect or cascading impacts of those hazards.

2023-2028 MITIGATION GOALS AND OBJECTIVES	
Goals	*Objectives*
3. Protect existing and future properties and infrastructure from all hazards that could affect Washington County.	3.1 Increase transportation and stormwater management infrastructure resilience through upgrades or replacement (through consideration of mitigation elements in design). 3.2 Decrease the number of road closures and life-threatening road conditions during hazard events. 3.3 Increase instances of property-owner mitigation measures. 3.4 Decrease the number of buildings that are at risk of flooding. 3.5 Sustain regulatory measures to ensure that new development will not increase risks. 3.6 Increase the resilience of manufactured housing through code enforcement. 3.7 Increase the resilience of existing residential structures at high-risk through retrofitting and floodproofing. 3.8 Increase public investment in risk reduction for public services, critical facilities, and critical infrastructure throughout the county.
4. Promote sustainable development to improve the quality of life by fostering resilient communities.	4.1 Increase naturalized areas throughout the county to provide for protection from increased precipitation events. 4.2 Decrease risk for vulnerable populations throughout the county.

3.0 MITIGATION STRATEGY

3.2 Mitigation Actions

§ 201.6(c)(3)	A mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools.
§ 201.6(c)(3)(ii)	[The mitigation strategy shall include] a section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure. All plans approved by FEMA after October 1, 2008, must also address the jurisdiction's participation in the NFIP, and continued compliance with NFIP requirements, as appropriate.
§ 201.6(c)(3)(iii)	[The mitigation strategy shall include] an action plan describing how the actions identified in paragraph (c)(3)(ii) of this section will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost-benefit review of the proposed projects and their associated costs.

This section serves as a mitigation action plan to reduce the losses and other impacts Washington County may suffer from the hazards included in the risk assessment. “A mitigation action is a specific action, project, activity, or process taken to reduce or eliminate long-term risk to people and property from hazards and their impacts. Implementing mitigation actions helps achieve the plan’s mission and goals. The actions to reduce vulnerability to threats and hazards form the core of the plan and are a key outcome of the planning process” (FEMA, 2013b).

Types of Mitigation Actions

Four primary types of mitigation actions can reduce long-term vulnerability: local plans and regulations, structure and infrastructure projects, natural systems protection, and education and outreach activities (FEMA, 2013b; FEMA, 2013c).

- **Local Plans and Regulations:** Local land use or comprehensive plans embody the goals, values, and aspirations of the community, as expressed through a process of community engagement. Local ordinances and review processes influence land development and building construction. In some cases, plans and regulations can work as cross-purposes.

For instance, a capital improvement plan may call for extending water and sewer lines to an area vulnerable to natural hazards. Examples include the following.

- Comprehensive plans
- Land use ordinances
- Subdivision regulations
- Development review
- Building codes and enforcement
- National Flood Insurance Program (NFIP) and the Community Rating System (CRS)
- Capital improvement programs
- Open space preservation
- Urban renewal plans
- Stormwater management regulations and master plans

- **Structure and Infrastructure Projects:** These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. These projects could apply to public or private structures as well as critical facilities and infrastructure. This type of action also involves projects to construct human-made structures to reduce the impact of hazards. Examples include the following.
  - Acquisitions and elevations of structures in flood-prone areas
  - Utility undergrounding
  - Structural retrofits
  - Floodwalls and retaining walls
  - Detention and retention structures
  - Culverts
  - Safe rooms

- **Natural Systems Protection:** These are actions that minimize damage and losses while preserving or restoring the functions of natural systems. Examples include the following.
  - Sediment and erosion control
  - Stream corridor restoration
  - Forest management
  - Conservation easements
  - Wetland restoration and preservation

- **Education and Outreach Activities:** These are actions to inform and educate citizens, elected officials, and property owners about hazards and possible ways to mitigate them. Although this type of mitigation reduces risk less directly than structural projects or regulations, it is an important foundation. A greater understanding and awareness of hazards and risks among local officials, stakeholders, and the public can lead to direct actions. Examples include the following.
  - Social media, radio, or television spots
  - Websites with maps and information
  - Real estate disclosure
  - Presentations to school groups or neighborhood organizations
  - Mailings to residents in hazard-prone areas.
  - StormReady
  - Firewise Communities

These mitigation techniques have pros and cons, and some work better for specific hazards than others. The following table suggests project types for each of the hazards included in Section 2.0 above.

MITIGATION TECHNIQUES SUITABLE FOR RELEVANT HAZARDS				
Hazard	*Local Plans & Regulations*	*Structure & Infrastructure Projects*	*Natural Systems Protection*	*Education & Outreach Activities*
Dam Failure	X			X
Drought	X	X	X	X
Extreme Temperatures				X
Fire (Structural/ Industrial/Wildland)	X			X
Flooding	X	X	X	X
Hazardous Materials	X	X	X	X
Land Subsidence	X	X	X	X
Opioid Epidemic	X			X
Reportable Disease Epidemic	X			X
Severe Summer Weather	X	X	X	X
Severe Winter Weather	X	X		X
Transportation Accident	X	X		X

Project Prioritization

Prioritizing projects helps to define the types of action that local leaders should pursue first. However, there is a recognition that communities may implement projects out of a prioritized order based on the availability of funding. FEMA guidance recommends using the STAPLEE method, and Washington County's steering committee agreed.

Further, the subcommittee ranked the STAPLEE categories in order from the one they felt was most important down to the least important of the seven categories and assigned points based on that ranking. The most important category equals seven points; the least important equals one point. The committee agreed on the questions in the following table as indicators for each category. A positive response to the question (per a project under consideration) yields the points. At the same time, a negative answer would net zero points for that category. See Appendix 2 for project scoring.

PRIORITIZATION CRITERIA AND SCORING			
STAPLEE Category	*Criteria*	*AVG Committee Score*	*Allocated Points*
Political (P)	Is there stakeholder and public support to implement and maintain the project?	5.00	7
Economic (E)	Will the project's benefits exceed the cost (over a measurable period, even if it is in years)?	4.625	6
Technical (T)	Will the proposed action work (i.e., is it technically feasible)?	4.375	5
Legal (L)	Will the project be challenged in court?	4.25	4
Social[1] (S)	Will the project unfairly treat any segment of the community (e.g., the homeless, those living under the poverty line, any protected class category, etc.)?	3.875	3
Administration (A)	Does the coordinating agency have the capability of meeting any on-going administrative requirements the project will create?	3.375	2
Environmental (E)	Will the project require environmental regulatory approvals?	2.5	1

The steering committee allowed for tie scores. In a tie, the projects will appear with the same priority. The next high priority will fall in numerical order based on the number of projects in the tie. For instance, if a jurisdiction has four projects and two of them tie for Priority 2, that jurisdiction's priority listing would be 1, 2, 2, and 4 (with the slot occupied by the third priority "taken" by the tied second priority project).

Participating jurisdictions added several new projects to the plan that represent efforts to (a) better integrate existing planning efforts such as comprehensive planning and floodplain

[1] This criterion is a small component that addresses distributional equity (FEMA, 2023b, p. 36).

management with mitigation planning, (b) utilize data (e.g., social vulnerability data) collected for this plan but relevant to other governmental planning and development issues, and (c) remind local leaders to consider the benefits and challenges of current operating arrangements as their communities change (e.g., floodplain management partnerships between jurisdictions). Since these projects point to more efficient operationalization of existing efforts, the steering committee did not score them for priority; rather, they appear as "high-priority initiatives."

2023-2028 Project List

The following tables list the active hazard mitigation projects for Washington County and the participating municipalities. There is a unique table for the county and each municipality. In addition to the action itself, the tables identify, to the extent possible, the following information.

- **Hazard(s) Addressed:** Hazard addressed by the action
- **Goal/Objective Alignment:** An identification of the goals/objectives (from Section 3.1) that the project supports
- **Action Type:** The mitigation technique category (local plans and regulations, structure and infrastructure projects, natural systems protection, education and outreach activities)
- **Implementation Schedule:** An approximate timeframe for completion, if known
- **Priority:** The prioritization calculation, based on the methodology noted above
- **Estimated Cost:** An informal cost estimate or credible source from which to develop a cost estimate
- **Potential Funding Source(s):** The programs and agencies/entities that could fund the mitigation action
- **Lead Agency or Department:** The coordinating agency for the mitigation action
- **Status:** As applicable, the status of the action (mainly if it is an action that appeared in the previous plan)

For continuity, the jurisdictions carefully considered the status of the projects that appeared in the previous version of the plan. However, each participating jurisdiction considered a comprehensive range of mitigation actions for inclusion in this plan. To provide context for why the jurisdictions chose the projects they did from that comprehensive array, a brief narrative precedes each of the jurisdictional project tables. Further, the preceding sections of this plan (e.g., Section 1.3: Capabilities) make recommendations for mitigation actions, some specific to participating jurisdictions and others applicable to all jurisdictions. Those action ideas appear below, though as bullet listed items (i.e., no marked with potential funding sources, etc.). Other

sections of the preceding plan, like the "Social Vulnerability Considerations" sections in Section 2.2 present specific data on populations that may be disproportionately at-risk to the range of hazards impacting participating communities. Participating jurisdictions were intrigued by this data, and there was a desire to consider it more carefully as a lens through which to view not only risk reduction (i.e., hazard mitigation) actions, but also other strategic projects like infrastructure upgrades, etc. Finally, all ten participating jurisdictions recognize the practical and symbolic need to identify at least one project to address each of the 14 hazards considered by the risk assessment above. The following table identifies the projects (by number) addressing each hazard.

HAZARDS ADDRESSED BY MITIGATION PROJECTS (BY JURISDICTION)														
Jurisdiction	*Dam Failure*	*Drought*	*Extreme Temp.*	*Fire*	*Flooding*	*Hazmat*	*Land Subsidence*	*Opioid Epidemic*	*Rep. Disease Epidemic*	*Summer Weather*	*Winter Weather*	*Tornado*	*Trans. Accident*	*Wildfire*
Washington County	WC-8, WC-9, WC-10, WC-11, WC-14, WC-15	WC-3, WC-14, WC-15	WC-3, WC-14, WC-15	WC-14, WC-15	WC-3, WC-6, WC-14, WC-15	WC-4, WC-14, WC-15	WC-3, WC-14, WC-15	WC-5, WC-14, WC-15	WC-14, WC-15	WC-2, WC-3, WC-7, WC-13, WC-14, WC-15	WC-1, WC-3, WC-14, WC-15	WC-2, WC-3, WC-7, WC-12, WC-13, WC-14, WC-15	WC-14, WC-15	WC-3, WC-7, WC-14, WC-15
Boonsboro	BOO-3, BOO-5, BOO-6, BOO-7	BOO-1, BOO-3, BOO-5, BOO-6, BOO-7	BOO-3, BOO-5, BOO-6, BOO-7	BOO-3, BOO-5, BOO-6, BOO-7	BOO-2, BOO-3, BOO-4, BOO-5, BOO-6, BOO-7	BOO-3, BOO-5, BOO-6, BOO-7	BOO-3, BOO-5, BOO-6, BOO-7	BOO-3, BOO-5, BOO-6, BOO-7	BOO-3, BOO-5, BOO-6, BOO-7	BOO-3, BOO-5, BOO-6, BOO-7	BOO-3, BOO-5, BOO-6, BOO-7	BOO-3, BOO-5, BOO-6, BOO-7	BOO-3, BOO-5, BOO-6, BOO-7	BOO-3, BOO-5, BOO-6, BOO-7
Clear Spring	CLE-8, CLE-11, CLE-12, CLE-13	CLE-2, CLE-11, CLE-12, CLE-13	CLE-11, CLE-12, CLE-13	CLE-11, CLE-12, CLE-13	CLE-1, CLE-6, CLE-9, CLE-11, CLE-12, CLE-13	CLE-3, CLE-4, CLE-11, CLE-12, CLE-13	CLE-11, CLE-12, CLE-13	CLE-5, CLE-11, CLE-12, CLE-13	CLE-11, CLE-12, CLE-13	CLE-7, CLE-10, CLE-11, CLE-12, CLE-13	CLE-7, CLE-10, CLE-11, CLE-12, CLE-13	CLE-10, CLE-11, CLE-12, CLE-13	CLE-11, CLE-12, CLE-13	CLE-11, CLE-12, CLE-13
Funkstown	FUN-7, FUN-8, FUN-9	FUN-7, FUN-8, FUN-9	FUN-7, FUN-8, FUN-9	FUN-4 FUN-7, FUN-8, FUN-9	FUN-1, FUN-2, FUN-5, FUN-7, FUN-8, FUN-9	FUN-7, FUN-8, FUN-9	FUN-7, FUN-8, FUN-9	FUN-3, FUN-7, FUN-8, FUN-9	FUN-7, FUN-8, FUN-9	FUN-6, FUN-7, FUN-8, FUN-9	FUN-6, FUN-7, FUN-8, FUN-9	FUN-6, FUN-7, FUN-8, FUN-9	FUN-7, FUN-8, FUN-9	FUN-7, FUN-8, FUN-9
Hagerstown	HAG-7, HAG-8	HAG-7, HAG-8	HAG-6, HAG-7, HAG-8	HAG-1, HAG-7, HAG-8	HAG-3, HAG-4, HAG-7, HAG-8	HAG-7, HAG-8	HAG-7, HAG-8	HAG-5, HAG-7, HAG-8	HAG-7, HAG-8	HAG-2, HAG-7, HAG-8	HAG-7, HAG-8	HAG-7, HAG-8	HAG-7, HAG-8	HAG-7, HAG-8
Hancock	HAN-6, HAN-7, HAN-8	HAN-6, HAN-7, HAN-8	HAN-6, HAN-7, HAN-8	HAN-6, HAN-7, HAN-8	HAN-1, HAN-4, HAN-5, HAN-6, HAN-7, HAN-8	HAN-2, HAN-6, HAN-7, HAN-8	HAN-6, HAN-7, HAN-8	HAN-6, HAN-7, HAN-8	HAN-6, HAN-7, HAN-8	HAN-3, HAN-6, HAN-7, HAN-8	HAN-3, HAN-6, HAN-7, HAN-8	HAN-6, HAN-7, HAN-8	HAN-6, HAN-7, HAN-8	HAN-6, HAN-7, HAN-8

HAZARDS ADDRESSED BY MITIGATION PROJECTS (BY JURISDICTION)														
Jurisdiction	*Dam Failure*	*Drought*	*Extreme Temp.*	*Fire*	*Flooding*	*Hazmat*	*Land Subsidence*	*Opioid Epidemic*	*Rep. Disease Epidemic*	*Summer Weather*	*Winter Weather*	*Tornado*	*Trans. Accident*	*Wildfire*
Keedysville	KEE-6, KEE-7, KEE-8	KEE-6, KEE-7, KEE-8	KEE-6, KEE-7, KEE-8	KEE-6, KEE-7, KEE-8	KEE-1, KEE-2, KEE-3, KEE-5, KEE-6, KEE-7, KEE-8	KEE-6, KEE-7, KEE-8	KEE-6, KEE-7, KEE-8	KEE-4, KEE-6, KEE-7, KEE-8	KEE-6, KEE-7, KEE-8	KEE-6, KEE-7, KEE-8	KEE-6, KEE-7, KEE-8	KEE-6, KEE-7, KEE-8	KEE-6, KEE-7, KEE-8	KEE-6, KEE-7, KEE-8
Sharpsburg	SHA-5, SHA-6, SHA-7	SHA-2, SHA-5, SHA-6, SHA-7	SHA-2, SHA-5, SHA-6, SHA-7	SHA-5, SHA-6, SHA-7	SHA-1, SHA-2, SHA-3, SHA-4, SHA-5, SHA-6, SHA-7	SHA-5, SHA-6, SHA-7	SHA-2, SHA-5, SHA-6, SHA-7	SHA-5, SHA-6, SHA-7	SHA-5, SHA-6, SHA-7	SHA-2, SHA-5, SHA-6, SHA-7	SHA-2, SHA-5, SHA-6, SHA-7	SHA-2, SHA-5, SHA-6, SHA-7	SHA-5, SHA-6, SHA-7	SHA-2, SHA-5, SHA-6, SHA-7
Smithsburg	SMI-5, SMI-6, SMI-7	SMI-5, SMI-6, SMI-7	SMI-5, SMI-6, SMI-7	SMI-1, SMI-5, SMI-6, SMI-7	SMI-2, SMI-4, SMI-5, SMI-6, SMI-7	SMI-5, SMI-6, SMI-7	SMI-5, SMI-6, SMI-7	SMI-5, SMI-6, SMI-7	SMI-5, SMI-6, SMI-7	SMI-5, SMI-6, SMI-7	SMI-5, SMI-6, SMI-7	SMI-5, SMI-6, SMI-7	SMI-3, SMI-5, SMI-6, SMI-7	SMI-5, SMI-6, SMI-7
Williamsport	WIL-2, WIL-3, WIL-4	WIL-2, WIL-3, WIL-4	WIL-2, WIL-3, WIL-4	WIL-2, WIL-3, WIL-4	WIL-1, WIL-2, WIL-3, WIL-4	WIL-2, WIL-3, WIL-4	WIL-2, WIL-3, WIL-4	WIL-2, WIL-3, WIL-4	WIL-2, WIL-3, WIL-4	WIL-2, WIL-3, WIL-4	WIL-2, WIL-3, WIL-4	WIL-2, WIL-3, WIL-4	WIL-2, WIL-3, WIL-4	WIL-2, WIL-3, WIL-4

The 2023 update marked the first time this plan had been reviewed following the U.S. Department of Homeland Security/FEMA's release of the "community lifelines" (FEMA, 2019) as a tool for framing preparedness and response. The seven community lifelines are as follows.

- **Safety & Security:** This lifeline covers responder and survivor safety and the continuity of government (including basic services, firefighting, and law enforcement).
- **Food, Hydration, Shelter:** This lifeline covers not only traditional feeding and hydration services, which are routinely paired with sheltering, but it also includes water and agricultural infrastructure.
- **Health & Medical:** This lifeline covers all aspects of medical services required during an incident, including survivor care, fatality management, public health, and the medical chain.
- **Energy:** This lifeline is focused on electricity and fuel as well as natural gas, which can be essential to a response operation.
- **Communications:** This lifeline covers all types of communications necessary to effectively respond to various incidents to help survivors, in addition to banking and electronic payment needs.

- **Transportation:** This lifeline covers all forms of transportation of people and resources to and from incidents.
- **Hazardous Material:** This lifeline covers the management (including containment and removal) of all hazardous materials.

Though not *mitigation* in the strictest sense, considering how an action supports community lifelines is a helpful activity to link the material in this plan with other preparedness efforts. As such, the following tables will identify the community lifeline with which each action best aligns.

Washington County

For the county jurisdiction, there are three primary areas of focus with respect to risk reduction. The first is to align reduce risk with other preparedness efforts. For instance, this plan identifies severe summer and winter weather as hazards, and discussions about reducing risk to those instances align nicely with recent efforts to more proactively maintain the county's inclement weather plan. The second area of focus is to ensure the other jurisdictions in the county receive appropriate support for their mitigation and preparedness initiatives. Finally, there are other county departments that work on issues that could overlap with hazard mitigation (e.g., the planning department with the comprehensive plan, engineering with floodplain administration, and public works regarding dam safety). The WCOEM, as the custodial agency for this plan, bears a responsibility to ensure those partner county departments are represented accurately by this document.

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
WC-1	Not enough resources, lack of public awareness. First responders have difficulty getting to the scene, and the public gets caught in the weather. Seek funding sources for additional equipment. Educate the public on new notification systems and where to go for information.	Education & Outreach Activities	On-going	Varies per equipment	EMPG, SHSP, Local funding	Washington County OEM	Safety & Security
	Hazard(s) Addressed: Severe winter weather **Goal/Objective Alignment:** 1.2: Increase collaboration between responder agencies, other relevant organizations, and jurisdictions with each other and the public. **Priority:** 9 **Status:** ON-GOING. Though jurisdictions and agencies upgrade equipment regularly, the need remains; thus, the project is on-going.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
WC-2	Concern for the elderly population and general public awareness. Educate the public on the new notification system and where to get information.	Education & Outreach Activities	On-going	Up to $2,500 per campaign	Local funding	Washington County OEM	Communi-cations 
	Hazard(s) Addressed: Severe summer weather, Tornado **Goal/Objective Alignment:** 2.3: Increase public awareness of natural hazards, including the indirect or cascading impacts of those hazards; 4.2: Decrease risk for vulnerable populations throughout the county. **Priority:** 1 **Status:** ON-GOING. This action represents a general outreach effort central to the mission of the office of emergency management. It remains on-going.						
WC-3	Without the incorporation of mitigation practices into the comprehensive plan, land development without mitigation plans will be ineffective. Work with Boonsboro, Clear Spring, Funkstown, Hancock, Keedysville, Sharpsburg, Smithsburg, and Williamsport to consider a planning commission representative on the mitigation plan steering committee (in addition to existing municipal participation).	Local Plans & Regulations	On-going	Requires little to no additional funding	Local funding	Washington County OEM	Safety & Security 
	Hazard(s) Addressed: Drought, Extreme temperatures, Flooding, Land subsidence, Severe summer weather, Severe winter weather, Tornado, Wildfire **Goal/Objective Alignment:** 1.2: Increase collaboration between responder agencies, other relevant organizations, and jurisdictions with each other and the public; 2.1: Increase awareness and knowledge of hazard mitigation principles and practices among local and municipal public officials. **Priority:** 10 **Status:** ON-GOING. A version of this project appeared in the previous version of the plan. It represents a need to continue cross-participation in planning efforts. Planning partners from the county and municipalities participated in this update, and municipal planners indicated a willingness to invite emergency management/services personnel to their comprehensive plan update processes. This mitigation action would represent an effort to better align hazard mitigation with jurisdictional comprehensive plans.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
WC-4	The amounts and types of hazardous materials transported through the county roadways make it possible for their release. Identify and train for the response to current materials being transported. Conduct a commodity flow study to identify current transport on roadways.	Local Plans & Regulations	5 years	Up to $9,500	EMPG, HMEP, Local funding	Washington County LEPC (Support: WCOEM)	Hazardous Material
	Hazard(s) Addressed: Hazardous materials **Goal/Objective Alignment:** 1.1: Increase data layers within Washington County's GIS system to graphically depict risk and vulnerability; 4.2: Decrease risk for vulnerable populations throughout the county. **Priority:** 10 **Status:** ON-GOING. An updated flow study remains an important project; however, due to a lack of available funding, it was not completed between 2018 and 2023.						
WC-5	An increasing number of people are dying because of opioid overdose. Increase citizen and provider Narcan training. Conduct citizen outreach on awareness and crisis intervention teams and peer intervention specialists.	Education & Outreach Activities	On-going	Up to $2,500 per campaign	Local funding	Washington County Sheriff's Office	Health & Medical
	Hazard(s) Addressed: Opioid epidemic **Goal/Objective Alignment:** 1.2: Increase collaboration between responder agencies, other relevant organizations, and jurisdictions with each other and the public; 4.2: Decrease risk for vulnerable populations throughout the county. **Priority:** 10 **Status:** ON-GOING. Despite numerous instances of outreach and training, the problem persists. Thus, this mitigation action remains on-going.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
WC-6	Flooding causes street closures, damages homes, and causes stream closures due to poor water quality. There has been some updating to the stormwater system to address issues. Under the MS4 Phase II permit for Washington County, develop a list of projects to address stormwater best management practices that will address the requirements of the permit, improve local water quality, and reduce associated flooding.	Structure & Infrastructure Projects	On-going	Varies per the size of individual projects	319 Nonpoint, BRIC, CDBG, State Revolving Fund	Washington County Public Works (Stormwater Management)	Safety & Security
	Hazard(s) Addressed: Flooding **Goal/Objective Alignment:** 3.1: Increase transportation and stormwater management infrastructure resilience through upgrades or replacement (through consideration of mitigation elements in design); 3.8: Increase public investment in risk reduction for public services, critical facilities, and critical infrastructure throughout the county. **Priority:** 6 **Status:** ON-GOING. The county and municipalities are implementing stormwater projects, though there is a continued need for investment.						
WC-7	Municipalities may not have sufficient training to use the county's public notification systems. Provide each municipality the opportunity to get familiar with and train in public notification systems.	Education & Outreach Activities	On-going	Requires little to no additional funding (assuming the availability of the notification system)	Local funding	Washington County OEM	Communi-cations
	Hazard(s) Addressed: Severe summer weather, Tornado, Wildfire **Goal/Objective Alignment:** 1.2: Increase collaboration between responder agencies, other relevant organizations, and jurisdictions with each other and the public; 1.3: Increase jurisdictional capabilities (e.g., staff, equipment, programs) to support risk reduction. **Priority:** 1 **Status:** ON-GOING. As notification system capabilities evolve and personnel throughout county and municipal offices change, on-going orientation and refresher training are necessary.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
WC-8	Update resource lists to include points of contact for all high-hazard potential dams in Washington County.	Local Plans & Regulations	2 years	Requires little to no additional funding	Local funding	Washington County OEM	Safety & Security
	Hazard(s) Addressed: Dam failure **Goal/Objective Alignment:** 1.2: Increase collaboration between responder agencies, other relevant organizations, and jurisdictions with each other and the public.1.3: Increase jurisdictional capabilities (e.g., staff, equipment, programs) to support risk reduction. **Priority:** 1 **Status:** NEW. WCOEM added this project as part of the 2023 update.						
WC-9	Replace the sluice gate at the Fort Ritchie-Lake Royer MD Dam #70.	Structure & Infrastructure Projects	5 years	TBD	HHPD	Washington County Public Works	Safety & Security
	Hazard(s) Addressed: Dam failure **Goal/Objective Alignment:** 3.3: Increase instances of property-owner mitigation measures. 3.4: Decrease the number of buildings that are at risk of flooding. 3.8: Increase public investment in risk reduction for public services, critical facilities, and critical infrastructure throughout the county. **Priority:** 7 **Status:** NEW. Washington County Public Works added this project as part of the 2023 update.						
WC-10	The county has several emergency action plans (EAPs) for dams on file; however, the availability of inundation areas for planning purposes varies. Digitize the inundation maps in the EAPs that are on file to assist in risk determinations (e.g., identifying actual structures at risk, etc.).	Local Plans & Regulations	3 years	Requires little to no additional funding	Local funding (mapping capabilities existing within the Planning & Zoning Department)	Washington County Public Works (Support: Planning & Zoning Department)	Safety & Security
	Hazard(s) Addressed: Dam failure **Goal/Objective Alignment:** 1.1: Increase data layers within Washington County's GIS system to graphically depict risk and vulnerability. 1.2: Increase collaboration between responder agencies, other relevant organizations, and jurisdictions with each other and the public. 1.3: Increase jurisdictional capabilities (e.g., staff, equipment, programs) to support risk reduction. **Priority:** 1 **Status:** NEW. Washington County Public Works added this project as part of the 2023 update.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
WC-11	Once established as a known risk area, communities can consider the implications of that finding for the areas and structures that are in dam hazard areas. Consider the implications of recognizing dam inundation areas as sensitive areas in zoning ordinances.	Local Plans & Regulations	5 years	An exploratory type of project would require little to no additional funding	N/A	Washington County Planning & Zoning	Safety & Security 
	Hazard(s) Addressed: Dam failure **Goal/Objective Alignment:** 2.1: Increase awareness and knowledge of hazard mitigation principles and practices among local and municipal public officials. 3.5: Sustain regulatory measures to ensure that new development will not increase risks. **Priority:** 14 **Status:** NEW. Washington County Public Works added this project as part of the 2023 update.						
WC-12	As per the tornado hazard profile, mobile homes may suffer heavy damage from tornadoes. Further, there are Census tracts in the county that have higher numbers of mobile homes in them. Identify and enter into agreements with facilities to serve as shelters in Census tracks with the highest number of mobile homes.	Local Plans & Regulations	3 years	Outreach and engaging in MOU discussions would require little to no additional funding	N/A	Washington County OEM	Food, Hydration, Shelter 
	Hazard(s) Addressed: Tornado **Goal/Objective Alignment:** 4.2: Decrease risk for vulnerable populations throughout the county. **Priority:** 8 **Status:** NEW. Washington County Office of Emergency Management added this project as part of the 2023 update.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
WC-13	Given the potential damage that mobile homes could sustain during tornadoes or high wind events, early action by the homeowner would be necessary. Conduct outreach campaigns for voluntary sign-ups for the county's mass notification system in the Census tracts with higher numbers of mobile homes. Outreach could include (but not be limited to) flyers/mailers distributed in those areas, preparedness fairs or expos in those areas, etc.	Education & Outreach Activities	3 years	Up to $5,000 if looking to print materials	Local funding	Washington County OEM	Communi-cations
	Hazard(s) Addressed: Severe summer weather, tornado **Goal/Objective Alignment:** 2.3: Increase public awareness of natural hazards, including the indirect or cascading impacts of those hazards; 4.2: Decrease risk for vulnerable populations throughout the county. **Priority:** 13 **Status:** NEW. Washington County Office of Emergency Management added this project as part of the 2023 update.						
WC-14	The risk assessment for this mitigation plan identifies social vulnerability considerations for the profiled hazards. The plan includes an array of maps to visualize this data. Compile municipal-specific reports of social vulnerability data and provide them to the participating jurisdictions.	Local Plans & Regulations	1 year	Requires little to no funding (as the base data is available with this plan)	Local funding (if necessary)	Washington County OEM (Support: Planning & Zoning Department)	Safety & Security
	Hazard(s) Addressed: Dam failure, Drought, Extreme temperatures, Fire (structural/industrial), Flooding, Hazardous materials, Land subsidence, Opioid epidemic, Reportable disease epidemic, Severe summer weather, Severe winter weather, Tornado, Transportation accident, Wildfire **Goal/Objective Alignment:** 1.2: Increase collaboration between responder agencies, other relevant organizations, and jurisdictions with each other and the public; 4.2: Decrease risk for vulnerable populations throughout the county. **Priority:** 1 **Status:** NEW. Washington County Office of Emergency Management added this project as part of the 2023 update.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
WC-15	Many of the municipalities in Washington County are small. To implement large mitigation projects, they would likely need administrative support. Build capacity at the municipal level to undertake hazard mitigation projects. Examples include (but are not limited to): • Sponsoring grants management training to strengthen local knowledge of administering projects with FEMA, HUD, SBA, USDA, etc., funds; • Sponsoring in-county G- or other similar courses from FEMA's Emergency Management Institute or preparedness consortium partners[2] to build awareness of the programmatic elements of mitigation and disaster recovery; • Compiling a countywide "resource manual" of personnel at the county and municipal levels with experience in grants management for capital, infrastructure, and mitigation projects; or • Preparing joint applications for mitigation project funding to capitalize on shared management resources. **Hazard(s) Addressed:** Dam failure, Drought, Extreme temperatures, Fire (structural/industrial), Flooding, Hazardous materials, Land subsidence, Opioid epidemic, Reportable disease epidemic, Severe summer weather, Severe winter weather, Tornado, Transportation accident, Wildfire **Goal/Objective Alignment:** 1.2: Increase collaboration between responder agencies, other relevant organizations, and jurisdictions with each other and the public; 4.2: Decrease risk for vulnerable populations throughout the county. **Priority:** 1 **Status:** NEW. Washington County Office of Emergency Management added this project as part of the 2023 update.	Education & Outreach Activities	3 years	Many FEMA courses require little to no funding	Local funding may be necessary to support training staff	Washington County OEM (Support: MDEM)	Safety & Security

[2] Examples include G278 NFIP/CRS, G279 Retrofitting flood-prone residential buildings, AWR647 Climate adaptation planning for EM, AWR377 Disaster resilience for small businesses, E212 HM assistance Developing quality app elements, E213 HM assistance App Review & eval, E214 HM assistance Project imp & closeout, MGT474 Mitigating hazards w/ land use planning, MGT484 Nature-based solutions for mitigating hazards.

Town of Boonsboro

Boonsboro, like other small towns in Washington County, stressed the importance of focusing its efforts on addressing urgent risk-related matters. For this reason, the joint project with Keedysville is a priority project, as it seeks to avoid a future infrastructure-related risk. Additionally, there are two residential developments in progress and one residential development in the planning stage for the town. There is thus a need to ensure the impact of these developments is minimal regarding things like runoff-related flooding.

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
BOO-1	Wells tend to dry during long periods of no or low precipitation. Partner with the Town of Keedysville to replace the Shafer Park well to address water availability issues.	Structure & Infrastructure Projects	3 years	$250,000	ARC, Local funding	Boonsboro Planning	Water Systems
	Hazard(s) Addressed: Drought **Goal/Objective Alignment:** 3.8: Increase public investment in risk reduction for public services, critical facilities, and critical infrastructure throughout the county. **Priority:** 1 **Status:** ON-GOING. Boonsboro representatives indicated this project remains on-going.						
BOO-2	Flooding in some areas of the town affects roads and houses. Proactively enforce floodplain ordinances, control and improve stormwater management systems, and participate in the NFIP, particularly with respect to the new residential developments.	Local Plans & Regulations Structure & Infrastructure Projects	On-going	Compliance requires minimal funding, yet implementing an infrastructure improvement may require more than $1M	BRIC, CDBG, HMGP, Local funding	Boonsboro Planning	Safety & Security
	Hazard(s) Addressed: Flooding **Goal/Objective Alignment:** 3.1: Increase transportation and stormwater management infrastructure resilience through upgrades or replacement (through consideration of mitigation elements in design; 3.5: Sustain regulatory measures to ensure that new development will not increase risks. **Priority:** 2 **Status:** ON-GOING. Boonsboro representatives indicated this project remains on-going and updated potential funding sources and the cost estimate, particularly regarding the implementation of a stormwater system upgrade.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
BOO-3	Growth and development in the town should be sensitive to the needs it creates for emergency services. Update the town's comprehensive plan, and invite the town's emergency services providers to participate in the process.	Local Plans & Regulations	5 years	$8,000 to $10,000	CDBG Special Project Grant, Local funding	Boonsboro Planning	Safety & Security
	Hazard(s) Addressed: Dam failure, Drought, Extreme temperatures, Fire (structural/industrial), Flooding, Hazardous materials, Land subsidence, Opioid epidemic, Reportable disease epidemic, Severe summer weather, Severe winter weather, Tornado, Transportation accident, Wildfire **Goal/Objective Alignment:** 2.1: Increase awareness and knowledge of hazard mitigation principles and practices among local and municipal public officials. **Priority:** Unscored (represents a high-priority initiative that involves linking two existing processes – comprehensive planning and mitigation planning) **Status:** NEW. Boonsboro added this project as part of the 2023 update.						
BOO-4	Boonsboro receives support from the county in coordinating its floodplain management activities; currently, this arrangement works well for the town and county. To ensure continued effectiveness, periodically coordinate with the Washington County Engineering Department (i.e., floodplain management) to determine whether the current arrangement for management of the NFIP continues to be beneficial or if a local monitoring capability would better meet the needs of the town.	Local Plans & Regulations	On-going	Coordination with other local entities requires little to no cost	N/A	Boonsboro Planning	Safety & Security
	Hazard(s) Addressed: Flooding **Goal/Objective Alignment:** 1.2 Increase collaboration between responder agencies, other relevant organizations, and jurisdictions with each other and the public. **Priority:** Unscored (represents a high-priority initiative that involves linking two existing processes – floodplain management and mitigation planning) **Status:** NEW. Boonsboro added this project as part of the 2023 update.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
BOO-5	For the purposes of its comprehensive plan, Boonsboro maintains a planning commission. To align general growth and development in the town with risk reduction goals, consider adding a responsibility for the planning commission chair to serve as a town representative on the steering committee for interim reviews and the next update of this plan.	Local Plans & Regulations	5 years	N/A	N/A	Boonsboro Planning	Safety & Security
	Hazard(s) Addressed: Dam failure, Drought, Extreme temperatures, Fire (structural/industrial), Flooding, Hazardous materials, Land subsidence, Opioid epidemic, Reportable disease epidemic, Severe summer weather, Severe winter weather, Tornado, Transportation accident, Wildfire **Goal/Objective Alignment:** 1.2 Increase collaboration between responder agencies, other relevant organizations, and jurisdictions with each other and the public. **Priority:** Unscored (represents a high-priority initiative that involves linking two existing processes – comprehensive planning and mitigation planning) **Status:** NEW. Boonsboro added this project as part of the 2023 update.						
BOO-6	See Project Number WC-14. Coordinate with the WCOEM to obtain Boonsboro's municipal-specific report.	Local Plans & Regulations	1 year	N/A	N/A	Boonsboro Planning (Support: Washington County OEM)	Safety & Security
	Hazard(s) Addressed: Dam failure, Drought, Extreme temperatures, Fire (structural/industrial), Flooding, Hazardous materials, Land subsidence, Opioid epidemic, Reportable disease epidemic, Severe summer weather, Severe winter weather, Tornado, Transportation accident, Wildfire **Goal/Objective Alignment:** 1.2: Increase collaboration between responder agencies, other relevant organizations, and jurisdictions with each other and the public. **Priority:** Unscored (represents a high-priority initiative to utilize the social vulnerability data collected for the 2023 update) **Status:** NEW. Boonsboro added this project as part of the 2023 update.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
BOO-7	See Project Number WC-15. Consider participation when training and funding opportunities are offered or available to build local capacities for risk reduction.	Education & Outreach Activities	On-going	N/A	N/A	Boonsboro Town Manager (Support: Washington County OEM)	Safety & Security
	Hazard(s) Addressed: Dam failure, Drought, Extreme temperatures, Fire (structural/industrial), Flooding, Hazardous materials, Land subsidence, Opioid epidemic, Reportable disease epidemic, Severe summer weather, Severe winter weather, Tornado, Transportation accident, Wildfire **Goal/Objective Alignment:** 1.3: Increase jurisdictional capabilities (e.g., staff, equipment, programs) to support risk reduction. **Priority:** Unscored (represents a high-priority initiative born out of a recognition of the need to build local capacity to realize future risk reduction opportunities) **Status:** NEW. Boonsboro added this project as part of the 2023 update.						

Town of Clear Spring

Flooding in 2014 impacted Clear Spring, and it contributed to the decision to undertake an acquisition project (and converting the property into a town park). Runoff-based flooding also continues to impact the town, especially along Toms Run. As such, the town's continued mitigation strategy seeks to address flooding. However, Clear Spring is Washington County's smallest municipality (by population). Town leadership understands the importance of combining efforts to maximize available management bandwidth. The town is currently looking closely at its wastewater collection and water distribution utilities, and as such, while looking at those systems, it is also considering risk reduction and resilience relative to those systems.

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
CLE-1	Heavy rainwaters back up the town. Toms Run, the culvert that carries the water through the town, has deteriorated, and walls need to be replaced. Property owners and businesses have suffered losses. Construct a plan to rebuild the damaged culvert; identify corrections and apply to funding sources.	Structure & Infrastructure Projects	5 years	Up to $1M, contingent on the size of the project	BRIC, CDBG	Clear Spring Streets	Safety & Security
	Hazard(s) Addressed: Flooding **Goal/Objective Alignment:** 3.1: Increase transportation and stormwater management infrastructure resilience through upgrades or replacement (through consideration of mitigation elements in design); 8: Increase public investment in risk reduction for public services, critical facilities, and critical infrastructure throughout the county. **Priority:** 2 **Status:** ON-GOING. This project remains on-going from the previous plan update.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
CLE-2	The town has three wells on the same aquifer that supply the municipality. There are concerns when the water supply is low. Identify additional water sources; encourage residents to conserve water.	Structure & Infrastructure Projects	5 years	Requires little to no additional funding	Local funding	Clear Spring Water	Water Systems
	Hazard(s) Addressed: Drought **Goal/Objective Alignment:** 3.8: Increase public investment in risk reduction for public services, critical facilities, and critical infrastructure throughout the county. **Priority:** 4 **Status:** ON-GOING. This project remains on-going from the previous plan update.						
CLE-3	Interstate 70: There is heavy traffic through town, and residents have a problem getting around the area. Work with the state for additional detours that don't affect the town.	Structure & Infrastructure Projects	On-going	Requires little to no additional funding	Local funding	Clear Spring Town Council	Transportation
	Hazard(s) Addressed: Hazardous materials **Goal/Objective Alignment:** 1.2: Increase collaboration between responder agencies, other relevant organizations, and jurisdictions with each other and the public; 3.2: Decrease the number of road closures and life-threatening road conditions during hazard events. **Priority:** 4 **Status:** ON-GOING. This project remains on-going from the previous plan update.						
CLE-4	Sewer lines have infiltration; the sewer flow is more than the water flow. The sewer plant is old and outdated. Identify problem areas and prepare an RFP for correction of the problem.	Structure & Infrastructure Projects	5 years	Preparing the RFP requires little to no additional funding; implementation could exceed $1M	BRIC, CDBG	Clear Spring Sewer	Safety & Security
	Hazard(s) Addressed: Hazardous materials **Goal/Objective Alignment:** 3.8: Increase public investment in risk reduction for public services, critical facilities, and critical infrastructure throughout the county. **Priority:** 2 **Status:** ON-GOING. This project remains on-going from the previous plan update.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
CLE-5	Several people have been charged with obstruction; residents are losing loved ones. Educate the public.	Education & Outreach Activities	On-going	Up to $2,500 per campaign	Local funding	Clear Spring Town Council	Health & Medical
	Hazard(s) Addressed: Opioid epidemic **Goal/Objective Alignment:** 1.2: Increase collaboration between responder agencies, other relevant organizations, and jurisdictions with each other and the public. **Priority:** 9 **Status:** ON-GOING. This project remains on-going from the previous plan update.						
CLE-6	Due to inadequate conveyance systems for a 100-year flooding event, the town of Clear Spring floods at Main Street, where 20+ homes have flooded. 20+ years ago, MDSHA installed a bypass culvert to take some of the flood water. Acquire properties and improve the conveyance system.	Structure & Infrastructure Projects	5 years	Up to $229,800 per structure (i.e., the median value of owner-occupied units per U.S. Census)	BRIC, HMGP	Clear Spring Town Council	Food, Hydration, Shelter
	Hazard(s) Addressed: Flooding **Goal/Objective Alignment:** 3.4: Decrease the number of buildings that are at risk of flooding. **Priority:** 7 **Status:** ON-GOING. The town recently completed an acquisition project and converted a flood prone property into a town park. Further, the county has worked to alleviate some runoff issues outside of corporate limits. This project remains on-going from the previous plan update, primarily as a means of determining how effective recent efforts have been.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
CLE-7	Recently, Clear Spring has been examining its water system and considering a project to reduce water loss from 33% to under 10%. As such, the town is exploring funding for a wholesale replacement of water meters to significantly quicken total system replacement over an average of 17 meters per year. While looking into the water loss issue, town officials realized an inability to pump water during power outages that occur as a result of severe weather. Purchase a generator for auxiliary power at the town's water treatment plant.	Structure & Infrastructure Projects	5 years	Approx. $100,000	BRIC, HMGP, Local funding	Clear Spring Town Council	Water Systems
	Hazard(s) Addressed: Severe summer weather, Severe winter weather **Goal/Objective Alignment:** 3.8: Increase public investment in risk reduction for public services, critical facilities, and critical infrastructure throughout the county. **Priority:** 1 **Status:** NEW. Clear Spring added this project as part of the 2023 update.						
CLE-8	Clear Spring has maintained a reservoir that has been out of service. Explore the removal of the reservoir.	Structure & Infrastructure Projects	5 years	Unknown at this time (TBD)	HHPD (explore as a possibility); Local funding	Clear Spring Town Council	Safety & Security
	Hazard(s) Addressed: Dam failure **Goal/Objective Alignment:** 3.8: Increase public investment in risk reduction for public services, critical facilities, and critical infrastructure throughout the county. 4.1: Increase naturalized areas throughout the county to provide for protection from increased precipitation events. **Priority:** 6 **Status:** NEW. Clear Spring added this project as part of the 2023 update.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
CLE-9	Clear Spring's floodplain management ordinance is in place, but not readily available to residents or developers. Clearly post Clear Spring's floodplain management ordinance on the town's website.	Local Plans & Regulations	1 year	Posting to an existing website requires little to no additional funding	Local funding	Clear Spring Town Administrator	Safety & Security
	Hazard(s) Addressed: Flooding **Goal/Objective Alignment:** 2.3: Increase public awareness of natural hazards, including the indirect or cascading impacts of those hazards. **Priority:** Unscored (represents a high-priority initiative that is easily implemented with no extra cost) **Status:** NEW. Clear Spring added this project as part of the 2023 update.						
CLE-10	The quality of construction can impact the hardiness of structures when incidents (particularly weather-related) occur. Consider the creation of a locally-specific building code.	Local Plans & Regulations	On-going	Consideration of a regulation requires little to no additional funding; however, enforcement of a regulation would necessitate regular funding	N/A (at this time)	Clear Spring Town Council	Safety & Security
	Hazard(s) Addressed: Severe summer weather, Severe winter weather, Tornado **Goal/Objective Alignment:** 3.5: Sustain regulatory measures to ensure that new developme0nt will not increase risks. **Priority:** 8 **Status:** NEW. Clear Spring added this project as part of the 2023 update.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
CLE-11	For the purposes of its comprehensive plan, Clear Spring maintains a planning commission. To align general growth and development in the town with risk reduction goals, consider adding a responsibility for the planning commission chair to serve as a town representative on the steering committee for interim reviews and the next update of this plan.	Local Plans & Regulations	5 years	N/A	N/A	Clear Spring Town Administrator	Safety & Security
	Hazard(s) Addressed: Dam failure, Drought, Extreme temperatures, Fire (structural/industrial), Flooding, Hazardous materials, Land subsidence, Opioid epidemic, Reportable disease epidemic, Severe summer weather, Severe winter weather, Tornado, Transportation accident, Wildfire **Goal/Objective Alignment:** 1.2 Increase collaboration between responder agencies, other relevant organizations, and jurisdictions with each other and the public. **Priority:** Unscored (represents a high-priority initiative that involves linking two existing processes – comprehensive planning and mitigation planning) **Status:** NEW. Clear Spring added this project as part of the 2023 update.						
CLE-12	See Project Number WC-14. Coordinate with the WCOEM to obtain Clear Spring's municipal-specific report.	Local Plans & Regulations	1 year	N/A	N/A	Clear Spring Town Administrator (Support: Washington County OEM)	Safety & Security
	Hazard(s) Addressed: Dam failure, Drought, Extreme temperatures, Fire (structural/industrial), Flooding, Hazardous materials, Land subsidence, Opioid epidemic, Reportable disease epidemic, Severe summer weather, Severe winter weather, Tornado, Transportation accident, Wildfire **Goal/Objective Alignment:** 1.2: Increase collaboration between responder agencies, other relevant organizations, and jurisdictions with each other and the public. **Priority:** Unscored (represents a high-priority initiative to utilize the social vulnerability data collected for the 2023 update) **Status:** NEW. Clear Spring added this project as part of the 2023 update.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
CLE-13	See Project Number WC-15. Consider participation when training and funding opportunities are offered or available to build local capacities for risk reduction.	Education & Outreach Activities	On-going	N/A	N/A	Clear Spring Town Administrator (Support: Washington County OEM)	Safety & Security
	Hazard(s) Addressed: Dam failure, Drought, Extreme temperatures, Fire (structural/industrial), Flooding, Hazardous materials, Land subsidence, Opioid epidemic, Reportable disease epidemic, Severe summer weather, Severe winter weather, Tornado, Transportation accident, Wildfire **Goal/Objective Alignment:** 1.3: Increase jurisdictional capabilities (e.g., staff, equipment, programs) to support risk reduction. **Priority:** Unscored (represents a high-priority initiative born out of a recognition of the need to build local capacity to realize future risk reduction opportunities) **Status:** NEW. Clear Spring added this project as part of the 2023 update.						

Town of Funkstown

Funkstown has had success with recent mitigation projects, having complete the acquisition of several properties and converting that property into Jerusalem Park. The town's strategy for determining mitigation actions in this plan update focused on sustaining the momentum from that successful effort. For instance, the Funkstown Volunteer Fire Department approached the town council about adding a dry hydrant in the newly-created park to support fire responses, to which council agreed as a means of paying forward the benefits of risk reduction. Recognizing that potential impacts from flooding remain, the town shifted to looking at mitigating those impacts to critical infrastructure, and as such, two flood-centric projects appear in the updated action list.

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
FUN-1	Pump stations flood during significant events, causing the electrical components to burn up. The town has identified problem areas. The town will raise the electrical components in the pump stations, targeting the following stations: • High Street, • Behind the fire company near the Oak Ridge Drive bridge • Lagoon Road • Edgewood Drive The town will also purchase a mobile generator to ensure available power for pump stations should electrical components be damaged.	Structure & Infrastructure Projects	5 years	Up to $50,000, contingent on the size of the generator	ARPA, BRIC, HMGP	Funkstown Sewer	Food, Hydration, Shelter 
	Hazard(s) Addressed: Flooding **Goal/Objective Alignment:** 3.8: Increase public investment in risk reduction for public services, critical facilities, and critical infrastructure throughout the county. **Priority:** 1 **Status:** ON-GOING. The town did not complete this project per a lack of available funding; however, it is currently considering the feasibility of a large sewer project that would include this action using American Rescue Plan Act (ARPA) funds.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
FUN-2	Storm sewers collect water during heavy rains and floods, causing inflow and infiltration (I&I) in the sanitary sewer system. Install water-tight covers or inflow guards on sewer manholes, with the Edgewood Drive pump station area being the priority (i.e., first) addressed.	Structure & Infrastructure Projects	5 years	Up to $200 per manhole	ARPA, Local funding	Funkstown Sewer	Food, Hydration, Shelter 
	Hazard(s) Addressed: Flooding **Goal/Objective Alignment:** 3.8: Increase public investment in risk reduction for public services, critical facilities, and critical infrastructure throughout the county. **Priority:** 2 **Status:** ON-GOING. The town did not complete this project per a lack of available funding; however, it is currently considering the feasibility of a large sewer project that would include this action using American Rescue Plan Act (ARPA) funds.						
FUN-3	Washington County and Funkstown continue to experience problems with the opioid epidemic. The town will work with Washington County agencies to promote awareness.	Education & Outreach Activities	On-Going	Up to $2,500 per campaign	Local funding	Funkstown Town Manager	Health & Medical 
	Hazard(s) Addressed: Opioid epidemic **Goal/Objective Alignment:** 1.2: Increase collaboration between responder agencies, other relevant organizations, and jurisdictions with each other and the public. **Priority:** 4 **Status:** ON-GOING. The town has supported county efforts and disseminated information as requested (and appropriate). Given the continued issues, the town will continue to do so.						
FUN-4	Given the construction of Jerusalem Park, there is an opportunity to enhance fire protection capabilities by installing a dry hydrant. The town will install the dry hydrant in Jerusalem Park.	Structure & Infrastructure Projects	5 years	Up to $7,000	Local funding	Funkstown Volunteer Fire Company	Safety & Security 
	Hazard(s) Addressed: Fire (structural/industrial) **Goal/Objective Alignment:** 1.3: Increase jurisdictional capabilities (e.g., staff, equipment, programs) to support risk reduction. **Priority:** 2 **Status:** NEW. Funkstown added this project as part of the 2023 update.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
FUN-5	Funkstown receives support from the county in coordinating its floodplain management activities; currently, this arrangement works well for the town and county. To ensure continued effectiveness, periodically coordinate with the Washington County Engineering Department (i.e., floodplain management) to determine whether the current arrangement for management of the NFIP continues to be beneficial or if a local monitoring capability would better meet the needs of the town.	Local Plans & Regulations	On-going	Coordination with other local entities requires little to no cost	N/A	Funkstown Town Manager	Safety & Security
	Hazard(s) Addressed: Flooding **Goal/Objective Alignment:** 1.2 Increase collaboration between responder agencies, other relevant organizations, and jurisdictions with each other and the public. **Priority:** Unscored (represents a high-priority initiative that involves linking two existing processes – floodplain management and mitigation planning) **Status:** NEW. Funkstown added this project as part of the 2023 update.						
FUN-6	The quality of construction can impact the hardiness of structures when incidents (particularly weather-related) occur. Consider the creation of a locally-specific building code.	Local Plans & Regulations	On-going	Consideration of a regulation requires little to no additional funding; however, enforcement of a regulation would necessitate regular funding	N/A (at this time)	Funkstown Town Council	Safety & Security
	Hazard(s) Addressed: Severe summer weather, Severe winter weather, Tornado **Goal/Objective Alignment:** 3.5: Sustain regulatory measures to ensure that new developme0nt will not increase risks. **Priority:** 5 **Status:** NEW. Funkstown added this project as part of the 2023 update.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
FUN-7	For the purposes of its comprehensive plan, Funkstown maintains a planning commission. To align general growth and development in the town with risk reduction goals, consider adding a responsibility for the planning commission chair to serve as a town representative on the steering committee for interim reviews and the next update of this plan.	Local Plans & Regulations	5 years	N/A	N/A	Funkstown Town Manager	Safety & Security
	Hazard(s) Addressed: Dam failure, Drought, Extreme temperatures, Fire (structural/industrial), Flooding, Hazardous materials, Land subsidence, Opioid epidemic, Reportable disease epidemic, Severe summer weather, Severe winter weather, Tornado, Transportation accident, Wildfire **Goal/Objective Alignment:** 1.2 Increase collaboration between responder agencies, other relevant organizations, and jurisdictions with each other and the public. **Priority:** Unscored (represents a high-priority initiative that involves linking two existing processes – comprehensive planning and mitigation planning) **Status:** NEW. Funkstown added this project as part of the 2023 update.						
FUN-8	See Project Number WC-14. Coordinate with the WCOEM to obtain Funkstown's municipal-specific report.	Local Plans & Regulations	1 year	N/A	N/A	Funkstown Town Manager (Support: Washington County OEM)	Safety & Security
	Hazard(s) Addressed: Dam failure, Drought, Extreme temperatures, Fire (structural/industrial), Flooding, Hazardous materials, Land subsidence, Opioid epidemic, Reportable disease epidemic, Severe summer weather, Severe winter weather, Tornado, Transportation accident, Wildfire **Goal/Objective Alignment:** 1.2: Increase collaboration between responder agencies, other relevant organizations, and jurisdictions with each other and the public. **Priority:** Unscored (represents a high-priority initiative to utilize the social vulnerability data collected for the 2023 update) **Status:** NEW. Funkstown added this project as part of the 2023 update.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
FUN-9	See Project Number WC-15. Consider participation when training and funding opportunities are offered or available to build local capacities for risk reduction.	Education & Outreach Activities	On-going	N/A	N/A	Funkstown Town Manager (Support: Washington County OEM)	Safety & Security
	Hazard(s) Addressed: Dam failure, Drought, Extreme temperatures, Fire (structural/industrial), Flooding, Hazardous materials, Land subsidence, Opioid epidemic, Reportable disease epidemic, Severe summer weather, Severe winter weather, Tornado, Transportation accident, Wildfire **Goal/Objective Alignment:** 1.3: Increase jurisdictional capabilities (e.g., staff, equipment, programs) to support risk reduction. **Priority:** Unscored (represents a high-priority initiative born out of a recognition of the need to build local capacity to realize future risk reduction opportunities) **Status:** NEW. Funkstown added this project as part of the 2023 update.						

City of Hagerstown

Hagerstown has a dense urban development pattern, and it is the anchor of the urbanized north-south corridor along Interstate 81. As such, it will likely continue to see urbanized development. Further, Hagerstown is a historic area, as is much of Washington County, and there is a desire to preserve the historical integrity of the city as it evolves. City officials participating in this planning process thus prioritized mitigation actions that combined mitigation and resilience concepts with that pattern. Thus, mitigation actions that enhance the resilience of retrofitted structures, better move runoff from severe weather across an urbanized landscape, and combine historic preservation and resilient construction for new development feature in the table below.

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
HAG-1	Old buildings without fire sprinklers and compromised fire-stopping, dense development, a high percentage of rental units and multi-family buildings, disabled occupancy, hoarding, and unpermitted occupancy cause loss of life, destruction of property, and strain on the water system during fires. Some areas of the urban growth area do not have adequate water pressure to handle large building fires easily. Rental licensing of rental units has been implemented, and the fire department does neighborhood sweeps with smoke detectors. PCAD and FD work diligently to require upgrades to fire-stopping systems during renovations.	Local Plans & Regulations	3 years	$250,000	Local funding, state grants, and city match for fire sprinkler projects	Planning & Code Administration (Support: DCED, FD)	Safety & Security
	Hazard(s) Addressed: Fire (structural/industrial) **Goal/Objective Alignment:** 1.2: Increase collaboration between responder agencies, other relevant organizations, and jurisdictions with each other and the public; 3.5: Sustain regulatory measures to ensure that new development will not increase risks. **Priority:** 1 **Status:** ON-GOING. DCED has received State grants for fire sprinkler projects in downtown investment projects. Yet, there continues to be a need to educate property owners.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
HAG-2	Large, older buildings without adequate fire-stopping in attic areas cause fires in unprotected spaces to grow beyond the ability of fire protection systems to suppress them, causing loss of life and destruction of property. Building code changes protect new construction. Educate property owners about risks. Require upgrades during building upgrades.	Local Plans & Regulations	On-going	Requires little to no additional funding	Local funding	Planning & Code Administration (Support: FD)	Food, Hydration, Shelter Food, Water, Shelter
	Hazard(s) Addressed: Severe summer storms **Goal/Objective Alignment:** 3.3: Increase instances of property-owner mitigation measures; 3.5: Sustain regulatory measures to ensure that new development will not increase risks. **Priority:** 3 **Status:** ON-GOING. This project appeared in the previous version of the plan; however, city participants revised the lead and support agencies.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
HAG-3	Unfiltered and unrestricted flow of flood water in older portions of the city causes pollutants to reach surface waters and follow karst pathways to groundwater. Climate change has brought more intense storms, which create flash flooding when old storm systems cannot handle rapid and heavy volumes of water. New development meets stormwater management requirements and gains improvements from renovation or reuse projects. Continue to retrofit stream channels and the public stormwater management systems as funding allows.	Structure & Infrastructure Projects	On-going	At least $1M, contingent on the size of the projects	Stormwater fees and grants	Hagerstown Engineering (Support: Grantors)	Safety & Security
	Hazard(s) Addressed: Flooding **Goal/Objective Alignment:** 1.1: Increase data layers within Washington County's GIS system to graphically depict risk and vulnerability; 3.7: Increase the resilience of existing residential structures at high-risk through retrofitting and floodproofing; 3.8: Increase public investment in risk reduction for public services, critical facilities, and critical infrastructure throughout the county. **Priority:** 5 **Status:** ON-GOING. This project appeared in the previous version of the plan; however, city participants revised the lead and support agencies as well as the cost estimate and potential funding source.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
HAG-4	As the city develops, the need to upgrade the stormwater management system becomes more apparent. Recent efforts to enact a stormwater fee have been a response to this need, and it has allowed the city to begin looking proactively at system upgrades. Create a hydrologic and hydraulic (H&H) model to identify problem areas and bottlenecks in the stormwater management system. The model's output/data can allow for the implementation of future proactive upgrade measures.	Local Plans & Regulations	3 years	Approx. $100,000	FEMA HMA	Washington County OEM (Support: Hagerstown Engineering)	Safety & Security
	Hazard(s) Addressed: Flooding **Goal/Objective Alignment:** 3.1: Increase transportation and stormwater management infrastructure resilience through upgrades or replacement (through consideration of mitigation elements in design). **Priority:** 1 **Status:** NEW. Hagerstown added this project as part of the 2023 update. It builds on a modeling project started while examining stormwater-related flooding in the west end of Hagerstown.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
HAG-5	The opioid epidemic has caused heavy loss of life, family trauma, and strain on public safety personnel to address overdoses and homelessness. Increase Narcan training and work with partners on longer-term solutions to assist people with overcoming addiction. Hired intermediary to coordinate services and concerns between public safety and non-profit service providers. Working on the idea of a 24-hour crisis center to bridge the gap after-hours when 9-5/M-F service providers are unavailable.	Education & Outreach Activities	3 years	$515,000	Local funding, grant funds	Meritus, other non-profits (Support: Public safety agencies)	Health & Medical 
	Hazard(s) Addressed: Opioid epidemic **Goal/Objective Alignment:** 1.2: Increase collaboration between responder agencies, other relevant organizations, and jurisdictions with each other and the public. **Priority:** 1 **Status:** NEW. Hagerstown added this project as part of the 2023 update.						
HAG-6	Climate change has brought more intense and prolonged heat waves, which can adversely affect human health and strain infrastructure. Identify neighborhoods vulnerable to the urban heat island effect and develop strategies to help naturally cool dwellings and communities. Street tree planting can assist with natural cooling.	Structure & Infrastructure Projects	On-going	At least $25,000/year	Forest conservation PIL funds, SWM fees, state grants	Hagerstown Engineering (Support: Planning & Code Administration)	Food, Hydration, Shelter 
	Hazard(s) Addressed: Extreme temperatures **Goal/Objective Alignment:** 1.2: Increase collaboration between responder agencies, other relevant organizations, and jurisdictions with each other and the public; 2.1: Increase awareness and knowledge of hazard mitigation principles and practices among local and municipal public officials. **Priority:** 3 **Status:** NEW. Hagerstown added this project as part of the 2023 update.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
HAG-7	See Project Number WC-14. Coordinate with the WCOEM to obtain Hagerstown's municipal-specific report.	Local Plans & Regulations	1 year	N/A	N/A	Hagerstown Planning & Code Administration (Support: Washington County OEM)	Safety & Security
	Hazard(s) Addressed: Dam failure, Drought, Extreme temperatures, Fire (structural/industrial), Flooding, Hazardous materials, Land subsidence, Opioid epidemic, Reportable disease epidemic, Severe summer weather, Severe winter weather, Tornado, Transportation accident, Wildfire **Goal/Objective Alignment:** 1.2: Increase collaboration between responder agencies, other relevant organizations, and jurisdictions with each other and the public. **Priority:** Unscored (represents a high-priority initiative to utilize the social vulnerability data collected for the 2023 update) **Status:** NEW. Hagerstown added this project as part of the 2023 update.						
HAG-8	See Project Number WC-15. Consider participation when training and funding opportunities are offered or available to build local capacities for risk reduction.	Education & Outreach Activities	On-going	N/A	N/A	Hagerstown Engineering Hagerstown Planning & Code Administration (Support: Washington County OEM)	Safety & Security
	Hazard(s) Addressed: Dam failure, Drought, Extreme temperatures, Fire (structural/industrial), Flooding, Hazardous materials, Land subsidence, Opioid epidemic, Reportable disease epidemic, Severe summer weather, Severe winter weather, Tornado, Transportation accident, Wildfire **Goal/Objective Alignment:** 1.3: Increase jurisdictional capabilities (e.g., staff, equipment, programs) to support risk reduction. **Priority:** Unscored (represents a high-priority initiative born out of a recognition of the need to build local capacity to realize future risk reduction opportunities) **Status:** NEW. Hagerstown added this project as part of the 2023 update.						

Town of Hancock

Though the corporate limits of Hancock are relatively large, the main commercial and residential areas are in a compact area between Tonoloway and Little Tonoloway Creek along the former C&O Canal. The town's leaders identify as a river and canal community, and there is interest in both preserving the core of the town while becoming more resilient to risks. Special flood hazard areas impact corporate limits from the Potomac River and the aforementioned creeks, and the town recognizes the need to either acquire or otherwise floodproof flood-prone properties (through partnership with property owners). Further, the core downtown area is situated between Interstate 70 and a freight rail line (on the West Virginia side of the river). The hazardous material risk could manifest as an airborne incident or through groundwater or river contamination. Other mitigation actions, then, look at the potential hazardous material impacts.

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
HAN-1	The town of Hancock has experienced flooding of businesses and commercial properties on Main Street due to the Potomac River, Little Tonoloway Creek, and Tonoloway Creek. Continue to acquire flood-prone properties and implement floodproofing measures.	Structure & Infrastructure Projects	5 years	Up to $1M, contingent on the size of the project	BRIC, CDBG, HMGP	Hancock Town Council	Safety & Security
	Hazard(s) Addressed: Flooding **Goal/Objective Alignment:** 3.4: Decrease the number of buildings that are at risk of flooding. **Priority:** 2 **Status:** ON-GOING. The Shaw Motors acquisition project remains active. The town has recently engaged in conversations with other downtown businesses about floodproofing and acquisition projects, primarily around the Main Street / Methodist Avenue intersection.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
HAN-2	Engage in preparedness activities with Morgan County (WV) officials regarding the potential for a rail incident on the Morgan County side of the river that could impact the town.	Local Plans & Regulations	3 years	Requires little to no additional funding	Local funding	Hancock Town Manager	Hazardous Material 
	Hazard(s) Addressed: Hazardous materials **Goal/Objective Alignment:** 1.2: Increase collaboration between responder agencies, other relevant organizations, and jurisdictions with each other and the public. **Priority:** 1 **Status:** NEW. Hancock added this project as part of the 2023 update.						
HAN-3	The town currently draws water from a wellfield for its municipal potable water system. The well could be contaminated or have quantity issues. As such, Hancock is working toward being able to draw water from the Potomac River as an alternate source. Additionally, there is currently no way to pump water during power outages. Purchase a generator as a means of auxiliary power for the town's water pumphouse.	Structure & Infrastructure Projects	5 years	$100,000 or more	BRIC, HMGP, Local funding	Hancock Water Superintendent	Water Systems 
	Hazard(s) Addressed: Severe summer weather, Severe winter weather **Goal/Objective Alignment:** 3.8: Increase public investment in risk reduction for public services, critical facilities, and critical infrastructure throughout the county. **Priority:** 1 **Status:** NEW. Hancock added this project as part of the 2023 update.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
HAN-4	As noted, Hancock receives support from the county for implementation of its floodplain management activities. Ensure the town's floodplain ordinance matches the county's, particularly with respect to substantial improvement and substantial damage (or ensure that the most current version of the town's ordinance is available via its website).	Local Plans & Regulations	3 years	Revision of an existing regulation should require little to no additional funding	Local funding	Hancock Town Manager	Safety & Security
	Hazard(s) Addressed: Flooding **Goal/Objective Alignment:** 1.3: Increase jurisdictional capabilities (e.g., staff, equipment, programs) to support risk reduction. **Priority:** Unscored (represents a high-priority initiative to standard data across partner entities) **Status:** NEW. Hancock added this project as part of the 2023 update.						
HAN-5	Hancock receives support from the county in coordinating its floodplain management activities; currently, this arrangement works well for the town and county. To ensure continued effectiveness, periodically coordinate with the Washington County Engineering Department (i.e., floodplain management) to determine whether the current arrangement for management of the NFIP continues to be beneficial or if a local monitoring capability would better meet the needs of the town.	Local Plans & Regulations	On-going	Coordination with other local entities requires little to no cost	N/A	Hancock Town Manager	Safety & Security
	Hazard(s) Addressed: Flooding **Goal/Objective Alignment:** 1.2 Increase collaboration between responder agencies, other relevant organizations, and jurisdictions with each other and the public. **Priority:** Unscored (represents a high-priority initiative that involves linking two existing processes – floodplain management and mitigation planning) **Status:** NEW. Hancock added this project as part of the 2023 update.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
HAN-6	For the purposes of its comprehensive plan, Hancock maintains a planning commission. To align general growth and development in the town with risk reduction goals, consider adding a responsibility for the planning commission chair to serve as a town representative on the steering committee for interim reviews and the next update of this plan.	Local Plans & Regulations	5 years	N/A	N/A	Hancock Town Manager	Safety & Security
	Hazard(s) Addressed: Dam failure, Drought, Extreme temperatures, Fire (structural/industrial), Flooding, Hazardous materials, Land subsidence, Opioid epidemic, Reportable disease epidemic, Severe summer weather, Severe winter weather, Tornado, Transportation accident, Wildfire **Goal/Objective Alignment:** 1.2 Increase collaboration between responder agencies, other relevant organizations, and jurisdictions with each other and the public. **Priority:** Unscored (represents a high-priority initiative that involves linking two existing processes – comprehensive planning and mitigation planning) **Status:** NEW. Hancock added this project as part of the 2023 update.						
HAN-7	See Project Number WC-14. Coordinate with the WCOEM to obtain Hancock's municipal-specific report.	Local Plans & Regulations	1 year	N/A	N/A	Hancock Town Manager (Support: Washington County OEM)	Safety & Security
	Hazard(s) Addressed: Dam failure, Drought, Extreme temperatures, Fire (structural/industrial), Flooding, Hazardous materials, Land subsidence, Opioid epidemic, Reportable disease epidemic, Severe summer weather, Severe winter weather, Tornado, Transportation accident, Wildfire **Goal/Objective Alignment:** 1.2: Increase collaboration between responder agencies, other relevant organizations, and jurisdictions with each other and the public. **Priority:** Unscored (represents a high-priority initiative to utilize the social vulnerability data collected for the 2023 update) **Status:** NEW. Hancock added this project as part of the 2023 update.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
HAN-8	See Project Number WC-15. Consider participation when training and funding opportunities are offered or available to build local capacities for risk reduction.	Education & Outreach Activities	On-going	N/A	N/A	Hancock Town Manager (Support: Washington County OEM)	Safety & Security
	Hazard(s) Addressed: Dam failure, Drought, Extreme temperatures, Fire (structural/industrial), Flooding, Hazardous materials, Land subsidence, Opioid epidemic, Reportable disease epidemic, Severe summer weather, Severe winter weather, Tornado, Transportation accident, Wildfire **Goal/Objective Alignment:** 1.3: Increase jurisdictional capabilities (e.g., staff, equipment, programs) to support risk reduction. **Priority:** Unscored (represents a high-priority initiative born out of a recognition of the need to build local capacity to realize future risk reduction opportunities) **Status:** NEW. Hancock added this project as part of the 2023 update.						

Town of Keedysville

Town officials recognize flooding as its primary natural hazard, and as such, three of the four projects below address that hazard. Keedysville is a small town, and though there are capabilities available at the local level, there is a need to ensure a balance between what can realistically be accomplished versus the full range of town needs (including risk reduction and beyond to areas such as infrastructure development, managing growth, running town business, etc.). As such, through this process, the town administrator and other local officials felt it most prudent to keep a small list of actionable projects addressing primary risks. Additionally, the town maintains a joint water system with the Town of Boonsboro, and the municipalities are collaborating to replace the Shafer Park well, a $250,000 project funded locally and with a grant from the Appalachian Regional Commission. That project will not reduce risk to the hazards identified in this plan, per se, but it represents an effort to build capability for water availability (thereby potentially avoiding the emergence of a different hazard in the future).

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
KEE-1	Every five to 10 years, Little Antietam Creek floods and enters several buildings, causing property loss. Research ways to alleviate flooding and limit permits in the flood zone.	Local Plans & Regulations	On-going	Requires little to no additional funding	Local funding	Keedysville Planning & Zoning	Safety & Security Safety and Security
	Hazard(s) Addressed: Flooding **Goal/Objective Alignment:** 3.4: Decrease the number of buildings that are at risk of flooding; 3.5: Sustain regulatory measures to ensure that new development will not increase risk. **Priority:** 2 **Status:** ON-GOING. Keedysville researched ways to alleviate flooding and limit permits in the flood zone and continues to do so. The town has been working with the county flood management office to regulate permits in the flood zone. The town also acquired a flood-prone property at 15 South Main Street.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
KEE-2	As noted in the previous project, the town recently purchased a flood-prone property at 15 South Main Street. Demolish the flood-prone structure and build a "pocket park" on that parcel.	Structure & Infrastructure Projects	3 years	Up to $100,000	Local funding	Keedysville Town Administrator	Safety & Security
	Hazard(s) Addressed: Flooding **Goal/Objective Alignment:** 3.4: Decrease the number of buildings that are at risk of flooding; 3.5: Sustain regulatory measures to ensure that new development will not increase risk. **Priority:** 1 **Status:** NEW. Keedysville added this project as part of the 2023 update.						
KEE-3	The Little Antietam Creek produces the flooding that impacts the town. Undertake a streambank restoration along Little Antietam behind Main Street (i.e., the Town Hall and the recently-purchased flood-prone property).	Natural Systems Protection	3 years	Up to $100,000	Grant from Washington County Soil Conservation	Keedysville Town Administrator	Safety & Security
	Hazard(s) Addressed: Flooding **Goal/Objective Alignment:** 3.4: Decrease the number of buildings that are at risk of flooding **Priority:** 2 **Status:** NEW. Keedysville added this project as part of the 2023 update.						
KEE-4	There have been overdoses and fatalities due to opioids. Partner with a group in town organizing to find ways to inform the public of this problem. Use town resources to promote awareness and available treatment programs.	Education & Outreach Activities	On-going	Up to $2,500 per campaign	Local funding	Keedysville Town Council	Health & Medical
	Hazard(s) Addressed: Opioid epidemic **Goal/Objective Alignment:** 1.2: Increase collaboration between responder agencies, other relevant organizations, and jurisdictions with each other and the public. **Priority:** 4 **Status:** ON-GOING. The town has worked to promote awareness and treatment programs and continues to look for opportunities to do so. The town participates in the county's Washington Goes Purple addiction and recovery awareness month activities.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
KEE-5	Keedysville receives support from the county in coordinating its floodplain management activities; currently, this arrangement works well for the town and county. To ensure continued effectiveness, periodically coordinate with the Washington County Engineering Department (i.e., floodplain management) to determine whether the current arrangement for management of the NFIP continues to be beneficial or if a local monitoring capability would better meet the needs of the town.	Local Plans & Regulations	On-going	Coordination with other local entities requires little to no cost	N/A	Keedysville Town Administrator	Safety & Security
	Hazard(s) Addressed: Flooding **Goal/Objective Alignment:** 1.2 Increase collaboration between responder agencies, other relevant organizations, and jurisdictions with each other and the public. **Priority:** Unscored (represents a high-priority initiative that involves linking two existing processes – floodplain management and mitigation planning) **Status:** NEW. Keedysville added this project as part of the 2023 update.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
KEE-6	For the purposes of its comprehensive plan, Keedysville maintains a planning commission. To align general growth and development in the town with risk reduction goals, consider adding a responsibility for the planning commission chair to serve as a town representative on the steering committee for interim reviews and the next update of this plan.	Local Plans & Regulations	5 years	N/A	N/A	Keedysville Town Administrator	Safety & Security
	Hazard(s) Addressed: Dam failure, Drought, Extreme temperatures, Fire (structural/industrial), Flooding, Hazardous materials, Land subsidence, Opioid epidemic, Reportable disease epidemic, Severe summer weather, Severe winter weather, Tornado, Transportation accident, Wildfire **Goal/Objective Alignment:** 1.2 Increase collaboration between responder agencies, other relevant organizations, and jurisdictions with each other and the public. **Priority:** Unscored (represents a high-priority initiative that involves linking two existing processes – comprehensive planning and mitigation planning) **Status:** NEW. Keedysville added this project as part of the 2023 update.						
KEE-7	See Project Number WC-14. Coordinate with the WCOEM to obtain Keedysville's municipal-specific report.	Local Plans & Regulations	1 year	N/A	N/A	Keedysville Town Administrator (Support: Washington County OEM)	Safety & Security
	Hazard(s) Addressed: Dam failure, Drought, Extreme temperatures, Fire (structural/industrial), Flooding, Hazardous materials, Land subsidence, Opioid epidemic, Reportable disease epidemic, Severe summer weather, Severe winter weather, Tornado, Transportation accident, Wildfire **Goal/Objective Alignment:** 1.2: Increase collaboration between responder agencies, other relevant organizations, and jurisdictions with each other and the public. **Priority:** Unscored (represents a high-priority initiative to utilize the social vulnerability data collected for the 2023 update) **Status:** NEW. Keedysville added this project as part of the 2023 update.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
KEE-8	See Project Number WC-15. Consider participation when training and funding opportunities are offered or available to build local capacities for risk reduction.	Education & Outreach Activities	On-going	N/A	N/A	Keedysville Town Administrator (Support: Washington County OEM)	Safety & Security
	Hazard(s) Addressed: Dam failure, Drought, Extreme temperatures, Fire (structural/industrial), Flooding, Hazardous materials, Land subsidence, Opioid epidemic, Reportable disease epidemic, Severe summer weather, Severe winter weather, Tornado, Transportation accident, Wildfire **Goal/Objective Alignment:** 1.3: Increase jurisdictional capabilities (e.g., staff, equipment, programs) to support risk reduction. **Priority:** Unscored (represents a high-priority initiative born out of a recognition of the need to build local capacity to realize future risk reduction opportunities) **Status:** NEW. Keedysville added this project as part of the 2023 update.						

Town of Sharpsburg

Historically, flooding has been Sharpsburg's primary threat. Runoff from nearby areas has fed the creeks running through the town, causing flooding. There have been numerous recent efforts, both in the town and in the surrounding rural areas, to better manage the water. The town felt it was important to continue the momentum of those recent flood mitigation efforts, and as such, the majority of the following project list addresses flooding. The nature of hazard risks, though, appears to be changing, meaning town residents may be exposed to a wider range of occurrences that they have been in the past. Risks like contamination of the water system or the residual impacts from far-flung wildfires, hazardous material incidents in the region, etc., may impact the town, and because those risks would be novel, residents may not know how to respond to them. To address this reality, town will continue educating its residents about the hazards impacting not only the corporate limits, but the wider area.

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
SHA-1	Areas of the town are in the floodplain. Restrict additional buildings in the floodplain and encourage mitigation reconstruction and elevation where appropriate.	Local Plans & Regulations Structure & Infrastructure Projects	On-going	Minimal costs	Local funding	Sharpsburg Town Manager (Support: County Floodplain Management)	Safety & Security
	Hazard(s) Addressed: Flooding **Goal/Objective Alignment:** 3.4: Decrease the number of buildings that are at risk of flooding; 3.5: Sustain regulatory measures to ensure that new development will not increase risks. **Priority:** 2 **Status:** ON-GOING. The state helped Sharpsburg with a digital floodplain map, and the town published this information for residents. The Town Manager updates new council members with critical information about the floodplain.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
SHA-2	Develop community outreach programs to educate officials and the public about the town's hazards.	Education & Outreach Activities	On-going	Up to $2,500 per campaign	Local funding	Sharpsburg Town Council	Safety & Security
	Hazard(s) Addressed: Drought, Extreme temperatures, Flooding, Land subsidence, Severe summer weather, Severe winter weather, Tornado, Wildfire **Goal/Objective Alignment:** 2.3: Increase public awareness of natural hazards, including the indirect or cascading impacts of those hazards; 4.2: Decrease risk for vulnerable populations throughout the county. **Priority:** 1 **Status:** ON-GOING. Sharpsburg participates in educational activities as they occur (and as appropriate per the town's risks).						
SHA-3	There is a need to re-engineer Antietam and Church Streets.	Structure & Infrastructure Projects	On-going	Unknown	TBD	Sharpsburg Town Council	Safety & Security
	Hazard(s) Addressed: Flooding **Goal/Objective Alignment:** 3.1: Increase transportation and stormwater management infrastructure resilience through upgrades or replacement (through consideration of mitigation elements in design). **Priority:** 2 **Status:** NEW. Sharpsburg added this project as part of the 2023 update.						
SHA-4	Sharpsburg receives support from the county for implementation of its floodplain management activities. Ensure the town's floodplain ordinance matches the county's, particularly with respect to substantial improvement and substantial damage (or ensure that the most current version of the town's ordinance is available via its website).	Local Plans & Regulations	3 years	Revision of an existing regulation should require little to no additional funding	Local funding	Sharpsburg Zoning Administrator	Safety & Security
	Hazard(s) Addressed: Flooding **Goal/Objective Alignment:** 1.3: Increase jurisdictional capabilities (e.g., staff, equipment, programs) to support risk reduction. **Priority:** Unscored (represents a high-priority initiative to standard data across partner entities) **Status:** NEW. Sharpsburg added this project as part of the 2023 update.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
SHA-5	For the purposes of its comprehensive plan, Sharpsburg maintains a planning commission. To align general growth and development in the town with risk reduction goals, consider adding a responsibility for the planning commission chair to serve as a town representative on the steering committee for the next update of this plan.	Local Plans & Regulations	5 years	N/A	N/A	Sharpsburg Town Administrator	Safety & Security
	Hazard(s) Addressed: Dam failure, Drought, Extreme temperatures, Fire (structural/industrial), Flooding, Hazardous materials, Land subsidence, Opioid epidemic, Reportable disease epidemic, Severe summer weather, Severe winter weather, Tornado, Transportation accident, Wildfire **Goal/Objective Alignment:** 1.2 Increase collaboration between responder agencies, other relevant organizations, and jurisdictions with each other and the public. **Priority:** Unscored (represents a high-priority initiative that involves linking two existing processes – comprehensive planning and mitigation planning) **Status:** NEW. Sharpsburg added this project as part of the 2023 update.						
SHA-6	See Project Number WC-14. Coordinate with the WCOEM to obtain Sharpsburg's municipal-specific report.	Local Plans & Regulations	1 year	N/A	N/A	Sharpsburg Town Administrator (Support: Washington County OEM)	Safety & Security
	Hazard(s) Addressed: Dam failure, Drought, Extreme temperatures, Fire (structural/industrial), Flooding, Hazardous materials, Land subsidence, Opioid epidemic, Reportable disease epidemic, Severe summer weather, Severe winter weather, Tornado, Transportation accident, Wildfire **Goal/Objective Alignment:** 1.2: Increase collaboration between responder agencies, other relevant organizations, and jurisdictions with each other and the public. **Priority:** Unscored (represents a high-priority initiative to utilize the social vulnerability data collected for the 2023 update) **Status:** NEW. Sharpsburg added this project as part of the 2023 update.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
SHA-7	See Project Number WC-15. Consider participation when training and funding opportunities are offered or available to build local capacities for risk reduction.	Education & Outreach Activities	On-going	N/A	N/A	Sharpsburg Town Administrator (Support: Washington County OEM)	Safety & Security
	Hazard(s) Addressed: Dam failure, Drought, Extreme temperatures, Fire (structural/industrial), Flooding, Hazardous materials, Land subsidence, Opioid epidemic, Reportable disease epidemic, Severe summer weather, Severe winter weather, Tornado, Transportation accident, Wildfire **Goal/Objective Alignment:** 1.3: Increase jurisdictional capabilities (e.g., staff, equipment, programs) to support risk reduction. **Priority:** Unscored (represents a high-priority initiative born out of a recognition of the need to build local capacity to realize future risk reduction opportunities) **Status:** NEW. Sharpsburg added this project as part of the 2023 update.						

Town of Smithsburg

Smithsburg examined its vulnerability to the hazards identified in this plan, and though all of the hazards impact the area, the town's leaders felt that a resiliency approach toward the built environment would yield more benefit. For instance, there are floodplains running through Smithsburg, but there is a small amount of building exposure in those areas. Flood impacts are more commonly attributed to runoff. Further, for hazards like building fires and wildland fires, the existing water distribution system does not produce adequate fire flow in some areas. The town's infrastructure has been generally neglected over the past several years, and given the needs for system upgrades and the risk reduction that can result from an enhanced water system and stormwater management system, coupling those efforts is a cost- and time-effective strategy for Smithsburg.

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
SMI-1	The previous plan noted the need to maintain specific segments of the town's water system to maintain both the availability and pressure of water for fighting fires. The need remains, and this action calls for upgrading the water system to support the availability of potable water and fire suppression.	Structure & Infrastructure Projects	5 years	TBD (per study)	TBD (per study)	Smithsburg Town Manager	Food, Hydration, Shelter 
	Hazard(s) Addressed: Fire (structural/industrial) **Goal/Objective Alignment:** 3.8: Increase public investment in risk reduction for public services, critical facilities, and critical infrastructure throughout the county. **Priority:** 1 **Status:** ON-GOING. The town received a PER grant to complete a study on the water system, and future projects (born out of that study) will be forthcoming. The intent of those upcoming projects is to lessen the current 25% water loss throughout the system. For risk reduction, projects will raise fire flow, particularly for Smithsburg Elementary, Middle, and High Schools, as well as in the Mountain Shadows subdivision area.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
SMI-2	The town's stormwater management system is in need of upgrades. Currently, Smithsburg is working with its engineering consultants on an on-going MS4 study. Though MS4 efforts focus more on environmental issues, there are areas when property damage and environmental impacts result from runoff. The town manager expects eight to 12 specific areas to be identified. Complete the study, and when considering the projects identified by the study, prioritize those with both environmental and property damage impacts for earlier implementation.	Local Plans & Regulations	2 years	TBD (per study)	TBD (per study)	Smithsburg Town Manager	Safety & Security
	Hazard(s) Addressed: Flooding **Goal/Objective Alignment:** 3.4: Decrease the number of buildings that are at risk of flooding. **Priority:** 3 **Status:** NEW. Smithsburg added this project as part of the 2023 update.						
SMI-3	A CSX line runs through town. It directly borders the side of the Smithsburg Emergency Medical Services (SEMS) building. Should a train de-rail at the railroad crossing in front of or beside SEMS, surrounding areas would be without medical responders. SEMS is currently looking for available property within the town growth area to relocate. If a proposed annexation is approved within the Town of Smithsburg, the developer has agreed to provide land for a new rescue company.	Structure & Infrastructure Projects	On-going	TBD	Local funding	SEMS (Support: Smithsburg Town Manager)	Safety & Security
	Hazard(s) Addressed: Transportation accident **Goal/Objective Alignment:** 1.3: Increase jurisdictional capabilities (e.g., staff, equipment, programs) to support risk reduction. **Priority:** 2 **Status:** ON-GOING. Though SEMS has not yet relocated, discussions are occurring in tandem with a nearby property development project.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
SMI-4	Smithsburg receives support from the county in coordinating its floodplain management activities; currently, this arrangement works well for the town and county. To ensure continued effectiveness, periodically coordinate with the Washington County Engineering Department (i.e., floodplain management) to determine whether the current arrangement for management of the NFIP continues to be beneficial or if a local monitoring capability would better meet the needs of the town.	Local Plans & Regulations	On-going	Coordination with other local entities requires little to no cost	N/A	Smithsburg Town Manager	Safety & Security
	Hazard(s) Addressed: Flooding **Goal/Objective Alignment:** 1.2 Increase collaboration between responder agencies, other relevant organizations, and jurisdictions with each other and the public. **Priority:** Unscored (represents a high-priority initiative that involves linking two existing processes – floodplain management and mitigation planning) **Status:** NEW. Smithsburg added this project as part of the 2023 update.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
SMI-5	For the purposes of its comprehensive plan, Smithsburg maintains a planning commission. To align general growth and development in the town with risk reduction goals, consider adding a responsibility for the planning commission chair to serve as a town representative on the steering committee for the next update of this plan.	Local Plans & Regulations	5 years	N/A	N/A	Smithsburg Town Manager	Safety & Security
	Hazard(s) Addressed: Dam failure, Drought, Extreme temperatures, Fire (structural/industrial), Flooding, Hazardous materials, Land subsidence, Opioid epidemic, Reportable disease epidemic, Severe summer weather, Severe winter weather, Tornado, Transportation accident, Wildfire **Goal/Objective Alignment:** 1.2 Increase collaboration between responder agencies, other relevant organizations, and jurisdictions with each other and the public. **Priority:** Unscored (represents a high-priority initiative that involves linking two existing processes – comprehensive planning and mitigation planning) **Status:** NEW. Smithsburg added this project as part of the 2023 update.						
SMI-6	See Project Number WC-14. Coordinate with the WCOEM to obtain Smithsburg's municipal-specific report.	Local Plans & Regulations	1 year	N/A	N/A	Smithsburg Town Manager (Support: Washington County OEM)	Safety & Security
	Hazard(s) Addressed: Dam failure, Drought, Extreme temperatures, Fire (structural/industrial), Flooding, Hazardous materials, Land subsidence, Opioid epidemic, Reportable disease epidemic, Severe summer weather, Severe winter weather, Tornado, Transportation accident, Wildfire **Goal/Objective Alignment:** 1.2: Increase collaboration between responder agencies, other relevant organizations, and jurisdictions with each other and the public. **Priority:** Unscored (represents a high-priority initiative to utilize the social vulnerability data collected for the 2023 update) **Status:** NEW. Smithsburg added this project as part of the 2023 update.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
SMI-7	See Project Number WC-15. Consider participation when training and funding opportunities are offered or available to build local capacities for risk reduction.	Education & Outreach Activities	On-going	N/A	N/A	Smithsburg Town Manager (Support: Washington County OEM)	Safety & Security
	Hazard(s) Addressed: Dam failure, Drought, Extreme temperatures, Fire (structural/industrial), Flooding, Hazardous materials, Land subsidence, Opioid epidemic, Reportable disease epidemic, Severe summer weather, Severe winter weather, Tornado, Transportation accident, Wildfire **Goal/Objective Alignment:** 1.3: Increase jurisdictional capabilities (e.g., staff, equipment, programs) to support risk reduction. **Priority:** Unscored (represents a high-priority initiative born out of a recognition of the need to build local capacity to realize future risk reduction opportunities) **Status:** NEW. Smithsburg added this project as part of the 2023 update.						

Town of Williamsport

Between the 2018 and 2023 updates, Williamsport saw turnover in its town manager position. The new town manager has been managing several projects while learning the ropes of the position. The town is undertaking projects to upgrade its infrastructure systems. One of those projects is a sewer lining and manhole redevelopment project; another is an effort to decrease inflow and infiltration because the town is running into problems with pump motors burning up. From the perspective of this plan, the primary focus has been on flooding. There are several floodplains in the town created by smaller creeks and streams, and the additional runoff creates problems with those streams as well as storm systems. There is a need to partner with the county regarding the runoff that is created from large commercial developments just outside of the town's corporate limits.

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
WIL-1	During heavy rains, water still collects in the C&O Canal until it reaches outlets that drain to the river; when the water is high enough in the river, additional flooding can occur in the canal. Additional mitigation measures for run-off would be helpful, particularly as development both in and just outside the town occurs.	Structure & Infrastructure Projects	On-going	Unknown	BRIC, CDBG, HMGP	Williamsport Town Council	Safety & Security 
	Hazard(s) Addressed: Flooding **Goal/Objective Alignment:** 3.1: Increase transportation and stormwater management infrastructure resilience through upgrades or replacement (through consideration of mitigation elements in design. **Priority:** 1 **Status:** NEW. Williamsport added this project as part of the 2023 update.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
WIL-2	For the purposes of its comprehensive plan, Williamsport maintains a planning commission. To align general growth and development in the town with risk reduction goals, consider adding a responsibility for the planning commission chair to serve as a town representative on the steering committee for the next update of this plan.	Local Plans & Regulations	5 years	N/A	N/A	Williamsport Town Manager	Safety & Security
	Hazard(s) Addressed: Dam failure, Drought, Extreme temperatures, Fire (structural/industrial), Flooding, Hazardous materials, Land subsidence, Opioid epidemic, Reportable disease epidemic, Severe summer weather, Severe winter weather, Tornado, Transportation accident, Wildfire **Goal/Objective Alignment:** 1.2: Increase collaboration between responder agencies, other relevant organizations, and jurisdictions with each other and the public. **Priority:** Unscored (represents a high-priority initiative that involves linking two existing processes – comprehensive planning and mitigation planning) **Status:** NEW. Williamsport added this project as part of the 2023 update.						
WIL-3	See Project Number WC-14. Coordinate with the WCOEM to obtain Williamsport's municipal-specific report.	Local Plans & Regulations	1 year	N/A	N/A	Williamsport Town Manager (Support: Washington County OEM)	Safety & Security
	Hazard(s) Addressed: Dam failure, Drought, Extreme temperatures, Fire (structural/industrial), Flooding, Hazardous materials, Land subsidence, Opioid epidemic, Reportable disease epidemic, Severe summer weather, Severe winter weather, Tornado, Transportation accident, Wildfire **Goal/Objective Alignment:** 1.2: Increase collaboration between responder agencies, other relevant organizations, and jurisdictions with each other and the public. **Priority:** Unscored (represents a high-priority initiative to utilize the social vulnerability data collected for the 2023 update) **Status:** NEW. Williamsport added this project as part of the 2023 update.						

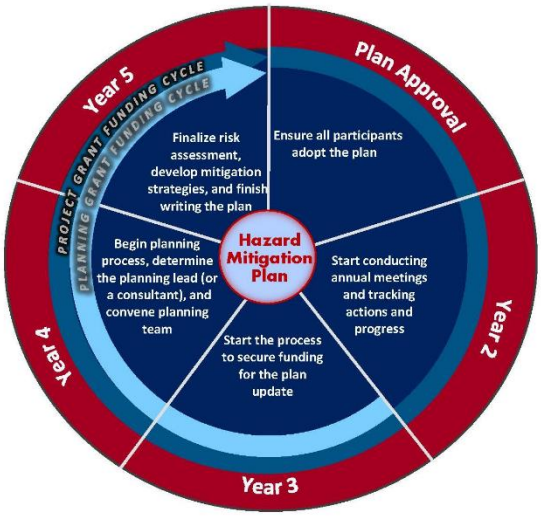
Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
WIL-4	See Project Number WC-15. Consider participation when training and funding opportunities are offered or available to build local capacities for risk reduction.	Education & Outreach Activities	On-going	N/A	N/A	Williamsport Town Manager (Support: Washington County OEM)	Safety & Security
	Hazard(s) Addressed: Dam failure, Drought, Extreme temperatures, Fire (structural/industrial), Flooding, Hazardous materials, Land subsidence, Opioid epidemic, Reportable disease epidemic, Severe summer weather, Severe winter weather, Tornado, Transportation accident, Wildfire **Goal/Objective Alignment:** 1.3: Increase jurisdictional capabilities (e.g., staff, equipment, programs) to support risk reduction. **Priority:** Unscored (represents a high-priority initiative born out of a recognition of the need to build local capacity to realize future risk reduction opportunities) **Status:** NEW. Williamsport added this project as part of the 2023 update.						

4.0 PLAN MAINTENANCE AND INTEGRATION

§201.6(c)(4)(i)	[The plan maintenance process shall include a] section describing the method and schedule of the monitoring, evaluating, and updating the mitigation plan within a five-year cycle.
§201.6(c)(4)(ii)	[The plan shall include a] process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.
§201.6(c)(4)(iii)	[The plan maintenance process shall include a] discussion on how the community will continue public participation in the plan maintenance process.

Monitoring, evaluating, and updating this plan is critical to maintaining its value and success in Washington County's hazard mitigation efforts. Ensuring effective implementation of mitigation activities paves the way for continued momentum in the planning process and gives direction for future value. This section explains who will be responsible for maintenance activities and what those responsibilities entail. It also provides a methodology and schedule of maintenance activities, including a description of how the public will have the opportunity to participate on a continuous basis.

For the 2023 update, the steering committee de-coupled plan maintenance efforts under this plan from the local emergency planning committee (LEPC), which the previous version identified as a partner with regular meetings whose agenda could periodically include mitigation discussions. The steering committee felt this move prudent because of the difference in focus between the LEPC and the mitigation steering committee. Additionally, the previous plan maintenance process called for an annual steering committee meeting, which proved unfeasible between 2018 and 2023. The steering committee agreed to utilize a mix of meetings and online surveys to gather and store data related to plan maintenance during the upcoming five-year cycle.



4.1 Monitoring, Evaluating, and Updating the Plan

The Washington County Office of Emergency Management (WCOEM) will be the custodial agent for this plan. As such, it will be

responsible for ensuring that plan maintenance occurs. Per the steering committee, the WCOEM will organize plan maintenance efforts consistent with the FEMA-suggested five-year cycle (see image above). The first year after obtaining "approved pending adoption" (APA) status will be for local government adoption, and the fifth year will be for initiating the next formal update.

In the second, third, and fourth years, the WCOEM will survey steering committee members about hazard experiences and mitigation action status. The survey will be a convenient way for committee members to submit comments, especially given their busy schedules. Online surveys will also provide an easy way to document committee member comments in their own words. The survey would include the following information.

WASHINGTON COUNTY HAZARD MITIGATION PLAN
ANNUAL STEERING COMMITTEE / JURISDICTIONAL SURVEY

It's that time of the year again! The survey below is part of Washington County's process to maintain an accurate, viable hazard mitigation plan to reduce risks throughout the county.

If you have any questions regarding the survey, or if you feel a meeting is necessary to discuss this information in more detail, feel free to contact the Washington County Office of Emergency Management at (240) 313-4360.

Q1: HAZARD EXPERIENCES
Did you experience any of the following within the past year?

□	Dam failure	□	Drought
□	Extreme temperature (hot or cold)	□	Fire (structural, industrial)
		□	Hazardous materials
□	Flooding	□	Transportation accident
□	Land subsidence	□	Reportable disease epidemic
□	Opioid epidemic	□	Severe winter weather
□	Severe summer weather	□	Tornado
□	Wildfire	□	Other

What comments would you add about these events?
_____
_____
_____

Did your jurisdiction or agency complete any mitigation projects? Yes □ No □
Description / Notes:
_____
_____
_____

Did your jurisdiction or agency update a plan that might be compatible with the mitigation plan? Yes □ No □
Description / Notes:
_____
_____
_____

Thank you for supporting our risk reduction efforts.

The WCOEM will download the survey results and place the resultant data[1] into a shared digital workspace (like a Google Drive or OneDrive folder). Sharing the digital workspace with the steering committee will allow committee members the opportunity to review data at their convenience. Steering committee members, particularly those representing the nine municipalities, will have the ability to download the report to share with their governing bodies.

[1] The WCOEM will share the raw data, so that steering committee members have access to the comprehensive results of the survey.

The steering committee also recognized the benefit of a meeting to discuss the information collected by the survey in more detail. The September (i.e., National Preparedness Month) that falls at the mid-point of the planning cycle (i.e., Year 3) would serve as a time for the steering committee to meet in person. The WCOEM will be responsible for polling the steering committee to determine whether the meeting will be in-person or virtual, and then planning and scheduling the meeting. The agenda for the mid-cycle meeting will be similar to Worksheet #10 in the *Local Mitigation Planning Guide* (FEMA, 2023c, p. 227).

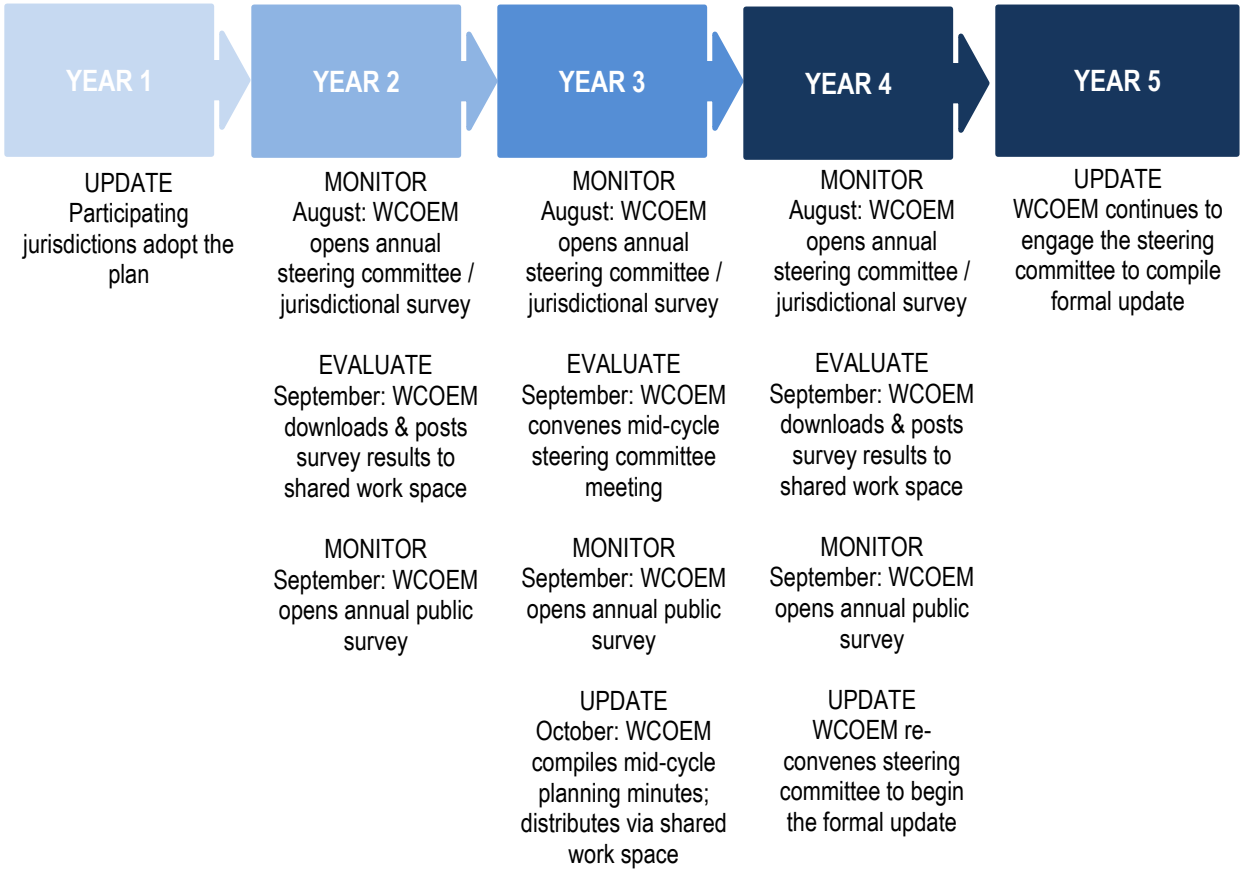
WASHINGTON COUNTY HAZARD MITIGATION PLAN
MID-CYCLE STEERING COMMITTEE MEETING AGENDA

Date:
Time:
Location:
Re: *Washington County Hazard Mitigation Plan*

---

1. *Welcome and Introductions*
2. *Hazard Occurrences*
   - *Review the data from annual surveys*
   - *Discuss major hazard events – How did they affect your communities?*
   - *Should we add any new hazards to the plan? Why?*
   - *Should we remove any hazards from the plan? Why?*
3. *Mitigation Strategy*
   - *Roundtable discussion about experiences implementing projects*
     - *Implementation challenges?*
     - *Consider new goals? Why?*
     - *New funding sources?*
     - *Overlap with other planning mechanisms (e.g., stormwater management, comprehensive planning)?*
   - *Activity: Participants to mark status of the mitigation actions listed in the existing plan*
     - *Complete, in-progress, not started, or cancelled*
4. *Capabilities*
   - *Any new or revised ordinances, policies, programs at the municipal level?*
   - *Any changes to NFIP administration?*
   - *General discussion*
5. *Data*
   - *New data sources (e.g., studies, maps, websites, etc.)?*
   - *Asset inventory updates (additions, deletions, changes)?*
   - *General discussion about development trends (e.g., developments in hazard areas, emerging risk-related impacts on new developments, etc.)?*
6. *Participants*
   - *Any new special bodies to invite (e.g., utilities, park districts, etc.)?*
   - *Partners to recognize (that have helped implement risk reduction/mitigation projects)?*
   - *Have there been any changes in public support or priorities about risk reduction/mitigation?*
   - *Necessary changes to the planning process?*
7. *General Q & A*
8. *Adjournment*

The following graphic summarizes this method for monitoring the plan.



4.2 Implementation through Existing Programs

To date, local policies have not hindered hazard mitigation efforts. Some policies, including using designated growth areas, support hazard mitigation by maintaining naturalized areas to help manage rainfall. Other, more response-oriented collaborative efforts serve as opportunities to regularly share risk and vulnerability information. For example, the Region 1/2 healthcare coalition – a committee supporting general preparedness for healthcare and public health partners – meets monthly. In May of each year, the WCOEM and the Washington County Health Department collaborate to complete a hazard analysis for Washington County that goes to the coalition. The data included in this plan's risk assessment (particularly the social vulnerability data) can inform the coalition hazard analysis, and conversely, coalition input can inform the opioid epidemic and reportable disease epidemic profiles.

As another example, the WCOEM coordinates an annual meeting (usually in September) of its Emergency Support Function (ESF) #6 and #8 partners to update the county's inclement

weather plan (see Appendix 1). Through this process, partners discuss impacts for both summer and winter weather. These discussions can also inform the summer/winter weather profiles as well as the tornado profile.

Additionally, planning commissions and other custodial bodies can modify their comprehensive plans to be more aligned with hazard mitigation. Each of the comprehensive plans serving Washington County either includes or has a variation of each of the following elements. The following table lists the elements along with points that are particularly relevant to hazard mitigation.

COMPREHENSIVE PLAN RELEVANCE FOR HAZARD MITIGATION	
Plan Element	*Relevance for Hazard Mitigation*
Goals & Objectives	**Definition[2]:** *This section establishes goals and objectives that serve as a guide for the development and economic and social well being of the local jurisdictions. The goals and objectives tell the world how the community wants to function and look in the future.* This section provides an opportunity for local officials to acknowledge the reciprocal benefits of hazard mitigation and community-level comprehensive planning. This section also serves as a statement of the community's stance on resilience as it moves forward.
Land Use	**Definition:** *The land use element outlines the most appropriate and desirable patterns of growth and development. Maps...can show areas targeted for different types of development; revitalization; priority corridors or areas; and preservation areas.* This section can include risk areas as key points of information for consideration as to the appropriate and desirable patterns. Incorporating mitigation in this section does not automatically imply banning development from all high-hazard areas; instead, it can identify those areas where certain types of resilient construction techniques would be beneficial.
Housing	**Definition:** *The housing element assesses a community's housing needs and addresses housing affordability for workforce and low-income households. The housing element may include goals, objectives, policies, plans, and standards for the community.* This section can include considerations for how hazards may impact equitable and affordable housing. It also offers an opportunity for discussing under-insurance (concerning natural hazards), disclosure of the risks in an area targeted for development, etc.
Transportation	**Definition:** *The transportation element describes and presents transportation patterns and includes the entire spectrum of transportation facilities (transit, roads, bicycle and pedestrian amenities, and transit-oriented development) applicable to the jurisdiction. It is important to note that the land use article requires jurisdictions to address bicycle and pedestrian facilities in their comprehensive plans.* This section can recognize the importance of the transportation infrastructure to overall emergency and disaster preparedness. Within such a discussion, maintaining critical arterial routes can be prioritized as a mitigative measure.

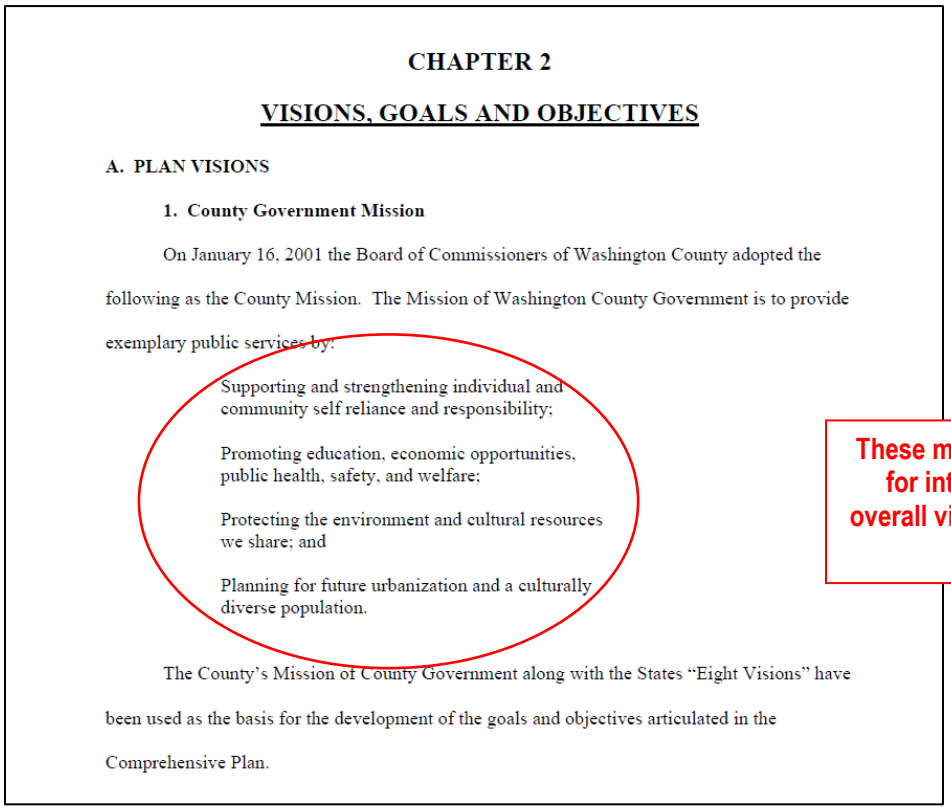
[2] All definitions come from the Maryland Department of Planning (MDP, n.d.B).

COMPREHENSIVE PLAN RELEVANCE FOR HAZARD MITIGATION	
Plan Element	*Relevance for Hazard Mitigation*
Community Facilities	**Definition:** *The community facilities element identifies the location, character and extent of public and semi-public buildings, lands, and facilities.* This section provides another perspective from which to consider high-risk areas.
Development Regulations	**Definition:** *The development regulations section identifies development tools that are the best available mechanisms to implement the plan, including a streamlined review for development in designated growth areas.* This section can discuss how to amend local ordinances and regulations to account for hazard risks. As with the land use element, these regulations may recommend or require specific types of resilient construction.
Sensitive Areas	**Definition:** *The sensitive areas element sets goals, objectives, principles, policies, and standards to protect sensitive areas from the adverse effects of development. The land use article requires jurisdictions to protect streams and their buffers; the 100-year floodplain; habitats of threatened and endangered species; and steep slopes, wetlands and agricultural and forest lands intended for resource protection or conservation.* This section gives communities the option of designating high-risk areas as sensitive areas.
Implementation	**Definition:** *Recognizing the importance of designing land development regulations that implement the plan, this section is supposed to address recommendations for land development regulations.* This section can include a series of actions that may be duplicated in the hazard mitigation plan (and vice versa). It allows communities to acknowledge those initiatives that overlap community development and hazard mitigation goals.
Development Capacity Analysis	**Definition:** *This section is an estimate of the total amount of development that may be built in an area under a certain set of assumptions, including land use laws and policies (e.g., zoning), environmental constraints, etc.* This section can include high-risk areas as a type of environmental constraint.
Municipal Growth	**Definition:** *This element requires municipalities to identify areas for future growth consistent with their long-range visions.* This section supports the multi-jurisdictional approach of this hazard mitigation plan by integrating discussions of high-risk areas and their relation to areas targeted for future growth. It also provides space to consider such measures as resilient construction in municipal areas.
Water Resources	**Definition:** *This element identifies drinking water supplies needed by projected populations.* This section supports the continued operation of critical infrastructure, particularly water systems. By identifying drinking water supply needs and potential upgrades necessary to meet those needs, this section allows local officials to discuss upgrades and other means of ensuring water reliability during emergencies.

The Maryland Department of Planning's *Land Use Article* (MDP, n.d.A) requires these elements as part of its "content requirements." The following images include excerpts from local

comprehensive plans and serve as examples of opportunities for alignment with mitigation goals and objectives (when the communities next update them).

Washington County Visions, Goals, and Objectives (2002 Version, p. 11)



CHAPTER 2

VISIONS, GOALS AND OBJECTIVES

A. PLAN VISIONS

1. County Government Mission

On January 16, 2001 the Board of Commissioners of Washington County adopted the following as the County Mission. The Mission of Washington County Government is to provide exemplary public services by:

Supporting and strengthening individual and community self reliance and responsibility;

Promoting education, economic opportunities, public health, safety, and welfare;

Protecting the environment and cultural resources we share; and

Planning for future urbanization and a culturally diverse population.

The County's Mission of County Government along with the States "Eight Visions" have been used as the basis for the development of the goals and objectives articulated in the Comprehensive Plan.

These missions provide opportunities for integrating resilience into the overall vision and goals for the county, as well as the plan.

Boonsboro Land Use Goal

Chapter 3: Land Use Element

This chapter sets forth land use policies and recommendations to help the Town of Boonsboro maintain its historic, small-town character, while recognizing opportunities for growth and economic development. Land use guidance for the nearly 1,000 acres of land annexed at the end of 2006 is particularly important, as is the relationship between this annexed land and the remainder of the Town.

Issues related to annexation, growth, and demand for public services are discussed in detail in Chapter 2 (the Municipal Growth Element), while the adequacy of public water and sewer service is discussed at length in Chapter 4, the Water Resources Element.

Goals and Objectives

1. Promote new development on the annexed properties that is in keeping with character of the Town's current residential development, and support the Town's economic development and other goals.
2. Ensure that future development avoids environmentally sensitive areas.
3. Encourage appropriate amounts and types of commercial development at appropriate locations in the Town.

Existing Land Use

Boonsboro's existing land use pattern, shown in Map 3.1, is a diverse mix of res
commercial, institutional and undeveloped areas. Table 3.1 summarizes the typ
amount of existing land uses. Boonsboro is primarily residential in nature, with
commercial activities in nodes along US Alternate 40 (Main Street).

Residential uses are generally single-family detached in nature, with some townhouse, multi-family, and apartment developments. Commercial areas are generally small in size, and cater to the needs of the local population or to the Town's tourism industry. The exception is the 50,000 square foot Weis supermarket on Chase Six Boulevard, which opened in 2005. Before Weis opened, Boonsboro residents typically did their major shopping in Hagerstown or Frederick.

The County public school complex (containing Boonsboro Elementary, Middle, and High Schools) along MD 66 (Maple Avenue) comprise most of the Town's institutional uses.

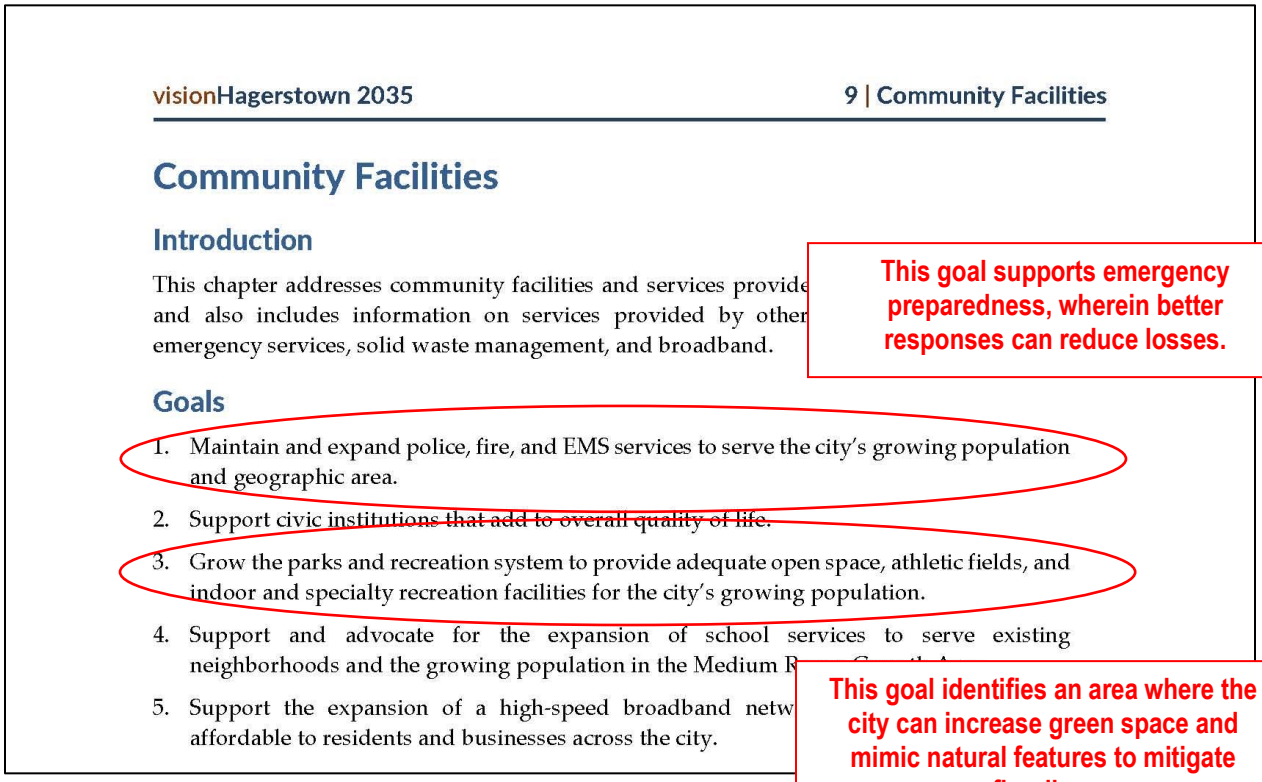
The Londontown Manufacturing Company (a clothing factory), south of the school complex, was Boonsboro's only major industrial activity, but it closed in the early 1990's. The Londontown site is currently occupied by Gesac, Inc, and remains appropriate for light industrial or employment-focused activity.

3-1

These goals can be amended to include references to high-risk areas.

Hagerstown updated its comprehensive plan between the 2018 and 2023 mitigation planning processes. The city's updated community facilities section, though, kept the two compatible goals identified by the 2018 mitigation plan.

Hagerstown Community Facilities Goals



visionHagerstown 2035 9 | Community Facilities

Community Facilities

Introduction

This chapter addresses community facilities and services provide
and also includes information on services provided by other
emergency services, solid waste management, and broadband.

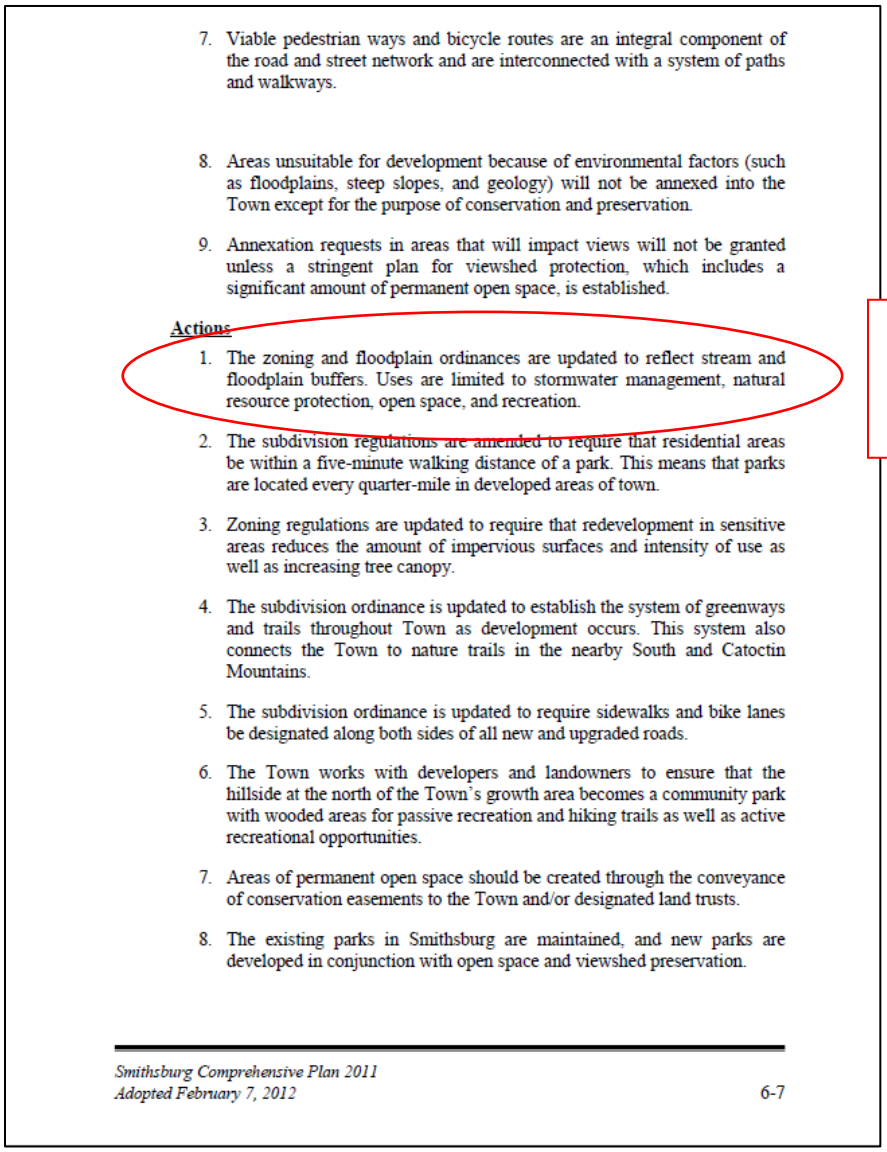
Goals

1. Maintain and expand police, fire, and EMS services to serve the city's growing population and geographic area.
2. Support civic institutions that add to overall quality of life.
3. Grow the parks and recreation system to provide adequate open space, athletic fields, and indoor and specialty recreation facilities for the city's growing population.
4. Support and advocate for the expansion of school services to serve existing neighborhoods and the growing population in the Medium R
5. Support the expansion of a high-speed broadband netw
affordable to residents and businesses across the city.

This goal supports emergency preparedness, wherein better responses can reduce losses.

This goal identifies an area where the city can increase green space and mimic natural features to mitigate flooding.

Smithsburg Actions within Floodplain Buffers



7. Viable pedestrian ways and bicycle routes are an integral component of the road and street network and are interconnected with a system of paths and walkways.

8. Areas unsuitable for development because of environmental factors (such as floodplains, steep slopes, and geology) will not be annexed into the Town except for the purpose of conservation and preservation.

9. Annexation requests in areas that will impact views will not be granted unless a stringent plan for viewshed protection, which includes a significant amount of permanent open space, is established.

Actions

1. The zoning and floodplain ordinances are updated to reflect stream and floodplain buffers. Uses are limited to stormwater management, natural resource protection, open space, and recreation.

2. The subdivision regulations are amended to require that residential areas be within a five-minute walking distance of a park. This means that parks are located every quarter-mile in developed areas of town.

3. Zoning regulations are updated to require that redevelopment in sensitive areas reduces the amount of impervious surfaces and intensity of use as well as increasing tree canopy.

4. The subdivision ordinance is updated to establish the system of greenways and trails throughout Town as development occurs. This system also connects the Town to nature trails in the nearby South and Catoctin Mountains.

5. The subdivision ordinance is updated to require sidewalks and bike lanes be designated along both sides of all new and upgraded roads.

6. The Town works with developers and landowners to ensure that the hillside at the north of the Town's growth area becomes a community park with wooded areas for passive recreation and hiking trails as well as active recreational opportunities.

7. Areas of permanent open space should be created through the conveyance of conservation easements to the Town and/or designated land trusts.

8. The existing parks in Smithsburg are maintained, and new parks are developed in conjunction with open space and viewshed preservation.

Smithsburg Comprehensive Plan 2011
Adopted February 7, 2012 6-7

This action is an example of a land use practice that can reduce the types of structures subject to flood exposure.

Given the potential overlap in these efforts, representatives from the Washington County Department of Planning and Zoning and Hagerstown Planning and Code Administration served on the steering committee for this update. For the other municipalities, town planners (for Boonsboro) and town administrators/managers (for Clear Spring, Funkstown, Hancock, Sharpsburg, Smithsburg, and Williamsport) also participated on the steering committee. Conversely, representatives of emergency management and response may participate in comprehensive (and other) plan updates.

Several municipalities noted the flooding that can occur outside of special flood hazard areas along with how inflow and infiltration into sewer systems causes problems. Boonsboro, Funkstown, Smithsburg, and Williamsport all noted the implementation of I&I projects and general

sewer system upgrades. Those projects are occurring separately from this hazard mitigation plan, though better managing stormwater supports mitigation. Rather than adding parallel projects to this plan, the towns requested a reference to those efforts under the “implementation through existing programs” discussion.

General opportunities for hazard mitigation plan integration with other plans and ordinances in Washington County appear in the following table. The method or option for each type of plan's integration is in the second column. The table intends to serve as a list of recommended potential considerations for the custodians of these various documents as they are updated. As a note, references to “City” point to the City of Hagerstown and “Towns” mean all of the towns in Washington County (i.e., Boonsboro, Clear Spring, Funkstown, Hagerstown, Hancock, Keedysville, Sharpsburg, Smithsburg, and Williamsport) unless otherwise noted.

<table>
<tr><th colspan="4">GENERAL PLAN INTEGRATION OPPORTUNITIES</th></tr>
<tr><th>Existing Program</th><th>Responsible Agency(ies)</th><th>Applicable Plan (i.e., Document)</th><th>Mitigation Action Comparison</th></tr>
<tr><td rowspan="2">Floodplain Management</td><td>• Hagerstown City Engineer's Office
• Washington County Division of Engineering</td><td>• Floodplain ordinances (county and municipal levels)</td><td>Continue to enforce floodplain development ordinances
Consider participation in the Community Rating System as appropriate for the jurisdiction
Continue public outreach to ensure awareness of flood risk and mitigation options</td></tr>
<tr><td colspan="2">Specific Integration Action(s):
• CITY: (a) Continue managing the city's participation in the NFIP; (b) FP administrator to serve as a steering committee member for HMP updates; (c) Ensure accuracy of city RL/SRL information in the HMP; (d) Contribute suggestions for priority flood mitigation projects in the city
• TOWNS: Coordinate with county engineering for NFIP management
• COUNTY (Div. of Engineering): (a) Continue managing the county's (and towns') participation in the NFIP; (b) FP administrator to serve as a steering committee member for HMP updates; (c) Ensure accuracy of county/town RL/SRL information in the HMP; (d) Contribute suggestions for priority flood mitigation projects through the county and towns</td><td>PLAN ELEMENTS/POLICIES

Support resilience by ensuring new development stays clear of known hazard areas or is built in such a way as to withstand the effects of known hazards

Protect green spaces in special flood hazard areas

ASSOCIATED MITIGATION OBJECTIVE (FROM THE HMP)
3.4: Decrease the number of buildings that are at risk of flooding

3.6: Increase the resilience of manufactured housing through code enforcement

4.1: Increase naturalized areas throughout the county to provide for protection from increased precipitation events</td></tr>
<tr><td rowspan="2">Stormwater Management</td><td>• Utility providers
• Washington County Division of Public Works (Stormwater Management Program)</td><td>• Jurisdictional MS4 permitting processes (where applicable)</td><td>Identify site-specific flooding concerns and other water quality issues
Provide a means for considering low-impact development options for flooding mitigation</td></tr>
<tr><td colspan="2">Specific Integration Action(s):
• COUNTY PUBLIC WORKS: Serve as a steering committee member for HMP updates</td><td>PLAN ELEMENT/POLICIES

Encourage onsite management of runoff

ASSOCIATED MITIGATION OBJECTIVE (FROM THE HMP)
3.1: Increase transportation and stormwater management infrastructure resilience through upgrades or replacement

3.2: Decrease the number of road closures and life-threatening road conditions during hazard events</td></tr>
</table>

<table>
<tr><th colspan="5">GENERAL PLAN INTEGRATION OPPORTUNITIES</th></tr>
<tr><th>Existing Program</th><th>Responsible Agency(ies)</th><th>Applicable Plan (i.e., Document)</th><th colspan="2">Mitigation Action Comparison</th></tr>
<tr><td rowspan="2">Infrastructure (i.e., Water, Sewer) Development</td><td>• Washington County Department of Water Quality
• Utility providers</td><td>• Jurisdictional and utility-specific capital improvement plans
• Jurisdictional source water protection plans
• Washington County Water and Sewer Plan</td><td colspan="2">Ensure the protection of environmental features when undertaking infrastructure projects
Support resilience by extending or improving public utility service to residents
Support improved emergency communications</td></tr>
<tr><td colspan="3"><u>Specific Integration Action(s):</u>
• CITY: Identify areas of concern (i.e., risk) and provide that information to the WCOEM (upon request) for consideration during HMP updates
• TOWNS (with Utility Systems): Identify areas of concern (i.e., risk) and provide that information the WCOEM (upon request) for consideration during HMP updates
• COUNTY (Dept. of Water Quality): Identify areas of concern (i.e., risk) and provide that information the WCOEM (upon request) for consideration during HMP updates</td><td>PLAN ELEMENTS/POLICIES

Support infrastructure development as a means of attracting economic development</td><td>ASSOCIATED MITIGATION OBJECTIVE (FROM THE HMP)
1.2: Increase collaboration between responder agencies, other relevant organizations, and jurisdictions with each other and the public

3.8: Increase public investment in risk reduction for public services, critical facilities, and critical infrastructure throughout the county</td></tr>
</table>

<table>
<tr><th colspan="5">GENERAL PLAN INTEGRATION OPPORTUNITIES</th></tr>
<tr><th>Existing Program</th><th>Responsible Agency(ies)</th><th>Applicable Plan (i.e., Document)</th><th colspan="2">Mitigation Action Comparison</th></tr>
<tr><td rowspan="2">Emergency Operations Planning</td><td>• Washington County Office of Emergency Management
• Washington County Department of Emergency Services
• Emergency response agencies</td><td>• Emergency operations plans
• Hazard/vulnerability analyses
• Commodity flow studies</td><td colspan="2">Ensure consistency between updated hazard analyses and the risk assessment portion of the plan
Consider mitigation projects as part of the overall cycle of emergency management</td></tr>
<tr><td colspan="3"><u>Specific Integration Action(s):</u>
• CITY: (a) Ensure city response agencies participate in multi-jurisdictional operations planning efforts; (b) Provide city-specific data for studies and assessments
• TOWNS: (a) Ensure town-supported response agencies participate in multi-jurisdictional operations planning efforts; (b) Provide town-specific data for studies and assessments
• COUNTY (WCOEM): (a) Sponsor operations planning updates regularly; (b) Update risk/vulnerability assessments regularly; (c) Solicit city and town participation in operations planning updates; (d) Utilize the hazard identification sections of emergency operations plans and the data contained in risk and vulnerability assessments and a commodity flow study to inform hazard discussions in Section 2.0: Risk Assessment</td><td>PLAN ELEMENTS/POLICIES

Establish and maintain an effective response program

Support continuity of critical infrastructure and key resources

Identify specific risk areas for certain hazards</td><td>ASSOCIATED MITIGATION OBJECTIVE (FROM THE HMP)
1.2: Increase collaboration between responder agencies, other relevant organizations, and jurisdictions with each other and the public

1.3: Increase jurisdictional capabilities (e.g., staff, equipment, programs) to support risk reduction

1.1: Increase data layers within Washington County's GIS system to graphically depict risk and vulnerability</td></tr>
</table>

<table>
<tr><th colspan="5">GENERAL PLAN INTEGRATION OPPORTUNITIES</th></tr>
<tr><th>Existing Program</th><th>Responsible Agency(ies)</th><th>Applicable Plan (i.e., Document)</th><th colspan="2">Mitigation Action Comparison</th></tr>
<tr><td rowspan="2">Transportation Planning</td><td>• Planning commissions for the county, Hagerstown, and the towns within the county</td><td>• Comprehensive plans (each contains a “Transportation” element)</td><td colspan="2">Acknowledge hazards in long-range transportation planning
Consider response elements to the risks identified in the mitigation plan, as appropriate, concerning transportation (e.g., evacuation)
Ensure planned transportation projects do not add to vulnerabilities (e.g., ensure projects utilize proper drainage, are properly elevated, etc.)
Consider incorporating green infrastructure/low-impact development as transportation projects are undertaken (e.g., permeable pavements, green streets, and alleys, etc.)</td></tr>
<tr><td colspan="3"><u>Specific Integration Action(s):</u>
• CITY: The Director of PCAD serves as a steering committee member to share, among other information, hazard impacts on transportation infrastructure
• TOWNS: Consider designating the planning commission chair to serve as the town’s representative on the steering committee for HMP updates (see Section 3.2 for mitigation action alignment)
• COUNTY (Dept. of Planning): The Director serves as a steering committee member to share, among other information, hazard impacts on transportation infrastructure</td><td>PLAN ELEMENTS/POLICIES

Provide emergency access to all parts of the county and safe evacuation routes

Consider upgrades to transportation infrastructures to prevent, to the extent possible, long-term infrastructure decay</td><td>ASSOCIATED MITIGATION OBJECTIVE (FROM THE HMP)
3.1: Increase transportation and stormwater management infrastructure resilience through upgrades or replacement (through consideration of mitigation elements in design)

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</table>

<table>
<tr><th colspan="4">GENERAL PLAN INTEGRATION OPPORTUNITIES</th></tr>
<tr><th>Existing Program</th><th>Responsible Agency(ies)</th><th>Applicable Plan (i.e., Document)</th><th colspan="2">Mitigation Action Comparison</th></tr>
<tr><td rowspan="4">Commercial/Economic Development</td><td>• Jurisdictional zoning departments and officers
• Planning commissions for the county, Hagerstown, and the towns within the county</td><td>• Zoning ordinances
• Building codes
• Subdivision and land development ordinances
• Comprehensive plans (each contains "Economic Development," "Land Use and Development," "Housing," "Community Facilities," and "Historical and Cultural Resources" elements)</td><td colspan="2">Ensure adherence to the floodplain, zoning, building, subdivision, and other relevant ordinances
Consider the implementation of stormwater management projects
Consider incorporating green infrastructure/low-impact development into site-specific projects (e.g., use of porous pavement, tree planting initiatives, planter boxes, bioswales, etc.)</td></tr>
<tr><td colspan="3">Specific Integration Action(s):
• CITY: The Director of PCAD serves as a steering committee member to ensure mitigation planning remains consistent with relevant ordinances and codes as well as to learn about potential information to share with developers to support resilient construction
• TOWNS: Consider designating the planning commission chair to serve as the town's representative on the steering committee for HMP updates (see Section 3.2 for mitigation action alignment)
• COUNTY (Dept. of Planning): The Director serves as a steering committee member to ensure mitigation planning remains consistent with relevant ordinances and codes as well as to learn about potential information to share with developers to support resilient construction</td><td>PLAN ELEMENTS/POLICIES</td><td>ASSOCIATED MITIGATION OBJECTIVE (FROM THE HMP)</td></tr>
<tr><td colspan="3"></td><td>Encourage responsible land use</td><td>4.2: Decrease risk for vulnerable populations throughout the county</td></tr>
<tr><td colspan="3"></td><td>Identify areas suitable for residential development (or redevelopment)</td><td>3.5: Sustain regulatory measures to ensure that new development will not increase risks</td></tr>
<tr><td colspan="3"></td><td>Identify areas suitable for commercial development (or redevelopment)</td><td>3.5: Sustain regulatory measures to ensure that new development will not increase risks</td></tr>
<tr><td colspan="3"></td><td>Identify areas suitable for industrial development (or redevelopment)</td><td>3.5: Sustain regulatory measures to ensure that new development will not increase risks</td></tr>
</table>

4.3 Continued Public Involvement

On-going public involvement will occur primarily through online surveying. During September (i.e., National Preparedness Month) of years two, three, and four of the planning cycle, the WCOEM will host the survey, and participating municipal governments will share the survey via websites, social media, etc. (as they did during the 2023 update). For those that do not have reliable internet access, paper copies of the survey will be available at the WCOEM office and the city/town halls of participating municipalities. The survey would include the following information.

WASHINGTON COUNTY HAZARD MITIGATION PLAN
ANNUAL PUBLIC SURVEY

Thank you for taking the time to respond to this survey and participating in Washington County's ongoing hazard mitigation planning process. By taking this survey, you are telling local leaders what risks are most important to you and your communities. That will help them to focus on the risk-related issues that matter (versus what might be necessary for other areas of Maryland or the Nation.)

If you have questions about this information or would like to discuss mitigation further, contact the Washington County Office of Emergency Management at (240) 313-4360.

Q1: HAZARD EXPRIENCES
Did you experience any of the following during the past year (select all that apply)?

- □ Dam failure
- □ Extreme temperature (hot or cold)
- □ Flooding
- □ Land subsidence
- □ Opioid epidemic
- □ Severe summer weather
- □ Wildfire
- □ Drought
- □ Fire (structural, industrial)
- □ Hazardous materials
- □ Transportation accident
- □ Reportable disease epidemic
- □ Severe winter weather
- □ Tornado
- □ Other

Q2: NOTIFICATIONS
Did you receive timely, accurate, and effective notifications about the hazards you've experienced in the past year?

- □ Yes
- □ No

How did you receive those notifications (select all that apply)?

- □ Television
- □ Radio
- □ Social media (Facebook, etc.)
- □ Email
- □ Other
- □ Newspaper
- □ Media website (TV, print, etc.)
- □ Text message
- □ Family member, friend, etc.

Q3: COMMUNITY RESPONSE
How would you rate the community's response to the hazards you've experienced in the past year (select one)?

- □ Excellent
- □ Average
- □ Poor
- □ Good
- □ Fair

Q4: MITIGATION ACTIONS
Did you undertake any mitigation measures at your home in the past year (select all that apply)?

- □ Elevated my home or business
- □ Repaired or replaced the roof
- □ Other
- □ Maintained trees/brush
- □ Cleared underbrush
- □ I did not undertake mitigation

Q5: GENERAL COMMENTS

_____
_____
_____

Thank you for supporting Washington County's hazard mitigation plan!