City of Staunton
Flood Resilience Plan

Prepared for:
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Acknowledgements

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Executive Summary

The City of Staunton presents this Flood Resilience Plan as an important first step toward increasing the City's ability to anticipate, prepare for, respond to, and recover from threats resulting from flooding, with minimum damage to social well-being, health, the economy, and the environment. The overarching goal is to plan the actions and measures necessary to balance growth with the need to build greater resilience in natural and human systems. This Plan provides a foundation for forthcoming studies and projects aimed at bolstering Staunton's flood resilience. Additionally, it serves as a basis for applying for state funding to support resiliency efforts. While the Plan's initial development phase is complete, the City remains committed to engaging with the community to improve its understanding of flooding issues and resilience. Therefore, this Plan remains open to future revisions that deal with the evolving concepts of flood resilience and community perspectives. It's important to note that while this Plan focuses solely on flood resilience, its methods were developed to be adapted for broader resilience applications.

This plan is organized as follows:

Section 1 defines the scope and purpose this plan,
Section 2 summarizes Staunton's flood history,
Section 3 characterizes Staunton's demographics and vulnerabilities in the context of social equity,
Section 4 presents the results of the public engagement process performed for this Plan
Section 5 places the Plan in the context of five key principles of flood resilience:

1. Best Available Science – Does decision making incorporate the best available science and predictions of future environmental changes (increased rainfall intensity and temperature) into design and implementation of efforts?
2. Social Equity – Does the effort acknowledge community vulnerabilities and work towards equitable outcomes in its conception? Will the effort improve or strengthen the social fabric in vulnerable parts of the community?
3. Community Scale Benefits – Will the effort render benefits at a U.S. Census Block scale or larger? Will at least 10% of the City's population benefit from the project? Is the effort consistent with regional efforts?
4. Economy and Land Use – Does the effort acknowledge fiscal realities and focus on cost-effectiveness? Does the effort encourage the usage and development of land that internalizes present and future flood risk? Is it consistent with best practice for floodplain management?
5. Nature-Based Approach – Will the effort leverage environmental processes and natural systems to minimize and mitigate flood impacts and reduce pollutants of concern including fine sediment, pathogens, and organic chemicals?

Section 6 presents existing City efforts and evaluates gaps to be addressed, and
Section 7 proposes future flood resilience projects, plans, and studies.

The flood resilience efforts proposed in Section 7 are consistent with existing City efforts, and provide specific, actionable work items that will ensure long-range resilience concepts are embedded in the City's decision-making processes with respect to floodplain management and flood-related infrastructure planning. Overall, it is anticipated that adoption and implementation of the five key flood resilience principles and the specific project proposals will further support the Comprehensive Plan (Staunton Planning Commission, 2019) ,which outlines goals for future development within the City to occur in an efficient and economically and environmentally sound manner, aiming to balance residential, commercial, and employment opportunities with preservation of the natural environment, history, and character of the community.

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Acronyms

BMP	best management practice
CDC/ATSDR	Centers for Disease Control and Prevention and the Agency for Toxic Substances and Disease Registry
CFPF	Community Flood Prevention Fund
CIP	Capital Improvement Plan
CRS	Community Rating System
CSPDC	Central Shenandoah Planning District Commission
EOP	Emergency Operations Plan
ESC	erosion and sediment control
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
FY	fiscal year
GIS	Geographic Information System
MCM	minimum control measure
MS4	Municipal Separate Storm Sewer System
NFIP	National Flood Insurance Program
NOAA	National Oceanic and Atmospheric Administration
NWS	National Weather Service
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
RCP	representative concentration pathway
SFHA	Special Flood Hazard AreaSVI Social Vulnerability Index
SWCD	Soil and Water Conservation District
SWM	stormwater management
TMDL	Total Maximum Daily Load
USEPA	United Stated Environmental Protection Agency
VADCR	Virginia Department of Conservation and Recreation
VADEQ	Virginia Department of Environmental Quality
VDEM	Virginia Department of Emergency Management
VDH	Virginia Department of Health
VDOT	Virginia Department of Transportation
VESMP	Virginia Erosion and Stormwater Management Program
VGIN	Virginia Geographic Information Network
VLCD	Virginia Land Cover Database
VSMP	Virginia Stormwater Management Program

1.0 INTRODUCTION

1.1. Statement of Purpose

Flood Resilience
The capability to anticipate, prepare for, respond to, and recover from a significant flood-related disruption or shock with minimum damage to social well-being, health, the economy, and the environment

The term "resilience" is defined as the capability to anticipate, prepare for, respond to, and recover from significant multi-hazard threats with minimum damage to social well-being, health of the economy, and the environment[1]. Resilience is a concept of major significance for communities in a rapidly changing world. In the context of flooding, resilience focuses both on minimizing the impacts of flooding and equipping a community to respond to and rebound from the impacts of flood events. This includes both the direct, short-term shocks related to a specific flood event, as well as the longer-term issues that flood risk can create in a community. The Commonwealth of Virginia recognized this challenge when it created the Community Flood Preparedness Fund in 2020. The Central Shenandoah Planning District Commission, which serves Staunton and 20 other surrounding localities, ranked the hazards of flooding and/or dam failure as the highest significance for their service area in the 2020 Central Shenandoah Hazard Mitigation Plan (CSPDC, 2020).

The City of Staunton has a vision, as expressed through the Comprehensive Plan (CSPC, 2019), of being a strong, livable, economically resilient community that exists in harmony with nature while ensuring that programs and actions are equitable for all members of the community. This vision is consistent with the State's vision for creating strong, resilient communities. As outlined in the goals taken from the Comprehensive Plan (CSPC, 2019), Staunton seeks to create balanced growth and revitalization that serves and encourages a demographically diverse and growing population. Generating this planned growth and revitalization without also addressing resilience to potential hazards, especially known and recurring hazards like flooding, would be socially and financially short-sighted and irresponsible.

With an acknowledgement of the present and future flood risk in the community, and a desire to apply resilience principles to the long-range mitigation of and response to this risk, the City of Staunton has developed this Flood Resilience Plan (Plan) to identify a path to a more flood resilient Staunton. As such, **the purpose of this document is to define the City's principles of flood resilience, to identify gaps in existing City knowledge/efforts with respect to these principles,**

[1] From U.S. Global Change Research Program and Virginia Coastal Resilience Master Planning Framework

and to provide specific action items that can be performed to make progress towards these principles.

The Plan follows the principles of the Community Flood Preparedness Fund (CFPF) as defined by the Virginia Department of Conservation and Recreation (VADCR) and the elements and direction of Staunton's Comprehensive Plan. **Appendix A** includes a cross-walk between VADCR's criteria for resilience plans with the contents of this document.

1.2. Overarching Themes and Principles

There are three overarching themes that apply to Staunton's flood resilience:

- The City of Staunton has a rich historical and architectural character that needs to be balanced with the realities of potential impacts of catastrophic flood events. This unique character must be considered when making decisions aimed at creating a more resilient City.
- With limited resources, being good stewards of our land and capital resources is critical and is based on an understanding of community needs.
- Achieving a high level of resilience is not possible through application of a single strategy. It requires multi-faceted efforts, informed by community partnership and feedback, with the City playing a critical role in developing enabling programs and policies, as well as strategic capital investment and project implementation.

These themes are applied to five guiding flood resilience planning principles. These principles are detailed in §10.1-602 of the Code of Virginia (the Flood Damage Reduction Act) and reiterated in the Virginia Coastal Resilience Master Plan (VADCR, 2021) and the 2025 CFPF Manual (VADCR, 2025a). The five guiding principles are to:

(i) base decision making on the best-available science;
(ii) identify and address socioeconomic inequities and strive to enhance equity through the adaptation and protection measures by considering all areas of recurrent flooding;
(iii) recognize the importance of protecting and enhancing natural infrastructure and nature-based approaches to flood mitigation, when possible;
(iv) utilize community and regional scale planning to the maximum extent possible, seeking region-specific approaches tailored to the needs of individual communities; and
(v) include an understanding of fiscal realities and focus on cost-effective solutions for the protection and adaptation of communities, businesses, and critical infrastructure."

Or, more succinctly:

1. Best Available Science
2. Social Equity
3. Nature-Based Solutions Approach
4. Community Scale Benefits
5. Economy and Land Use

Nature Based Solutions are sustainable practices that weave natural features and processes into the built environment to promote adaptation and resilience.

These principles support the plan's objective of providing a blueprint for the City's future efforts to build upon and expand on considerable stormwater and floodplain management plans, policies and projects to guide the City towards greater flood resilience.

1.3. Methods and Scope

In order to form a Plan that applies resilience-thinking appropriately to the City's specific context, the following document structure is used: first, an introduction is provided that clarifies the purpose, methodology, and scope of this Resilience Plan in **Section 1.0**. Next, **Section 2.0** provides a summary of how Staunton's history and hydrology shapes the present-day context for flood resilience, with discussion of other related vulnerabilities. **Section 3.0** is focused on characterizing Staunton's demographics and vulnerabilities in the context of social equity, and **Section 4.0** adds to this knowledge base using the public engagement process for this Plan. **Section 5.0** assimilates the previous sections into five key flood resilience principles, which are used to evaluate existing City efforts in **Section 6.0** and propose future flood resilience projects and programs in **Section 7.0**.

The planning team consisted of City staff from the Departments of Community Development, Public Works, and Fire and Rescue as well as the City Manager's office and a consultant team from Wiley|Wilson and Wetland Studies and Solutions Inc. (WSSI). Public outreach to guide plan development was conducted from July 2025 to August 2025 and in April 2026. The plan was reviewed by pertinent City leadership prior to presentation to and adoption by City Council. While this document memorializes the resilience-thinking and public outreach completed to date, it is acknowledged that community engagement is an ongoing, project-specific process that will continue as the proposed ideas in this plan make their way to implementation. This plan is therefore subject to future revisions, as concepts of flood resilience and community perspectives evolve. Many similar sorts of documents (e.g. the regional Hazard Mitigation Plan) are updated on a four or five year rotation at a minimum, and it is recommended that this Plan be revisited at least as frequently.

Finally, it is important to understand that the focus of this plan is flood resilience and not resilience more broadly (e.g. economic, health, energy). A broader evaluation of other known hazards and

the complex interdependencies of critical infrastructure during emergency events is outside of the scope of this work. Notwithstanding, the methods, analysis, findings, and recommendations in this plan are carefully crafted to support a broader application of resilience thinking across these domains.

2.0 BACKGROUND

2.1. History and Hydrology

Located in the Shenandoah Valley in between the Blue Ridge Mountains to the east and the Ridge-and-Valley Appalachians to the west, the City of Staunton is an independent city within Augusta County in western Virginia. The City limits incorporate 19.98 square miles and as of 2020 had a population of 25,750.

Evidence has been found of the Augusta-Staunton area supporting a robust Native American population presence since at least 11,500 BC (Staunton Planning Commission, 2019). Benefitting from abundant water resources and laying at the intersection of several early trade routes, Staunton quickly became a major trading center for European colonists. Founded in 1747, Staunton continued to grow as a commercial center and was incorporated as a city in 1871, becoming an independent city in 1902. Those historic trade routes are now modern railroads and highways, with the I-81 corridor running north-south, I-64 connecting Staunton to Richmond and the east coast through Afton Gap, and Route 250 crossing the mountains to the west.

The landscape is characterized by rolling hills punctuated by steep slopes, some greater than 25%. It is underlain by karst geology, and as such there are several springs throughout the area. One of the original water sources for the City was from springs located in what is now Gypsy Hill Park. The land that is now the park was acquired by the City starting in 1876 to protect the water supply (Staunton Parks and Recreation Department, 2018). The water supply for the City is now sourced from three separate locations: North River, Gardner Spring, and Middle River.

Lewis Creek runs through the City from west to east and the majority of the city (~16 of the 20 square mile City footprint) is contained in the Lewis Creek watershed, with small portions to the north and south draining to the Middle River and Christians Creek, respectively (**Figure 1**). Lewis Creek and Christians Creek join the Middle River to the east and are part of the South Fork Shenandoah River watershed. Much of the northern portion of the City drains to a tributary of Lewis Creek called Peyton Creek (also known as Gum Spring Branch), which flows south to join Lewis Creek in the Wharf area of downtown Staunton (**Figure 2**).

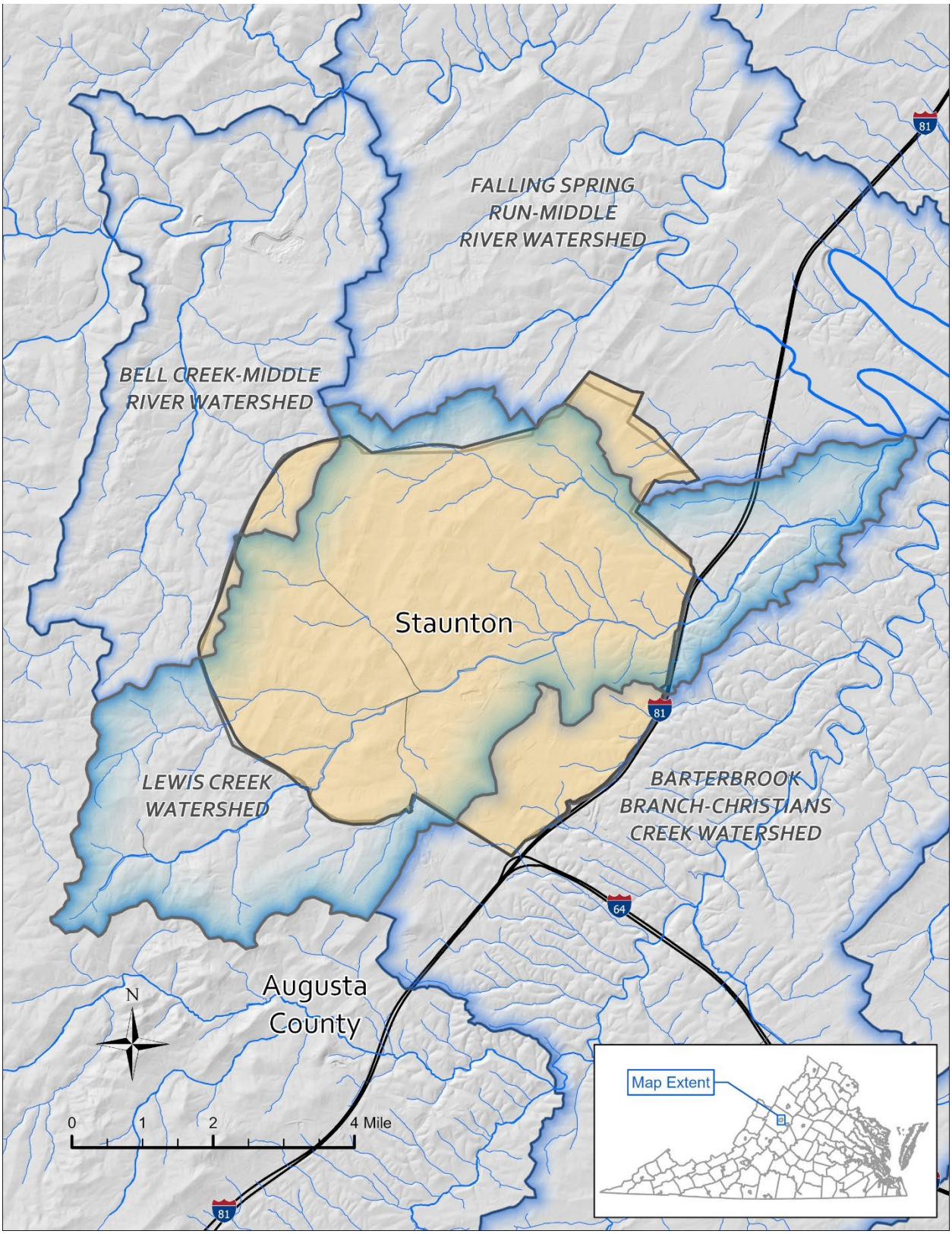

Figure 1. City of Staunton in the broader watershed context of Lewis Creek and surrounding Middle River tributaries.

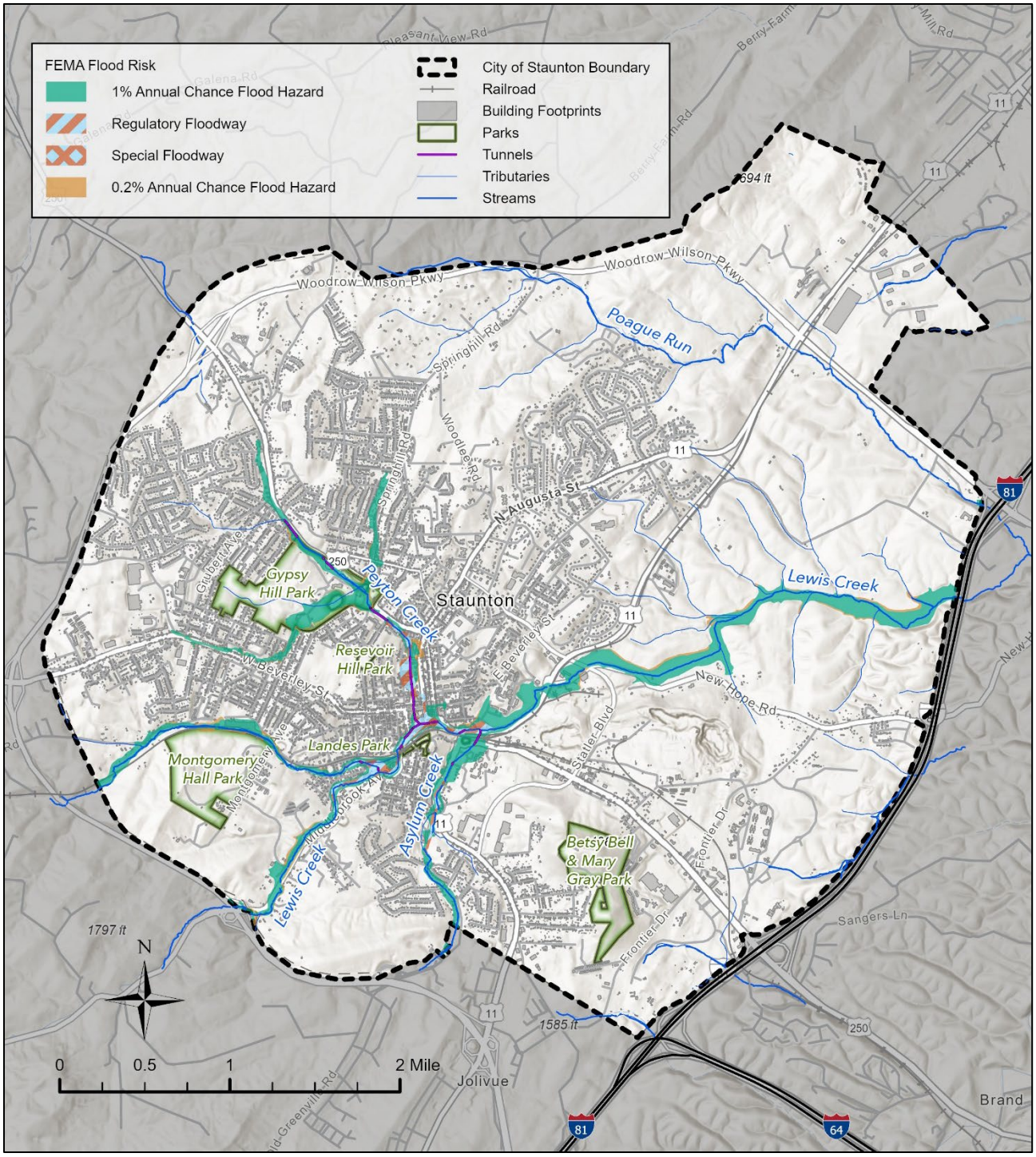

Figure 2. City of Staunton and its streams and FEMA Special Flood Hazard Areas (SFHAs).

The Lewis Creek watershed is approximately 28 square miles (16.3 of which are Staunton), including 2.75 miles of regulatory floodway within the Federal Emergency Management Agency (FEMA) 1% Annual Chance flood hazard area inside the Staunton City limits. Significant portions of Lewis Creek and its tributary Peyton Creek are encased in tunnels below buildings, roads, and parking lots. These tunnels run through parts of the historic downtown area of Staunton, where a

large amount of infrastructure is highly susceptible to flooding. Additionally, large areas of parking lots, streets, and other impervious surfaces throughout the City cause a high percentage of rainfall to be funneled rapidly into inadequate drainage structures.

The Lewis Creek watershed is on average 39% developed and the City's footprint is 47% developed (defined as either impervious or turf in 2016 VGIN VLCD (VGIN, 2021)). As a result of this highly developed land cover and the related removal of vegetation and grading/compaction of soils, the hydrology throughout the Lewis Creek watershed has changed considerably from the early days of its settlement. Thus, Staunton now experiences two separate but related flooding processes: riverine and pluvial. In general, riverine flooding is caused by longer duration rainfall (tropical storms or frontal systems) while pluvial flooding is caused by shorter duration but very intense rainfall (convective or "burst" storms) – the impacts of these two processes are further expanded in the following subsections. A summary of historic floods impacting the City of Staunton is included in **Appendix B**.

2.1.1. Riverine Flooding

Riverine flooding in Staunton occurs when longer duration precipitation events that exceed the infiltration limits of the soils in the Lewis Creek watershed and causes flooding along the stream corridor. Flooding has proven a persistent problem for Staunton, with records of significant flood events damaging portions of the city and even taking lives since before its establishment as a city in 1871, with large floods recorded in 1860 and 1870 (CSPDC, 2020). The flood of record occurred in 1896, damaging much of the downtown business area, washing many houses off of their foundations, and taking six lives (**Figure 3**). Hurricanes and tropical storm systems have periodically brought large and often high-intensity rainfall events to Staunton throughout its history and will continue to do so in the future. As recently as August 2020, two back-to-back storms dropped up to six inches of rain each on the city (NWS, 2020), causing flash flooding and up to six feet of water in structures downtown.

The extent and impacts of riverine flooding can generally be summarized using FEMA's mapped floodplain – known as "Special Flood Hazard Areas" (SFHAs, **Figure 2**) – as these areas portray the inundation extent along streams and rivers with drainage areas greater than approximately 1 mi^2. The floodplain boundaries are based on the extent of inundation during the 0.2% and 1% Annual Chance floods (Previously known as the 500-year and 100-year floods) and the regulatory Floodway which is the zone of highest flood risk. Many of the City's known flooding issues are areas subject to riverine flooding and are therefore located in a mapped FEMA SFHA. However, there are known flood prone locations throughout the City that are not adjacent to a stream or river, but nonetheless experience flooding during brief, intense rainfall.

Figure 3. Damages from 1896 flood (Source: City of Staunton – Local Citizen, pulled from Staunton Comprehensive Plan, 2019)

2.1.2. Pluvial Flooding

In comparison to the long duration rainfall systems that cause riverine flooding, pluvial flooding is generally caused by short duration, localized, intense bursts of rainfall over more highly developed land. This type of flooding generally impacts the storm drain system and smaller tributaries as excess runoff generated from urbanized areas exceeds their capacity and causes brief periods (5 minutes – 30 minutes) of surface flooding. While pluvial flooding is a different process from riverine flooding, the impacts of pluvial flooding can sometimes be exacerbated if the river is at flood stage and therefore becomes a downstream impedance to drainage of the tributaries. Various areas of the City are subject to pluvial flooding issues related to intense precipitation and legacy infrastructure that was not designed to modern engineering standards. Inadequate storm drain systems, either due to undersized connections or blockages, throughout the City repeatedly cause localized pluvial flooding during high-intensity rainfall events, flooding buildings and damaging property.

2.2. Legacy Infrastructure and Standards

The City dates back to before 1871, with many of the City's downtown buildings constructed before the 1900s and the majority of the City's housing inventory built before 1980 (CSPC, 2019). The age of drainage infrastructure generally reflects the age of the development of the various areas of the City. Among other issues, this means that a large proportion of the City's flood-related infrastructure:

- May be undersized because it pre-dates modern-day (or any) hydraulic engineering methods or because it was sized based on a now-dated rainfall atlas.
- Was built using materials (e.g. vitrified clay, corrugated metal) that are susceptible to damage and/or are at the end of their service life, or using methods (e.g. unsuitable backfill material, poorly formed connections, no maintenance access) that present significant maintenance burdens.
- Did not consider impacts on downstream channel erosion or water quality in the design.

The City's Stormwater Capital Improvement Program (CIP) has a list of projects planned for 2026-2030 that would address some of the flooding related to the issues listed above (City of Staunton, 2025). In addition, a flood study report completed in 2021 by Wiley|Wilson proposed an additional 12 projects estimated to cost $49M per project to address Downtown flooding, beyond those listed in the CIP (Wiley|Wilson, 2021). However, it was determined that many of the engineered solutions presented in the study, while effective, may not be achievable given the city's limited fiscal resources.

Note that the CIP amount does not include the substantial cost of maintaining existing storm drain infrastructure throughout the City. While the City has been working to address these legacy infrastructure issues, it is important to understand that the age, scale, and right-of-way needed to address these issues means that the volume and rate of depreciation of aging infrastructure will continue to surpass the City's replacement capabilities (funding, staff, equipment, etc.) for the foreseeable future as the annual project delivery capability is in the $1M - 3M range. This gap is further widened by the rapid inflation in the cost of construction products[2] and the potential impacts of climate change on pipe sizing calculations (see **Section 2.3**). These factors suggest that while traditional drainage improvement projects are still beneficial in certain circumstances, community-wide flood resilience cannot be achieved by simply replacing and updating legacy infrastructure - a more diverse portfolio of strategies will be needed.

[2] Concrete pipe (for example) has increased nationally in unit cost by 14% in two years from May 2023 to May 2025, where it rose 14% over five years from May 2015 to May 2020. It has risen 7.6% from May 2024 to May 2025 alone. See U.S. Bureau of Labor Statistics WPU1332

The City's age also means that the development in much of the service area pre-dates modern day flooding-related development standards. A few examples of this are:

- Construction of buildings or other capital assets in the floodplain or floodway prior to the availability of floodplain maps (i.e. Flood Insurance Rate Maps, FIRMs) and prior to the creation of the National Flood Insurance Program (NFIP) in 1968.
- Land development prior to modern-day stormwater and erosion/sediment control regulations, which have been applied since the 1970s to mitigate discharges of runoff from developed land.

While the City has adopted floodplain, stormwater, and erosion and sediment control regulations, and other development standards to control runoff and/or reduce flood risk, older developments do pose a significant risk. That risk may be associated with buildings and structures on the immediate property or the effect of that development on downstream properties. As properties are redeveloped and modified over time, there is the opportunity to install retrofit improvements to reduce stormwater runoff and/or make the properties more resilient to flooding. Over time some, but not all, risk can be managed through redevelopment and renovation.

In summary, the age of the City's infrastructure presents a particular challenge because of the complexity and cost of retrofitting legacy developed land to reflect modern-day standards. An additional complication is that modern-day standards assume that historical rainfall and hydrology patterns are representative of present and future patterns. However, it is likely that this is not accurate, and the specter of a changing climate further exacerbates the issues outlined in this section.

2.3. Climate Projections Using Best Available Science

In general, climate forecasts suggest that average temperatures in Virginia will increase by 4 to 9°F by the year 2100. If emissions are not reduced, Staunton's climate will feel more like the present-day climate in Achille, Oklahoma or Dallas, Texas by 2080[3]. These higher temperatures and corresponding increased moisture holding capacity of the atmosphere will likely cause more frequent and intense rainfall and flood events (IPCC, 2022). Expert guidance suggests that, compared to recorded observations from 1981-2010, the City of Staunton should expect an estimated 3.7% increase in average annual precipitation by 2035 and a 7.3% increase by 2060, potentially increasing streamflow (i.e. the volume of water flowing through the City's streams during flood events) by 1.4 times the recorded streamflow during the observation window[4]. The intensity of individual storms is anticipated to increase as well. The intensity of the 100-year storm

[3] For more detailed information on temperature impacts in Virginia, see the National Climate Assessment, Southeast Region, the Climate Impact Lab and University of Maryland's Climate Analog Tool.

[4] See EPA's Streamflow Projections Map and Climate Projections Map

in the Staunton area is projected to increase by 4.4% to 11.9% by 2035, depending on the projection. By 2060, those increases scale up to 8.5% to 23.2%.

While the total annual rainfall increase is substantial, the greatest impact to flood resilience is the increasing intensity and frequency of individual storm and rainfall events. To quantify this impact, the National Oceanographic and Atmospheric Administration's (NOAA's) Mid-Atlantic Regional Integrated Sciences and Assessments (MARISA) Team has developed a tool to predict rainfall intensity, duration, and frequency data for future storm events. This tool can be used to predict rainfall for future design storms in Staunton based on planning horizons (year 2070 or 2100) and two scenarios for level of action taken to reduce the effects of climate change: steady state emissions (Representative Concentration Pathway (RCP) 8.5) or optimistic reductions (RCP 4.5). Several storm events pertinent to hydraulic engineering are summarized in **Table 1**.

As the table shows, predictions can be complicated based on a range of factors. However, the projected increase in precipitation and storm events necessitates a new vision for managing stormwater and flood adaptation. Two highlights are:

- The 10-year storm (or 10% Annual Chance): This rainfall event is typically used for storm drain and culvert sizing, will increase in size by about 9% by 2070. This means that in fifty years, storm drain pipes that are sized to present day standards will no longer achieve the designed level-of-service and may flood on a more frequent basis than anticipated. (Note that because of the City's age, much of the City's drainage infrastructure cannot convey the current 10-year storm event, see **Section 2.2**).
- The 100-year storm (or 1% Annual Chance): Rainfall is projected to increase by 11% from present-day estimates, making it more like the present day 200-year rainfall event (0.5% Annual Chance). While these storms may be infrequent, it means that major riverine floods would be larger and more frequent, and that flood risk would increase for floodplain properties.

Table 1 - Estimated impacts of climate change on statistical rainfall estimates at Staunton Water Treatment Plant for time period 2020 – 2070 from NOAA's MARISA Team IDF tool. The low emissions RCP 4.5 scenario was used for this table, which assumes that emissions would be reduced over the 2020 – 2070 time period. Existing data based on NOAA Atlas 14.

Rainfall Duration	10-year Rainfall Accumulations (inches)			100-year Rainfall Accumulations (inches)		
	Existing	Projected	Change	Existing	Projected	Change
10 min.	0.75	0.82	+0.07	1.00	1.11	+0.11
1 hr.	1.78	1.94	+0.16	2.66	2.95	+0.29
24 hr.	4.26	4.64	+0.38	6.72	7.46	+0.74

While the estimated changes to precipitation patterns are now available, it is more difficult to translate changes in precipitation patterns to impacts on infrastructure cost and floodplain structures. This is because the relationship between rainfall intensity and corresponding runoff,

stream flows, and flood depths are non-linear (i.e. a 9% increase in rainfall does not necessarily lead to a 9% increase in runoff or streamflow) and the cost of infrastructure and impacts to floodplain structures varies, depending on a wide number of factors. The complexity involved in understanding how changes in precipitation result in on-the-ground impacts means that the formulation of policies and protocols aimed at these long-term changes requires additional study. Recommendations with respect to hydraulic engineering calculations and floodplain management that address this complexity are provided in **Section 7.0**, though the reader should understand that the field of climate change adaptation for local flood resilience is still relatively new, and that best practice will evolve rapidly as communities experiment with different adaptation strategies.

In general, the best available practice that has formed around hydraulic engineering design for climate change is to shift from a principle of "protection" to that of "adaptation". While these concepts may sound similar, protection is focused on repelling and diverting flood waters, while adaptation acknowledges the eventuality and increasing probability of flooding with climate change and focuses on replacing risk with natural assets. Levees and concrete floodwalls are a simple example of a flood protection structure, as they are built to repel floodwaters from developed land up to their design flood; though the major issue is that when they overtop (which they are more likely to do in the context of climate change), their failure is typically catastrophic. The adaptive alternative to levees and floodwalls is called a riparian buffer, which replaces flood risk along the river with trees and other vegetation that will not be subject to damages if flooded. There can be an economic tradeoff with the use of adaptive solutions, and their implementation requires careful weighing of benefits and costs – though it is critical that these types of adaptive, nature-based solutions be considered as a viable project alternative in the context of drainage improvements and other flood-related projects. This is discussed further in **Section 7.0** of this Plan.

2.4. Related Hazards

A flood resilience plan would not be complete without addressing other hazards related to flooding. There are several flood-related hazards pertinent to the City that are considered here with respect to flood resilience. The proposed efforts in this Plan will also work towards City objectives related to safety and water quality.

2.4.1. Water Quality

It is well known that hydrology – the volume, rate, energy, and frequency of flow – is a master variable that drives water quality. While the focus of this plan is flood resilience, it is anticipated that the principles and projects outlined here would also support the City's efforts to improve water quality in its tributary streams. In particular, Lewis Creek, Christians Creek, and the Middle River have been designated as "impaired" by the Virginia Department of Environmental Quality (VADEQ) for aquatic life, bacteria, and a category of organic chemicals known as polychlorinated biphenyls (PCBs). VADEQ has designated regulatory pollutant reduction requirements for all

three of these impairments, known as "total maximum daily loads" (TMDLs) (MapTech, Inc. 2004, 2006; USEPA and VADEQ, 2001; VADEQ and VADCR, 2002), and as such, the City is required to demonstrate progress towards mitigation of these water quality impairments.

More specifically, the aquatic life impairment results from long-term assessment of aquatic insects indicating an unhealthy lack of diversity. Excessive fine sediment from urban runoff is a primary cause of this issue in these watersheds. In general, efforts to mitigate the volume and rate of urban runoff that flows into the City's waterways will make the City more resilient to flooding while also improving the health of streams. Similarly, issues related to bacteria are multi-faceted, but at least part of this issue can be mitigated by controlling excess runoff during storm events. This is because excess runoff can infiltrate the sewer system during periods of heavy rainfall leading to overflows and contamination of downstream waterways.

As mandated in 2013 for compliance with the Chesapeake Bay Act through coverage under VADEQ permit No. VAR040133, the City has developed and is implementing an MS4 (Municipal Separate Storm Sewer System) Program. This program supports efforts to satisfy six minimum control measures (MCMs) outlined in the permit, as well as work towards achieving pollutant reduction goals of the Chesapeake Bay TMDL. The City of Staunton's MS4 permit does not currently have a wasteload allocation in any local TMDLs and as such is not required to develop a local TMDL action plan (Staunton Environmental Programs Division, 2024), though there are local TMDLs for bacteria, PCBs, sediment, lead, and PAHs that recommend reductions to pollutant sources within the footprint of the city.

2.4.2. Landslides

Another hazard related to severe rainfall and localized flooding is that excessive water can induce landslides in high slope topography. The landscape in and around Staunton is characterized by rolling hills punctuated by steep slopes, making it particularly susceptible to landslides. On June 29-30, 2018, severe storms resulted in flooding, landslides, and mudslides in the area (CSPDC, 2020). The risk of landslides can be reduced by minimizing disturbance and grading on existing steep slopes, and by establishment of suitable soil and slope stabilization methods where necessary.

2.4.3. Sinkholes

The City of Staunton is underlain by karst geology, which has supported its population positively with an abundance of freshwater springs, but also comes with the danger of sinkholes. There are records of sinkholes opening within the City of Staunton in both 2001 and 2016 (CSPDC, 2020) and many more recorded sinkholes in and around the footprint of the City (Virginia Department of Energy, 2025). The Big Cave-In of 1910 damaged homes, a fire station, and a school when a set of three sinkholes up to 60 feet deep opened up under Lewis Street, Baldwin Street, and Central Avenue (**Figure 4**).

Figure 4. Photos taken of the Big Cave-In in August 1910 (Source: CSPDC HMP, 2020)

2.4.4. Dam Safety

Staunton Dam is a 15 acre impoundment owned by the City on the North River in the George Washington and Jefferson National Forests. Just upstream is Elkhorn Lake which is a 54 acre reservoir that the City also owns. Staunton Dam and the dam on Elkhorn Lake are classified as High Hazard Dams, but are not upstream of the City of Staunton, contributing instead to North River which joins Middle River east of the City. However, a failure in either of these dams, in addition to being the City's responsibility, could significantly impact the water supply of the City as the Staunton Dam reservoir serves as one of the three drinking water sources for Staunton. Within the City, there is one privately owned dam of unknown hazard rating (VADCR, 2025b) within the agricultural land in the eastern part of the City footprint. There do not appear to be any structures in the immediate downstream path likely to be impacted by a breach of this private dam, but the flood pulse resulting from dam failure would flow directly into Lewis Creek and under I-81. Lake Tams in Gypsy Hill Park, while small enough to not be subject to impounding structure regulations, serves to retain stormwater and provide recreation.

Increased frequencies and durations of storm events create additional dam safety risk in a variety of ways. The increased volume of water that accumulates behind impounding structures puts more frequent and greater pressure on these structures, impacting their structural integrity, particularly for earthen structures or those that have not been properly maintained. The region has a number of dams on private property where responsibility for maintenance falls on the property owner; these expenses can be difficult for such owners and maintenance is often postponed. Additionally, many impounding structures were designed and built before current day engineering requirements were in place and may have difficulty withstanding changing weather patterns. Increased storm events due to climate change and their hydrologic impacts result in additional dam safety risk.

2.5. Summary of Vulnerabilities

Table 2 below summarizes potential risks and vulnerabilities associated with flooding and related hazards:

One issue of particular importance is the potential impact of flooding on **critical facilities** within the City. A critical facility is one that functions as a community lifeline, and a disruption in service may lead to health and public safety issues – this includes hospitals, fire stations, police stations, storage of critical records, etc. While it is difficult to predict what facilities would be impacted in a pluvial flooding event, there are several critical facilities within the City's SFHA that present a particular risk during riverine flooding events, including one of the fire and rescue stations, an elementary school, two daycares, and portions of City Hall, the District Courthouse, and the sheriff's office (**Figure 5**). These critical facilities would benefit from additional flood protection efforts and well- documented/rehearsed flood-day operations manuals. Additionally, many road

and railroad crossings intersect the SFHA. Damage to bridges during flood events could severely restrict the ability to get vital services to parts of the City.

Table 2. Potential risks and vulnerabilities of flooding and related hazards.

High Likelihood		
Hazard Type	*Vulnerability*	*Potential Actions/Adaptations*
Riverine Flooding	High along Lewis Creek and tributaries	• Update aged stormwater infrastructure to remove bottlenecks. • Acquisition/restoration of flood prone land to contain flood waters and remove highly vulnerable structures. • Adequately elevate or flood proof structures per development regulations/retrofits. • Expand/improve the existing alert system and encourage its use.
Pluvial Flooding	High for development along former natural drainage paths.	• Effects of pluvial flooding are localized, thus reducing direct discharges from impervious surfaces may reduce some flood risk. • Evaluate current stormwater infrastructure and maintenance to address accumulation of debris exacerbating pluvial flooding. • Acquisition/restoration of flood prone land to contain flood waters and remove highly vulnerable structures. • Adequately elevate or flood proof structures per development regulations/retrofits.
Aging Infrastructure	Moderate across the City but high in areas with aging or undersized infrastructure.	• Green infrastructure, infiltration, and detention practices to reduce runoff. • Upsizing pipes/culverts where bottlenecks exist. • Update design practices to account for future weather patterns. Infrastructure can be adapted to handle larger flows based on available funds and impacts on other parts of the system (improvements in one area can create issues downstream).
Moderate Likelihood		
Hazard Type	*Vulnerability*	*Potential Actions/Adaptations*
Sinkholes	Moderate but unpredictable.	• Maintain and upgrade stormwater, potable water, and sewer lines to prevent leaks that would exacerbate sinkhole formation.
Low Likelihood		
Hazard Type	*Vulnerability*	*Potential Actions/Adaptations*
Dam Safety	Low, due to small size and/or remote location	• Monitor water levels and embankment conditions.
Landslides	Low	• Periodically review standards/regulations for best practices related to development on slopes. • Slope issues on new developments can be evaluated as part of plan review process

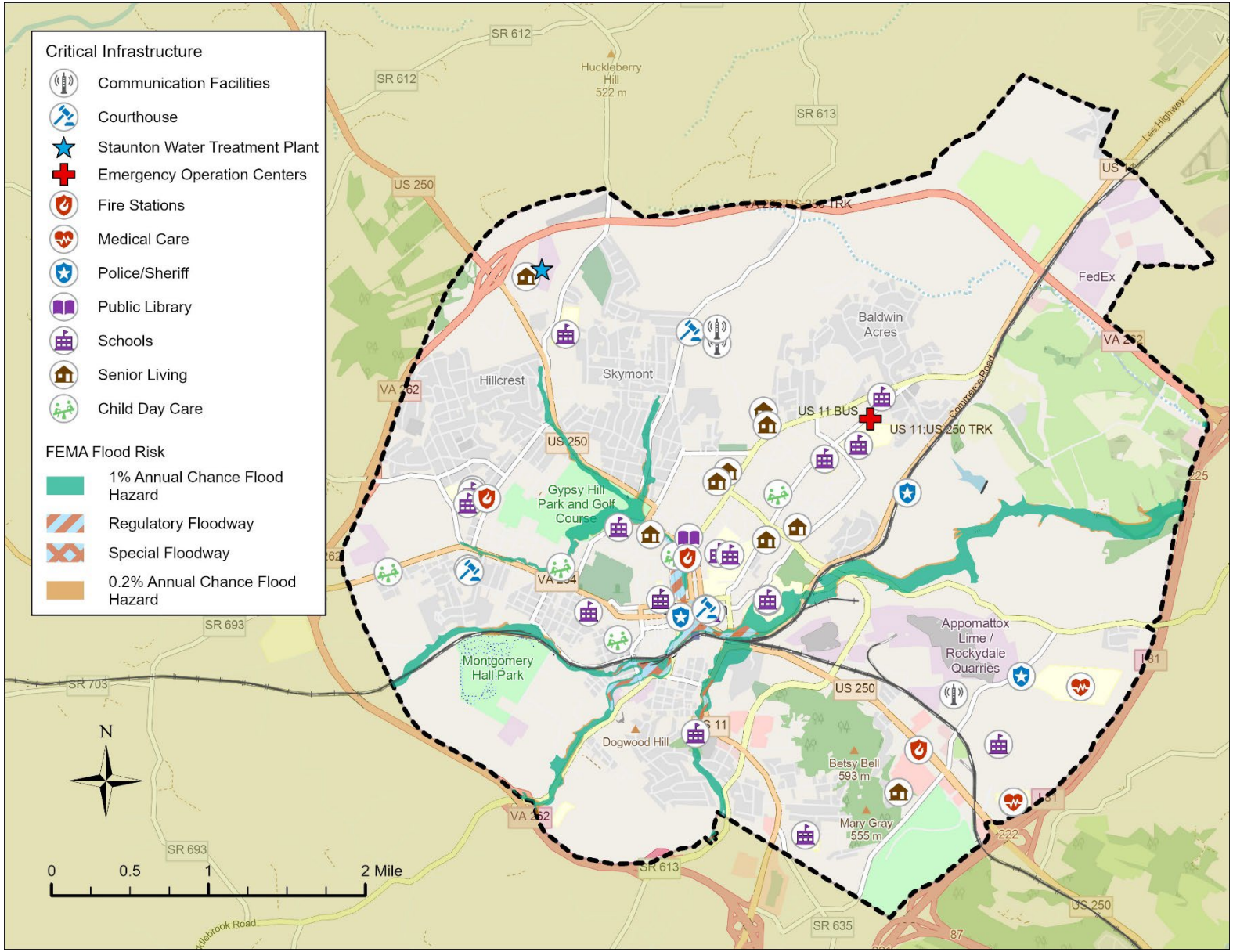

Figure 5. Staunton's critical facilities.

3.0 PEOPLE, LAND, ECONOMY, AND EQUITY

In addition to the City's history of development and hydrology, the community's character is a fundamental element of resilience planning including assessment of vulnerabilities. Residents' goals, issues, demographics, and economic situations all provide the context for project planning, funding and delivery. The purpose of this section is to contextualize any assessment of flood resilience and all proposed solutions with regards to Staunton's local community. While Community information that is pertinent to flood resilience is presented in this section, this is not a comprehensive summary, and the reader is referred to the City's demographics analysis in the Comprehensive Plan 2018-2040 (Staunton Planning Commission, 2019) and various resources noted in this section for more detail.

The City has prioritized maintaining its historic downtown while residential areas for the growing population radiated outward, punctuated by green spaces maintained either currently or historically as parks or as part of various institutions. The City is also home to Mary Baldwin University, the Frontier Culture Museum, and the Virginia School for the Deaf and Blind.

Since its incorporation as a city in 1871, at a population of just over 5,000, Staunton grew steadily to a population of just under 20,000 in 1950 (**Figure 6**). The population of the City remained fairly constant from 1960 through 2010, hovering around 23,000 people with a peak of 24,581 people between 1980 and 1990. The 2010 US Census recorded the City's population at 23,746 people. Since 2010, the population has grown modestly, with the 2020 US Census recorded the City's population at 25,750 people (US Census Bureau, 2025). Projections for 2020-2040 predict the population remaining around 25,000 people through 2040 (Staunton Planning Commission, 2019).

The distribution of the City's population by race and ethnicity is shown in **Table 3**, and as can be seen in **Figure 6** the distribution is little changed since 2000 and 2010 outside of a small increase in the population not reporting as White or Black alone. The City is less diverse than the Commonwealth of Virginia as a whole, but more diverse than the surrounding Augusta County or the greater Staunton-Stuarts Draft Metro Area described in the US Census Bureau data.

The median age of the City's populace is higher than that of the Commonwealth as a whole, but lower than the surrounding area. As noted in the City's Comprehensive Plan, though, the median age in Staunton is increasing and at a faster rate than the median age of the Commonwealth as a whole (Staunton Planning Commission, 2019). An aging populace can change the dynamics of flood response and resilience, as older individuals may need more time to respond to warnings of impending flood conditions. In addition to an aging populace that may be living on fixed incomes, there is a greater proportion of the populace living below the poverty line in Staunton than the surrounding areas. These individuals and many others within the City may be less able to fund repairs due to flood damages if they are impacted.

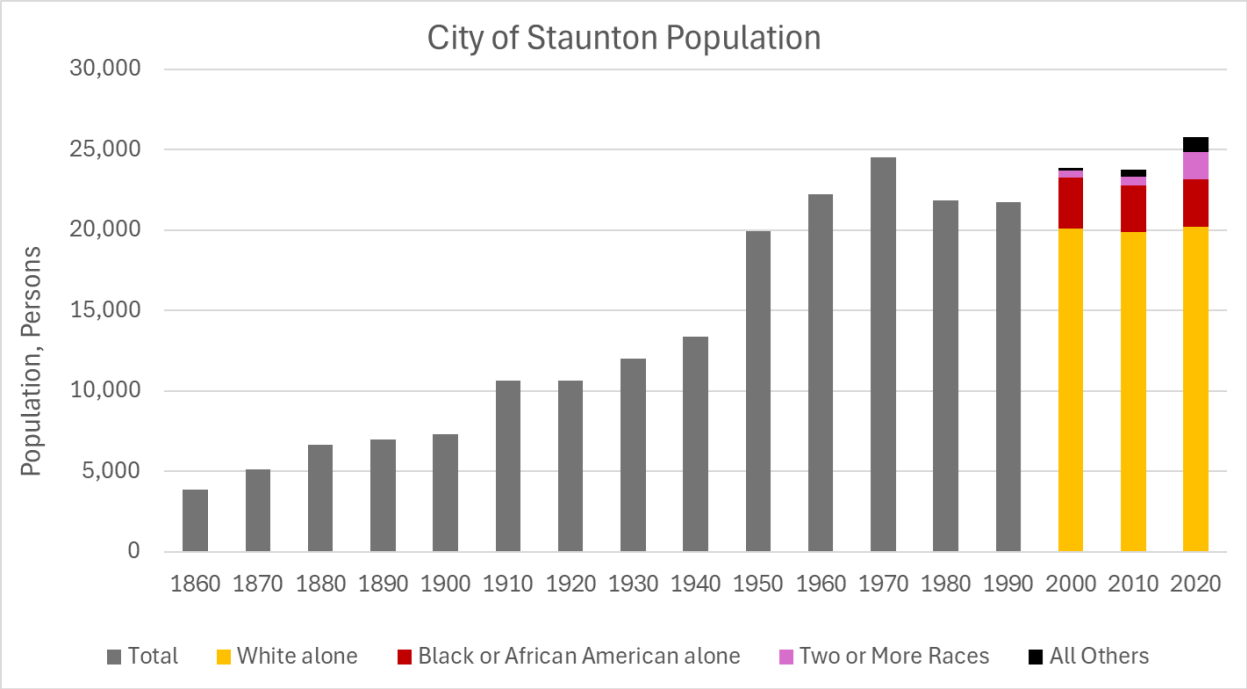

Figure 6. Population of Staunton from 1860 -2020 with demographic data for available years 2000-2020. Note that 'All Others' is an aggregate of several additional categories of small size for visibility. Data abstracted from the following US Census Bureau publications and data sources: "Census of Population: 1950" (1860-1950); "Census of Population: 1980" (1960-1980); Census Table CPH-L-102 (1990); Census Table DP1 (2000); Census Table P1 (2010-2020).

Table 3. Demographic characteristics of City of Staunton as compared to Augusta County, the Staunton-Stuarts Draft Metro Area, and the Commonwealth of Virginia. Data from US Census Bureau American Community Survey's 2023 5-year estimate tables DP05, S1501, S2001, S1903, and S1701, which are the most recently available with data specific to City of Staunton.

U.S. Census Bureau Statistic	City of Staunton	Augusta County	Staunton-Stuarts Draft Metro Area	Virginia
Total Population	25,765	77,713	126,052	8,657,499
Racial/Hispanic Origin				
White alone, percent	80.1%	90.0%	85.4%	61.7%
Black or African American alone, percent	11.0%	4.3%	7.0%	18.7%
Asian alone, percent	1.5%	0.4%	0.9%	6.9%
Two or more races, percent	5.7%	3.1%	4.6%	8.2%
All Others, percent	1.7%	2.2%	2.1%	4.5%
Hispanic or Latino, any race, percent	4.4%	3.8%	4.9%	10.7%
Educational Attainment				
High School Degree or higher, percent	93.7%	90.8%	91.1%	91.3%

U.S. Census Bureau Statistic	City of Staunton	Augusta County	Staunton-Stuarts Draft Metro Area	Virginia
Bachelor's Degree or higher, percent	35.1%	23.3%	26.2%	41.5%
Income and Poverty				
Per Capita Income	$39,933	$43,473	$41,692	$49,405
Median Household Income	$62,586	$79,972	$70,949	$90,974
% Below Poverty Level	12.60%	7.30%	9.20%	9.90%
Age Structure				
Median Age	41.0	42.8	44.9	38.8
62 years and over, percent	25.2%	25.1%	26.4%	20.0%

The Social Vulnerability Index (SVI) (CDC/ATSDR, 2018) is a widely accepted approach for quantifying social vulnerability in a city. Developed by the Centers for Disease Control and Prevention and the Agency for Toxic Substances and Disease Registry (CDC/ATSDR), SVI was the approach chosen to quantify social vulnerability in Virginia's Coastal Resilience Master Plan (2021) because it was considered the most publicly accessible, acceptable, and replicable approach used for federal agency grant programs. The SVI uses more than 15 census variables to represent four categories, shown in **Figure 7**, which it combines to develop an overall vulnerability score from 0 (low vulnerability) to 1 (high vulnerability) (CDC/ATSDR, 2018; Flanagan et al. 2011). The SVI is used in this plan to identify socially vulnerable areas and help focus flood resilience efforts in these communities.

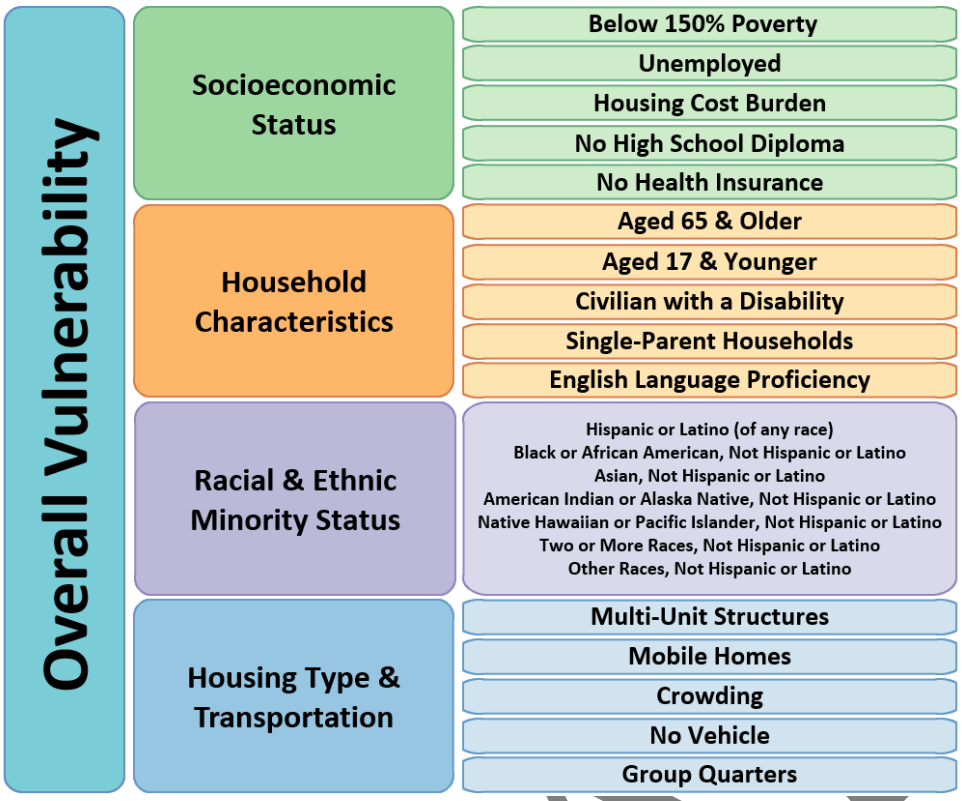

Figure 7. Variables included in the Social Vulnerability Index (CDC/ATSDR, 2022).

Staunton's overall SVI in the 2022 statewide assessment was 0.7045, which is categorized as a 'medium to high' level of vulnerability. The City's SVI has fluctuated back and forth between 'medium to high' and 'low to medium' from 2000-2022. When calculated at a census-tract level, high SVI overlaps with SFHA along the length of Lewis Creek and medium to high SVI overlaps with SFHA along Peyton Creek (**Figure 8**). This means that in general, the community's ability to respond to and recover from a hazardous event (flooding, for the purposes of this plan) are affected by several social conditions, such as poverty, mobility, health, etc. The community's vulnerability is of particular importance to flood resilience where high SVI overlaps with flood prone areas. This vulnerability can manifest in many ways, several examples of which are listed below:

- Low-income households are less likely to have income or savings that could be used to recover from flood damage (Morrow, 1999, Cutter et al., 2003)
- Areas with high unemployment or underemployment may have less access to paid time off or insurance that would help cover costs during the time needed to recover from a flood (Brodie et al., 2006)
- Lower educational attainment can mean that the practical and bureaucratic hurdles to cope with and recover from a flood would be more challenging (Morrow, 1999)
- Households with dependent children or elderly, single parent households, and those with disabled persons would likely require additional financial support, transportation, and/or medical care during and after a flood disaster (Flanagan et al., 2011)

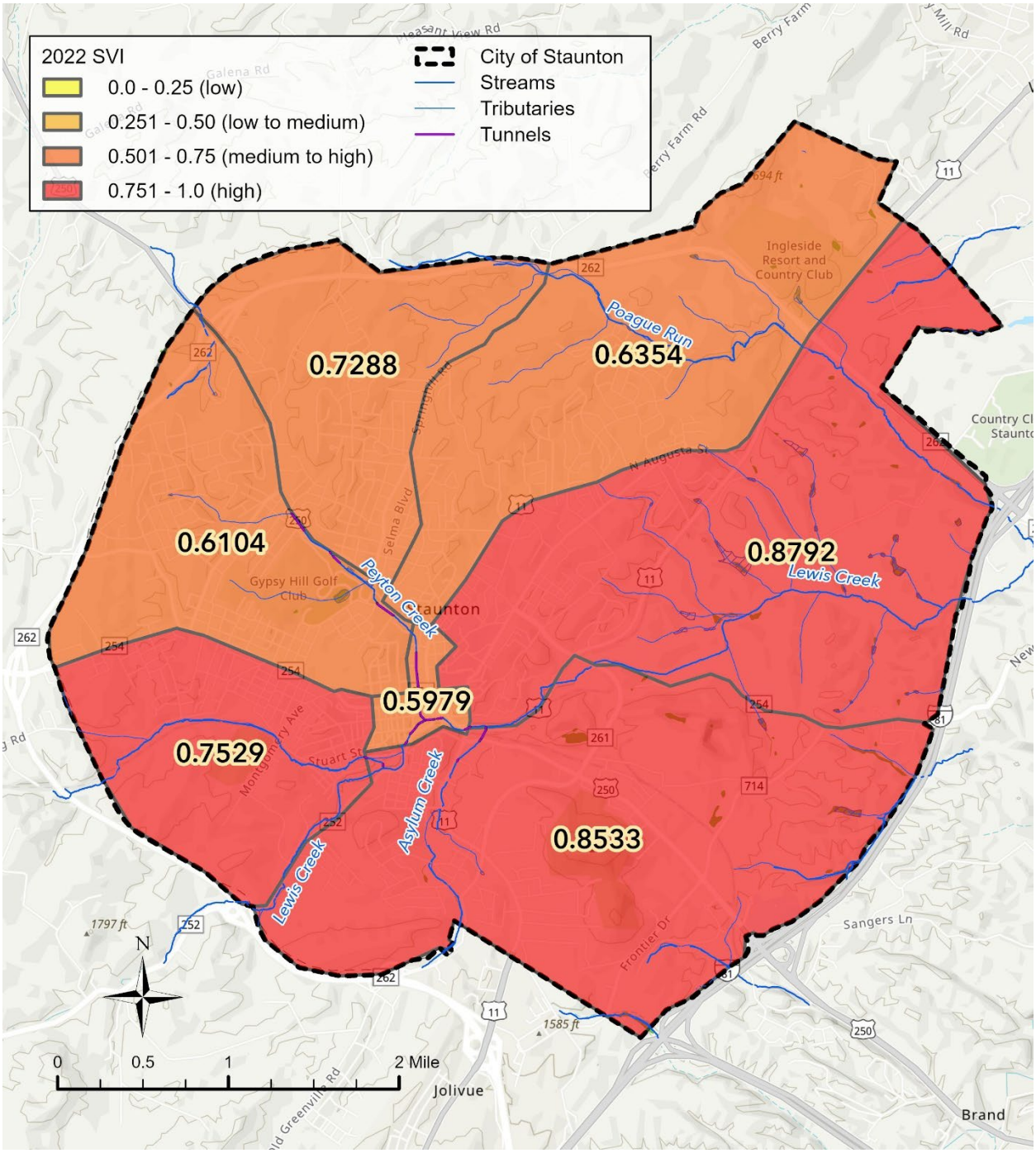

Figure 8. SVI values of census tracts within City of Staunton.

In the City, areas of high social vulnerability intersect with flood prone areas along Lewis Creek, Peyton Creek, and their tributaries (**Figure 8**); with this in mind, some recommendations on how to incorporate social vulnerability in flood resilience projects are provided in **Section 7.0**. An equitable distribution of flood resilience investment in Staunton should also consider the pertinent issues in the local housing market and business economy. The availability and affordability of

housing in the City appears to be a significant issue, with 27.5% of Staunton's households categorized as "cost-burdened" with respect to mortgage or rent payments, meaning that the cost of housing is greater than 30 percent of the household's income, as of 2021 (Housing Forward Virginia, 2021b). That number varies when separated by homeowners, experiencing a 16.8% cost burden rate, compared to renters, 42.9% of whom are cost burdened. This is compared to an overall cost-burdened percentage of 20.1% of the households in surrounding Augusta County (16.1% for homeowners, 35.1% for renters). Severity varies as well, as 13.1% of all households (7.8% of homeowners and 20.6% of renters) in Staunton classify as severely cost burdened, meaning that housing is greater than 50% of household income. While this housing disparity may be due to a number of factors, a shortage in housing stock appears to be at least one driver of this issue. Age of housing stock is also of concern, as the majority of housing in Staunton was constructed prior to 1980 (Housing Forward Virginia, 2021a). An important aspect of the housing shortage that is pertinent to flood resilience is that 383 properties zoned at least partially residential, or approximately 3.8% of all residential properties in the City, intersect the 1% Annual Chance SFHA or designated floodway. This suggests that the already at-risk local residential real-estate economy is subject to potential damages from flooding which could further exacerbate the housing shortage.

Similar considerations apply to commercial and industrial real estate in the City, as 29.4% of all business/professional/industrial parcels intersect the 1% Annual Chance SFHA or designated floodway – which suggests that a major flood event would likely have significant impacts on the local economy by way of business damages, closures, foregone revenue, lost wages, etc. Inversely, reduction of flood risk at commercial/industrial properties would reinforce the local economy's ability to continue operations during and after a major flood event. Strategies for protection of commercial real estate depend on site-specific variables (e.g. topography, business model, development type, etc.), though in general, elevation of assets above flood elevations, relocating out of the floodplain, or floodproofing are the three primary methods that can be used. With respect to equity, implementation of commercial floodproofing can require a significant amount of capital and technical expertise that is probably not widely achievable for small or mid-sized businesses – although these businesses bring an important measure of adaptability to the local economy.

Finally, the age of the City means that most of the readily developable land has already been used in some fashion, and the housing shortage and commercial development needs mean that the remaining land will be needed to support the necessary growth of the local economy. This context and demand create a land issue for flood resilience, as most types of flood resilience projects require a significant land footprint to provide a material reduction in flooding (e.g. acquisition/demolition projects, land conservation, retention ponds, riparian buffer). On the one hand, there is a need to create additional housing units and working spaces, but the addition of more developed land could lead to more runoff and flooding, further increasing the land needed to provide flood resilience projects. As such, the pathway to flood resilience in Staunton will likely need to integrate flood-resilient design into land development.

4.0 COMMUNITY ENGAGEMENT

The social, economic and demographic summary provided in **Section 3.0** provides helpful high-level community context for this Plan, but it was imperative that the perspectives of individual community members be collected as part of this planning effort. As such, an extensive community engagement effort was performed that included both a survey and an in-person meeting to further understand the community's perspective on flooding and resilience. This section summarizes the methods and findings of the community engagement effort and discusses how this new information supplements the significant engagement, education, and outreach programs that already existed prior to this planning effort. Efforts prior to this Plan are summarized in **Section 6.2**.

4.1. Methods

Public outreach for the 2025 Staunton Flood Resilience Plan was done primarily with a public survey followed by an in person public meeting. A 10-minute survey on flooding was created by the City through their Polco system. The survey was promoted through social media, local radio stations, local news (WHSV), and local partners and non-profit groups. The same methods were used to promote the in-person meeting.

The public survey received 115 responses. Of the survey respondents, nearly half (47%) were age 40-65, with another 31% aged 18-39, and 22% greater than 65. This reasonably reflects the age distribution of the residents (median age 41, 25% above 62). A majority of respondents identified as white (86%), which was slightly higher than the overall population (80% white). The most common occupational status of respondents was full-time employed (65%) followed by retired (25%).

The first in-person public meeting was held at the Staunton Public Library on July 14, 2025. At this meeting, a brief presentation was given providing general information about flooding and flood resilience, followed by an open forum for the community to ask questions, express concern, and discuss flooding with staff and consultants. Approximately 50 participants were able to attend the in-person meeting, and the level of interaction of the participants was high and beneficial. A second in-person meeting was held on April 15, 2026 to present the draft report for public comment. Follow-up public outreach is planned to allow for dissemination of plan results and to answer community questions after adoption of the plan document. Future feedback will inform plan updates.

4.2. Summary of Responses

This section provides a summary of the findings of the community engagement efforts. The full survey responses are included in **Appendix C**.

Over 30% of survey respondents felt that flooding currently poses either a serious (29%) or extreme (8%) challenge to their property(ies). When asked about the challenge they feel flooding will pose to their property(ies) in the next 20-40 years those values increased to 32% (serious) and 18% (extreme). This concern is very understandable given that 49% of the respondents noted that their home had flooded in the past. The most commonly reported property damage was basement flooding (60%), followed by street flooding (40%), mold/mildew problems due to flooding, soil washout or erosion damage, and debris/trash deposits (each 36%).

Only 10% of respondents reported that they had "not experienced any negative impacts resulting from a flood event". Negative impacts reported most frequently were debris needing cleaned up (50%) and damages and delays impacting transportation networks (42%). Other damages were highly reported, as well as a 14% reporting rate of limited access to services such as schools, government offices, and hospitals. Of the respondents, 34% reported dealing with mental health/anxiety related to flood events, highlighting the unseen costs impacting the community on top of all the highly visible damages flooding incurs. Evacuation or temporary housing needs were reported by 3% of respondents.

When asked whether they have considered moving to avoid future flood impacts, most (54%) of respondents said 'no – I do not want to leave my current location', but the option of 'no – my property never floods so it is not a concern' was only selected by 10% of respondents. Various versions of 'yes' were selected by 34% of respondents, though 19% of all respondents chose ' yes – I have considered relocating but there are conditions that prevent me from doing so'. Elaboration on the conditions preventing relocation weren't collected, but a separate 11% of respondents noted that increased frequency of flooding could push them to join the 3% reporting actively looking to relocate.

Respondents, while clearly concerned about flooding and the damages incurred, were also willing to invest their own money into protecting their families, homes, and businesses (59% responded willing to spend $1,000 or more to do so). The kinds of projects most popular with respondents were a mix of natural solutions such as preserving/creating natural spaces for floodwater storage (75%) and traditional solutions of increasing the size/capacity of bridges, tunnels, and drainage pipes (65%). A similarly popular solution was to provide resources to property owners for floodproofing (64%). More than half of respondents also believed the City would benefit from regulatory measures such as modifying design standards/building codes to minimize flooding and/or flood damage (58%) and more detailed real estate sale disclosures for flood prone properties (54%). Buy-outs of properties in flood prone areas were not as popular (20%), but this could be due to a range of factors including not wanting to see historic but flood-prone properties torn down or seeing the City's needs as more holistic than something that remediating a limited number of properties could address.

In the open forum of the survey as well as in the public meeting, several comments were received reflecting the desire to expand or increase the sophistication of the existing flood awareness system that the City has in place. Many individuals also noted that they often saw localized flooding that regular clearing of storm grates could ease, as well as a need for improved street design where lack of curb and gutter has led to property flooding. There was significant interest in the public meeting for providing residents with individual guidance on what they can do to reduce risk of flood damage.

Abundantly represented in both the open responses of the survey and at the public meeting was discussion of the flooding issues and potential mitigation efforts around the Wharf area of downtown. This area, loosely defined as extending from Mill Street west along both sides of Middlebrook Avenue to Lewis Street, is part of the downtown economic and historic hub of the City and has been impacted multiple times in high-profile flooding events. Along this area, Lewis Creek has been confined to underground tunnels that have recently been found to need significant structural repair work. It is also in this area that the tributary Peyton Creek, also confined in tunnels, joins Lewis Creek. A series of constrictions in the tunnel system have repeatedly caused water to back up and dramatically flood out onto the roadways and surfaces in the area. Several potential mitigation efforts have been proposed by concerned parties, but given the extent of mitigation needed, for solutions to be impactful they necessarily tend to be expensive (e.g. construct an auxiliary tunnel to convey floodwater), dramatic (e.g. turn the Wharf into a park and remove buildings and roads covering the streams), or both. Notably, in the public meeting there was also significant feedback that citizens wanted to ensure the many other at-risk places in the City did not get overshadowed by the high-profile flood risk in the Wharf. This highlights the importance of developing this Plan as a holistic approach to flood resilience for the entire City of Staunton.

5.0 PRINCIPLES OF FLOOD RESILIENCE

In this section, the background context related to flooding, community vulnerabilities, and equity provided in **Sections 2.0 and 3.0** are combined with the information gained from the Community Engagement survey for this Plan effort in **Section 4.0** to refine Staunton's five basic principles of flood resilience. These principles acknowledge and internalize the nature of flooding in Staunton (i.e. a combination of pluvial and riverine), with the challenge of retrofitting legacy land with modern day infrastructure and standards in the face of a changing climate. The principles also acknowledge the variability in social vulnerability in the City and incorporate social equity as one of the principles. The basis of each of the five principles was derived from VADCR's 2025 Community Flood Prevention Fund Grant Manual, which are then adapted to Staunton's specific context based on the extensive work performed in the previous sections of this Plan. The five key principles are described as follows; note that in each principle the term "effort" is used, as it includes any type of planning document, internal protocol or program, policy, or technical/construction project that the City may perform. Current and future efforts will be evaluated against these principles:

1. Best Available Science – Does the effort internalize the potential impacts of climate change, such as increased rainfall intensity and temperature into planning, design, and implementation of efforts?
2. Social Equity – Does the effort acknowledge community vulnerabilities and work towards equitable outcomes in its conception? Will the effort improve or strengthen the social fabric in vulnerable parts of the community?
3. Community Scale Benefits – Will the effort render benefits at a U.S. Census Block scale or larger? Will at least 10% of the City's population benefit from the project? Is the effort consistent with regional efforts?
4. Economy and Land Use – Does the effort acknowledge fiscal realities and focus on cost effectiveness? Does the effort encourage the usage and development of land that internalizes present and future flood risk? Is it consistent with best practice for floodplain management?
5. Nature-Based Approach – Will the effort use or leverage environmental processes and natural systems including (but not limited to) vegetation, soil, and biota to minimize flooding and mitigate flood impacts? Will the effort encourage a reduction in key pollutants of concern for Staunton's waterways, including fine sediment, pathogens and organic chemicals?

It is important to understand that these principles are focused on flood resilience – the scope of this Plan. While these principles do not explicitly internalize other known threats and hazards or the complex interdependencies between different types of critical infrastructure during an emergency event, they are crafted carefully to support a broader application of resilience thinking across these domains. The following Sections use these principles to evaluate efforts to date related to flooding (**Section 6.0**) and to propose recommendations that would further advance Staunton as a flood resilient community (**Section 7.0**). While these principles represent knowledge of the community and best practices with respect to flood resilience as of the date of this plan, it is anticipated that these principles could be revised in future versions of this plan, as community dynamics shift and flood resilience practice evolves.

6.0 EFFORTS TO DATE

In this section, the five principles of flood resilience are used to evaluate existing City efforts to date related to flooding and flood resilience. City efforts are organized into the categories of planning documents, internal practices and programs, external facing policies, and engineering/construction projects. Each section contains a summary of the effort, a description of how the effort relates to flood resilience, and an analysis of the degree to which each effort incorporates the five key principles of flood resilience. As existing efforts are evaluated, a gap analysis is performed to identify if and how the key principles of flood resilience may be missing

from individual efforts or from the collection of effort. As gaps are identified, future work is proposed in **Section 7.0** and links to specific recommendations are provided throughout.

Efforts to address flood resilience can be broken into five categories:

1. Plans - Documents that outline issues and establish policies and propose actions to address those issues.
2. Practices, Programs, and Studies – Represent best practices, studies or programs that the City implements to reduce flood risk and increase resilience and/or to help prioritize efforts.
3. Regulations – Specific requirements that the City is required to follow or that the City requires of its residents/businesses.
4. Projects – Actions to address flooding issues and increase resilience
5. Funding – Providing monetary resources to execute work.

This section concludes with a gap analysis of current efforts and the City's vision to become more flood resilient.

6.1. Plans

There are existing planning documents that have undergone extensive authorship, editing, review, and approval processes that have a bearing on flood resilience. The documents evaluated in this section include only those documents that have been approved by City Council for adoption; other planning-type documents that have not been approved by Council are found in Section 6.2 – Practices, Programs, and Studies, as these documents are primarily for internal use and prioritization of projects and are subsidiary to any Council-approved Plan.

6.1.1. Comprehensive Plan 2018-2040

The City of Staunton's most recent update of their Comprehensive Plan was adopted in 2019 (Staunton Planning Commission, 2019). The City is currently updating the Comprehensive Plan looking out to 2045 and anticipates having a final draft completed by Spring 2026 for adoption by City Council likely in Summer 2026. The Plan provides for future development within the City to occur in an efficient and economically and environmentally sound manner, aiming to balance residential, commercial, and employment opportunities with preservation of the natural environment, history, and character of the community.

Some of the goals and objectives presented in the Comprehensive Plan directly relate to flooding, including:

- Practice good stewardship of the environmental resources within and surrounding the City, encouraging sustainability and conservation practices

- Encouraging implementation of mitigation strategies included in the Central Shenandoah Hazard Mitigation Plan
- Taking a watershed approach to protecting water resources and continuing the implementation of stormwater best management practices
- Promoting only appropriate uses of floodplains
- Continuing to fund and seek additional funding for critical stormwater control facilities and flood mitigation activities

Additional goals and objectives from the Comprehensive Plan relate more specifically to the social equity principle of flood resilience, such as:

- Aggressively pursue an economic development program that strengthens and broadens the City's economic base, with an emphasis on living wage opportunities
- Ensure adequate services and facilities commensurate with the City's economic base
- Encourage a demographically diverse and growing population
- Support preservation efforts of Staunton's historic African American communities and identify properties of historical or architectural significance. Support the preservation goals for Uniontown as noted in the Uniontown Neighborhood Action Plan
- Develop a city-wide housing plan to address housing issues such as affordable housing, blighted areas, historic rehabilitation, housing for seniors and the elderly, and housing too concentrated based on income levels

Overall, the ideas, themes, and action items included in the Comprehensive Plan are highly consistent with the five key principles of flood resilience in this Plan. The 2045 update thus far includes goals and strategies that continue to be consistent with those of the 2040 plan listed here.

6.1.2. Capital Improvement Plan

The Capital Improvement Plan (CIP) FY 2026 – FY 2030 for the City of Staunton was adopted on April 24, 2025 (City of Staunton, 2025). It is a comprehensive five-year plan identifying capital and infrastructure needs for City operation and to improve the quality of life and provide benefit to all citizens in the community. The CIP is updated annually, with the FY 2027 – FY 2031 update anticipated to be completed and approved by the City Council before summer 2026. The adoption of the CIP indicates the City's commitment to the various included projects and their funding for the period.

Several stormwater and flooding related projects are included in the CIP and planned for implementation:

- Study for possible stream daylighting in Wharf Parking Lot
- Lake Tams monitoring and water level control plus adding flood storage
- Green Hills Industrial Park Basin Retrofits

While some of these projects are described in the CIP as addressing TMDL water quality requirements, many if not all of these projects could viably improve flood conditions in the City.

6.1.3. Central Shenandoah Hazard Mitigation Plan 2020 Update

The Central Shenandoah Hazard Mitigation Plan 2020 update is a continuing effort supported by the Central Shenandoah Planning District Commission (CSPDC) and a Steering Committee of stakeholders from the 21 jurisdictions within the Central Shenandoah region. The CSPDC coverage area includes the Counties of Augusta, Bath, Highland, Rockbridge, and Rockingham, the cities of Buena Vista, Harrisonburg, Lexington, Staunton, and Waynesboro, and eleven incorporated towns (Craigsville, Bridgewater, Broadway, Dayton, Elkton, Glasgow, Goshen, Grottoes, Monterey, Mt. Crawford, and Timberville). The CSPDC is currently updating the regional Hazard Mitigation Plan, as it is intended to be a living document and regularly updated. The 2026 update draft is complete and is undergoing agency review as of March 2026, following which the participating jurisdictions can formally adopt the updated regional plan. This plan, also referred to as an All-Hazard Plan, identifies natural and other hazards that impact the Central Shenandoah Region and lays out mitigation goals and strategies to prepare for and adapt to risks and vulnerabilities in the region. It analyzed identified hazards to determine risks and vulnerabilities in the Region and ranked flooding and dam failure to be the most significant hazards, followed by drought, hurricanes, and severe winter weather.

The first iteration of the Hazard Mitigation Plan was initiated in 1995 after a void in flood planning and prevention was recognized by local government officials following devastating floods in 1995. This highlights how flooding has been a consistent throughline in the variety of hazards that have impacted the region.

The four categories of mitigation actions outlined in the Hazard Mitigation Plan are:

- Local plans and regulations
- Structure and infrastructure projects
- Natural systems protection
- Education and awareness programs

Within these actions are many goals and strategies which are outlined for implementation in the Region. Many of the goals presented in the Hazard Mitigation Plan are directly applicable to flood resiliency, as flooding was identified as the most significant risk factor for the area, and are reflected in this Flood Resilience Plan, including:

- Zoning/planning improvements and enforcement
- Participation in the NFIP
- Improve stormwater management infrastructure
- Proactive planning and implementation, preferably at the watershed level

- Improve monitoring and warning systems
- Implement stream and natural systems protection actions that not only minimize damage and losses but also preserve and restore these systems
- Education and awareness programs
- Support implementation of structural and non-structural mitigation activities on private or public property to reduce exposure to and provide protection from natural and manmade hazards.

6.1.4. Central Shenandoah Pandemic Recovery and Resiliency Plan

In August 2022, the Central Shenandoah Planning District Commission (CSPDC) finalized the Central Shenandoah Pandemic Recovery and Resiliency Plan. While focusing on recovery needs of the time and to offer recommendations and resources to become more resilient to future health pandemics, a primary resiliency strategy goal of the Pandemic Recovery and Resiliency Plan was to prioritize a multi-hazard approach to emergency preparedness. The plan noted that between 2020 and 2022 the region had "experienced a significant flood, a wildfire, heavy rains from Tropical Depression Ida, and two tornadoes" in addition to the ongoing COVID-19 pandemic, highlighting the need to take a broad approach to improving resiliency.

6.1.5. Staunton-Augusta-Waynesboro Emergency Operations Plan

Staunton works with Augusta County and the City of Waynesboro to maintain a regional Emergency Operations Plan (EOP). Per State Code, localities are required to renew their EOPs on a four-year cycle, and the most recently updated Staunton-Augusta-Waynesboro (S-A-W) EOP was adopted in January 2026. The purpose of the S-A-W EOP is to more effectively and efficiently utilize the resources of the three localities in preparing for and responding to emergencies. It establishes policies and procedures to guide response by the local government staff during emergencies and identifies and clarifies lines of authority and relationships among the various groups that will be part of emergency operations. Preparedness, response, recovery, and mitigation are the core tenets of the EOP. The EOP outlines roles and responsibilities for emergency and support functions such as transportation, communications, public works and engineering, fire fighting, damage assessment, and debris management, among others. The EOP also covers procedures specific to certain kinds of disasters, such as flooding, and jurisdiction-specific resources and procedures. These sorts of tools are critical in responding to emergency situations such as those created by flooding and related hazards.

6.1.6. Chesapeake Bay TMDL Action Plan

The City's Chesapeake Bay TMDL Action Plan 2023-2028 speaks to the City's MS4 permit and provides information on the effects of sediment, nitrogen, and phosphorus loading caused in part by stormwater runoff (Wiley|Wilson, 2024). It outlines the City's completed and planned projects

that address the MS4's sediment, nitrogen, and phosphorus reduction goals. These include the now-complete Gypsy Hill Park stream restoration and the Cole Avenue stream restoration. These projects will improve water quality by reducing erosion and may mitigate flooding by lowering the volume of stormwater runoff from smaller storms. Reducing sediment erosion and deposition can also reduce the risk from flooding, particularly if sediment is prevented from blocking storm drain systems.

6.2. Practices, Programs, and Studies

Programs and best practices help to create structure for City staff to implement flood prevention and mitigation strategies and provide guidance when flooding and associated hazards impact the community. Staunton continues to advance flood resilience through implementing and advancing practices and programs related to flood mitigation. The City has contracted several studies to better gauge and understand the options available to mitigate flooding related to specific critical issues within the City.

6.2.1. Flood Awareness System and Staunton Alert Message

The City implements a Flood Awareness System to provide near-real-time data collection and analysis of rainfall and water level in multiple locations throughout the City. This system supports a publicly accessible map dashboard interface online (*https://stauntonva.onerain.com/*). The system also supports an alert system where citizens can sign up to receive alerts via email and/or text messages relating to rainfall and/or water level for multiple monitored locations. The monitoring system went live in June 2023.

Additionally, the City utilizes Staunton Alert Message, powered by the Everbridge platform, as its primary emergency notification system to alert residents of urgent situations and public safety threats. To further enhance community resilience, the City is actively working toward becoming an authorized user of the Integrated Public Alert & Warning System (IPAWS). Once finalized, this authorization will allow the City to broadcast critical emergency information through multiple channels, including the Wireless Emergency Alerts (WEA) and the Emergency Alert System (EAS), ensuring that both residents and visitors receive life-saving notifications even if they have not opted into local alert programs.

6.2.2. MS4 Program

As mandated in 2013 for compliance with the Chesapeake Bay Act through coverage under VADEQ permit No. VAR040133, the City has developed and is implementing an MS4 (Municipal Separate Storm Sewer System) Program. This program supports efforts to satisfy the six minimum control measures outlined in the permit as well as work towards achieving pollutant reduction goals of the Chesapeake Bay TMDL. The City of Staunton's MS4 permit does not currently have a wasteload allocation in any local TMDLs and as such is not required to develop a local TMDL

action plan (Staunton Environmental Programs Division, 2024), though there are local TMDLs for bacteria, sediment, PAHs, and lead that recommend reductions to pollutant sources within the footprint of the city.

6.2.3. Stormwater Utility Fee Program

The City of Staunton established an official Stormwater Utility Fee Program (City Code chapter 13.02) in 2010 to assist in providing funding for public stormwater management improvements, maintenance, monitoring, inspections, and other related projects such as flood mitigation and water quality improvement. The fee itself is based on the total amount of impervious cover on a given parcel. The fee structure encourages the installation and maintenance of stormwater BMPs on individual properties by providing a fee discount based on treatment of quantity and/or quality of runoff water. The credit program and outreach and education efforts can lead to reductions in runoff that can become significant as these practices become accepted/adopted in the community. The fee structure was updated in 2024 to account for increasing funding needs predicted for upcoming years.

6.2.4. Staunton Flood Study Report

In response to the flooding experienced by the City in August 2020, which resulted in 166 reports of damage estimated at a total of $3.1 million, Wiley|Wilson was commissioned to conduct a hydrologic and hydraulic analysis of the watershed focusing on the drainage capacity and flooding risk at the Wharf (Wiley|Wilson, 2021). The study assessed the tunnel system's stormwater capacity and identified several potential large-scale projects to help reduce flooding. However, the analysis showed that these major improvements would be extremely costly while providing only limited reductions in stormwater flooding. Several recommendations were singled out for immediate short-term gains, including removing accumulated debris from the tunnel, adding additional access points to improve future debris removal, and conducting a visual structural inspection to document the tunnel's current condition and identify necessary repairs and maintenance.

6.2.5. Tunnel Evaluation Study

Following the Flood Study Report, the City engaged Wiley|Wilson in December 2024 to perform a Tunnel Evaluation Study of the downtown tunnel system. The evaluation included detailed 3D scanning and surveying, visual observation to identify structural deficiencies and maintenance needs, and assessment of debris accumulation with recommendations for removal and additional access points. The inspection revealed several areas of significant concern and potential structural failure, which were further surveyed to determine the exact scope of immediate repairs to recommend. Based on these findings, certain sections of road over the tunnels were recommended for temporary closure to vehicular traffic until repairs could be completed.

6.2.6. Wharf Parking Lot Daylighting Study

The Tunnel Evaluation Study identified several significant structural issues within the Wharf parking lot area. The option of daylighting, or uncovering, sections of stream currently enclosed in tunnels under the Wharf has emerged as an alternative to replacing the existing tunnel network as-is. To assess the overall viability, costs, and impacts of daylighting sections of stream compared to traditional repairs to the existing tunnels, the City commissioned Wiley|Wilson in November 2025 to evaluate daylighting options and develop cost estimates for tunnel repair, tunnel replacement, and daylighting alternatives for the streams under the Wharf parking lot. The study will also include conceptual grading and site planning for daylighting the creeks beneath the parking lot. Preliminary design is anticipated to be completed in spring 2026, providing the City with information needed to determine the most effective path forward.

6.3. Regulations

Like all municipalities and localities, the City of Staunton is subject to regulatory measures that aim to protect and improve the well-being of its residents, infrastructure, and the environment. Fortunately, local, state and federal regulations are increasingly intersecting with flood resiliency objectives as our society begins to see the impact of natural events upon the built environment.

6.3.1. Floodplain Management

Zoning is an important method used by localities, including Staunton, to protect against preventable flood damages by curtailing development in the floodplain. Section 18.170 of Staunton City Code covers Floodplain Districts and Regulations. The City's floodplain districts are used as an overlay to the existing districts on the official zoning ordinance map and as such supplement the underlying district provisions. The basis of the floodplain overlay district is the Flood Insurance Study (FIS) for Augusta County and the City of Staunton prepared by FEMA, dated December 1, 1978, and revised September 28, 2007, and January 6, 2010, as amended. The FEMA regulations associated with the NFIP include minimum standards related to development in flood zones, such as building elevation and flood proofing standards. It should be noted that the Uniform Statewide Building Code requires construction consistent with FEMA and related standards. FEMA regulations are administered at the state level by the Virginia Department of Conservation and Recreation (VADCR) and at the local level through the City's Zoning Ordinance at Chapter 18.170. - Floodplain Districts and Regulations. Additional restrictions are applied to areas overlaid by the floodway (Zone AE of FEMA SFHA) requiring hydrologic and hydraulic engineering analyses demonstrating that any proposed encroachment would not result in an increase in the 100-year flood elevation.

The floodplain regulations include guidance on substantial improvement/substantial damage of structures, design criteria for utilities, and submittal requirements when changes are anticipated in the base flood elevation. The regulations also highlight the need to protect adjacent properties from

stormwater, noting in 18.170.070(5)(c) Drainage Facilities "[a]ll storm drainage facilities shall be designed to convey the flow of surface waters without damage to persons or property. … The facilities shall be designed to prevent the discharge of excess runoff onto adjacent properties."

6.3.2. Erosion and Stormwater Management

The City of Staunton's stormwater management program is regulated and implemented through programs and regulations that are derived from the federal Clean Water Act and administered through VADEQ. These include:

- Virginia Erosion and Stormwater Management Program (VESMP) (9VAC25-875) - provides standards for managing erosion during construction and stormwater quantity and quality once construction is complete.
- Municipal Separate Storm Sewer System (MS4) - regulates City owned and operated stormwater infrastructure and permits discharges from the City's MS4 into Lewis Creek, Christians Creek, Middle River, and their tributaries.
- Total Maximum Daily Load (TMDL) - designates specific pollutants of concern and requires the City to report steps taken to reduce transport of these pollutants into waters of the United States in the City's annual MS4 permit report and TMDL Action Plan.

The state criteria for erosion and stormwater management are adopted directly into Staunton City Code 13.01.085. The disturbance of land leaves bare or stockpiled soil and similar materials exposed to runoff that can carry the material into the storm drain system and on to Lewis Creek, Christians Creek, or the Middle River. Sedimentation can affect water quality (impair habitat for fish and insects) and can also accumulate and create clogs or flow constrictions that can create or exacerbate flooding conditions. Regulations on the quantity and quality of stormwater leaving a developed area post-construction are developed to prevent increases in flooding and prevent damages from erosive flows. Aligned with state regulations, land disturbing activities disturbing more than 10,000 square feet within the City are required to develop an Erosion and Sediment Control Plan, which must show appropriate controls on sediment loss during construction and that downstream properties and waterways are being protected from increases in volume, velocity, and peak flow rate for the 10-year 24-hour storm event post-construction.

The MS4 program, as noted in **Section 6.2.2**, is a water quality program and is not specifically focused on flooding, though it is well understood that a reduction in stormwater runoff magnitude, volume, and frequency can both improve water quality and reduce flooding. The City's MS4 permit requires demonstration of progress towards six programmatic Minimum Control Measures (MCMs) designed to reduce stormwater pollutant loads into the MS4. Three of these MCMs are largely requirements of the City to maintain the program and improve awareness including public education and outreach (MCM #1), public participation (MCM #2), and to carry out good housekeeping in municipal operations (MCM #6).

MCM #3 relates to illicit discharge detection and elimination. This is regulated through Chapter 13.60 – Non-Stormwater Discharge of City Code. This section restricts non-stormwater discharges into the City's MS4 and provides penalties for violations. While illicit discharges may be associated more often with pollution (e.g., allowing chemicals to flow into a drain), dumping debris and trash into drains can create flooding issues. Such debris, sediment, or material can clog drains and lead to flooding conditions when stormwater is unable to pass through the system as designed.

MCM #4 and #5 relate to managing runoff from construction activities and maintaining and installing stormwater management facilities at new and re-development sites. This is administered through the City's adoption of the VESMP (Chapter 13.01 – Erosion and Stormwater Management of City code). The most important element of the VESMP with respect to flood resilience is the requirement that downstream channel adequacy be evaluated, and that detention is provided to manage downstream erosion and flooding. As noted above, these requirements apply to development on sites disturbing more than 10,000 square feet of area.

The TMDL program, which is enforced through the MS4 program, limits the amount of sediment, bacteria, and other pollutants that can be discharged to the Middle River and its tributaries. While the City does not have any specific pollutant reduction goals from local TMDLs, as part of the Chesapeake Bay TMDL the City is required to reduce sources of sediment and nutrients and to report progress towards meeting these goals in an annual MS4 program report. As previously noted, efforts to improve water quality align with flood resilience goals of reducing the amount of runoff.

6.3.3. Riparian Buffers

City Code Chapter 13.12 establishes a duty to retain or establish a riparian buffer of at least 50 feet on each side of waterway and around wetlands to slow runoff, prevent erosion, and filter pollution from runoff to these features. Beyond small, temporary, and unavoidable impacts, development within the riparian buffer area requires the submittal and approval of a mitigation plan to address water quality and riparian buffer impacts in addition to a fee.

6.4. Projects

In addition to various smaller stormwater system upgrades and repairs throughout the City, this section presents an assortment of flood resilience related projects that the City has already begun implementing. These projects represent a range of improvements, from increasing stormwater storage volume to protect downstream assets to relocating critical infrastructure away from frequently flooded locations.

6.4.1. Gypsy Hill Park Stream Restoration

Completed in April 2025, this project was designed to reduce streambank erosion, improve aquatic habitat, and also provide flood attenuation by reconnecting more of the channel with its floodplain, which serves to reduce some of the risk of flooding impacts downstream.

6.4.2. Cole Avenue Stream Restoration

Completed in August 2025, this project restored channel stability to an ephemeral stream that carries stormwater runoff during rain events from an upstream residential watershed of about 275 acres, of which about 29% is impervious. Improving channel stability will reduce erosion and improve water quality. The project also included construction of a new outlet structure with an upgraded trash rack designed to improve debris capture and removal. The embankment was raised and reinforced to increase storage capacity, allowing it to retain more stormwater and reduce downstream peak flows during frequently occurring storm events. In addition, sanitary sewer lines were relocated and reinforced to minimize the risk of future impacts. While not the primary focus of the design, the restoration reestablishes some connection of the channel to its floodplain, slowing the flow of water and enabling more infiltration, serving to further reduce the impact of flooding downstream.

6.4.3. Tunnel Repairs – Johnson, Byers, and New Street

The Tunnel Evaluation Study (**Section 6.2.5**) identified several significant structural issues that prompted the City to limit vehicular traffic over the tunnels in certain locations. Three locations were prioritized for immediate repair: Johnson Street, Byers Street, and New Street. The Johnson Street tunnel will be completely removed and replaced with a larger section. Existing gas and utility lines that currently pass through the tunnel will be rerouted beneath it to reduce restrictions. Repair work also includes removing accumulated debris from a critical chokepoint in the system and the installation of a tunnel access point to enable easier debris removal in the future. The Byers Street tunnel will also be fully removed and replaced with a larger section to improve overall service capacity. The New Street repairs will consist of concrete replacement and restoration within the existing tunnel section. Abandoned utility lines will be removed, and a waterline will be relocated to reduce restrictions. Construction began in February 2026.

6.4.4. Juvenile and Domestic Relations District Court Relocation

A new facility for the Staunton Juvenile and Domestic Relations District Court was completed in December 2025. The juvenile and domestic relations court previously shared a location with the Augusta County District Courts at 6 East Johnson Street, which is in the SFHA. The new courthouse facility at 2020 West Beverly Street relocates the Staunton J&DR Court outside of the SFHA. In November 2022, Augusta County voted to relocate the Augusta County Circuit and

District Courts to a new facility in Verona currently under construction, which will remove those facilities from the SFHA as well.

6.4.5. Gardner Spring Pump Station Upgrades

Completed in December 2025, the 1940s-era Gardner Springs Pump Station was replaced with a modern facility designed to provide added resilience and increased reliability to the City's drinking water supply by elevating the station above the floodplain and incorporating a robust new generator system. The nearly $13 million project was funded in part by a $5.93 million grant from the Virginia Department of Health (VDH) Office of Drinking Water, using American Rescue Plan Act (ARPA) funds.

6.4.6. West Beverly Street Flood Study

An update to the SFHA along West Beverly Street was completed by Timmons Group in 2019 and incorporated into FEMA flood maps in 2021 (delayed due to the COVID pandemic). The letter of map revision (LOMR) submitted to FEMA updated the SFHA boundary and established base flood elevations (BFE) along the West Beverly Tributary to Peyton Creek. This provided better data to homeowners and developers to evaluate flood risk. Grant funding was provided by Virginia's Dam Safety, Flood Prevention and Protection Assistance Fund and covered approximately half the cost of the approximately $130,000 study.

6.5. Funding

To create a sustainable funding source to address issues related to stormwater management and flooding, the City created a dedicated stormwater utility fee as outlined in City Code Chapter 13.02. The fee provides a dedicated funding source for the Stormwater Management Program. The Stormwater Management Program operates with the primary goals of:

- Maintaining compliance with the City's MS4 permit requirements,
- Implementing projects to improve water quality within the Chesapeake Bay Watershed,
- Providing information to help the public recognize and understand the MS4 program, stormwater management, pollution concerns, and state and federal regulations,
- Enhance funding to maintain and repair existing stormwater infrastructure,
- Providing protection from runoff to both residential and commercial properties,
- Reduce flooding potential and damages to both residential and commercial properties through preventative stormwater control measures, and
- Establishing, enhancing, and protecting riparian buffers along the streams and wetlands of the City.

The fee provides operating budget that allows for progress towards these goals, compliance with regulations, equipment, planning and research, etc. It is important to understand that the fee only provides a portion of the funding necessary for capital construction projects, as increasing the fee

enough to cover more or all of the capital needed for planned projects was not politically tenable. Construction of large projects are often funded partially by the Stormwater Operating Budget and the remainder funded using external grants and/or loans. The Stormwater Management Program's operating budget is reviewed as part of the City's annual budget adoption process. The operating budget is based on expected revenues and services needed to meet regulatory requirements, debt service, and overarching City goals. The CIP outlines expected capital expenditures over the five-year window and the projects that are expected to be executed. The operating budget and CIP are both reviewed and approved by City Council.

As noted earlier in this plan, the backlog of stormwater related projects is substantial. To advance the City's vision of flood resilience, a holistic approach to managing stormwater runoff and improving flood resilience must be implemented. Projects, to the extent possible, need to address multiple facets of stormwater management/flood resilience, and be developed in a way that supports broader community growth. This mindset recognizes that there are often multiple solutions to a problem. The methods that best address broad community objectives should be pursued.

Some of the various grant or loan programs that have been used in the past or are available to the City are outlined below. Many of these opportunities are not limited to localities and can be viable options for private entities or individuals to use in seeking funding for stormwater and/or flooding improvement projects. This should not be considered a comprehensive list of possible funding sources, only an outline of the current most commonly referenced resources. More funding opportunities may become available in the future while others may be discontinued, and the restrictions and prioritizations of funding sources can change over time. This can provide a great deal of flexibility in funding as long as there is capacity to evaluate and manage the most viable possibilities.

VADEQ Stormwater Local Assistance Fund (SLAF)

The Stormwater Local Assistance Fund (SLAF) provides matching grants (funding 50% of awarded projects) to local governments for the planning, design, and implementation of stormwater best management practices (BMPs) that address cost efficiency and commitments related to reducing water quality pollutant loads. Water quality projects including stormwater BMPs, stream and wetland restoration, and riparian buffer/floodplain restoration projects are all eligible.

VADCR Community Flood Preparedness Fund (CFPF) Grants

CFPF was established in 2020 to provide support for regions and localities across Virginia to reduce the impacts of flooding. It prioritizes projects that are in concert with floodplain management standards and local resilience plans, utilize nature-based solutions, and are consistent with the principles outlined in the Virginia Coastal Resilience Master Plan. The fund can be used

to complete planning and assessment efforts in addition to the implementation of physical projects, which can be pivotal for under-funded communities. The completion of this Flood Resilience Plan enhances the ability of the City to apply for additional funding to implement the kinds of projects that the Plan prioritizes.

VADCR Resilient Virginia Revolving Loan Fund (RVRF)
The RVRF, established in 2022, provides statewide loans and grants for property-scale hazard mitigation, federal grant matches, and seed funding for local government resilience loan programs. Eligible applicants include local governments and political subdivisions such as localities, authorities, districts, and commissions created by the General Assembly.

Building Resilient Infrastructure and Communities (BRIC) grants
The intent of the grant, Building Resilient Infrastructure and Communities (BRIC), is to support states, local communities, tribes, and territories as they undertake hazard mitigation projects, reducing the risks they face from natural hazards. Administered by VDEM, BRIC is a FEMA pre-disaster hazard mitigation program that has replaced the previously-existing Pre-Disaster Mitigation (PDM) program.

Flood Mitigation Assistance (FMA) grants
Administered by VDEM, the intent of FEMA's Flood Mitigation Assistance Program (FMA) is to provide funding for projects either reducing or eliminating the risk of repetitive flood damage to buildings insured by the National Flood Insurance Program (NFIP). It is designed to serve localities, agencies, and planning districts.

Hazard Mitigation Grant Program (HMGP)
Administered by VDEM, FEMA's Hazard Mitigation Grant Program (HMGP) provides funding to state, local, tribal, and territory governments so that they can rebuild in a way that either reduces or mitigates future disaster-related losses in their communities. Unlike the Flood Mitigation Assistance Program (FMA) which is an annually-recurring grant opportunity, the grant funding through HMGP is made available following a presidentially declared disaster, and these funds must be requested by a governor or tribal executive in eligible communities in a state, tribe, or territory.

Grants through the Department of Housing and Urban Development
The US Department of Housing and Urban Development administers a variety of funding opportunities that can be leveraged for flood resilience projects that intersect with improving housing opportunities for the community. The Community Development Block Grant program supports a range of community development activities to build more resilient communities. The CDBG program can provide grant funding to states and localities for infrastructure, economic development, community centers, housing rehabilitation, and other projects. The Community

Development Block Grant – Disaster Recovery fund can be activated in response to specific disasters to provide additional funding.

Virginia Conservation Assistance Program (VCAP)

Tailored for property owners outside of the agricultural land uses, the Virginia Conservation Assistance Program can provide financial incentives and technical and educational assistance to residential/urban landowners who install stormwater BMPs. The program is administered by local Soil and Water Conservation Districts (Headwaters SWCD administers Augusta County and Staunton), who accept and review BMP plans submitted by landowners, verify project eligibility, and issue and track reimbursements for completed projects. All non-agricultural property owners (including businesses and public and private lands) in eligible districts may apply for project funding to reduce erosion and address poor drainage and poor vegetation that contribute to water quality problems. A program manual includes standards and specifications for the urban BMPs that are eligible for reimbursement. The local SWCDs may have staff members available to apply for funds through this program to work with interested property owners on eligible BMPs such as rain gardens, permeable pavement, and conservation landscaping among many others.

EPA Water Infrastructure Finance and Innovation Act (WIFIA) Funds

The WIFIA program was established by the Water Infrastructure Finance and Innovation Act of 2014. WIFIA provides long-term, low-cost supplemental loans for regionally and nationally significant projects. The funds can be used for development and implementation activities for eligible projects including, but not limited to, wastewater conveyance and treatment, drinking water treatment and distribution, enhanced energy efficiency projects at drinking water and wastewater facilities, acquisition of property if it is integral to the project or will mitigate the environmental impact of a project, and combinations of eligible projects. Loans can be combined with other funding sources including state Revolving Fund loans.

VA Clean Water Revolving Loan Fund

EPA awards grants to states to capitalize their Clean Water State Revolving Funds (CWSRFs). The states, through CWSRF, make loans for high-priority water quality activities. As loan recipients make payments back into the fund, money is available for new loans to be issued to other recipients. Eligible projects include point source, nonpoint source and estuary protection projects. Point source projects typically include building wastewater treatment facilities, combining sewer overflow and sanitary sewer overflow correction, urban stormwater control, and water quality aspects of landfill projects. Nonpoint source projects include agricultural, silvicultural, rural, and some urban runoff control; on-site wastewater disposal systems (septic tanks); land conservation and riparian buffers; leaking underground storage tank remediation, etc.

Water Quality Improvement Fund (WQIF)
This is a permanent, non-reverting fund established by the Commonwealth of Virginia to assist local stakeholders in reducing point and nonpoint source loads to surface waters. Eligible recipients include local governments, SWCDs, and individuals. Grants are administered through DEQ and require matching funds on a 50/50 cost-share basis.

In addition to these existing sources of funding, there is precedent of other localities developing their own loan programs to help facilitate project implementation by residents and businesses in the locality. This format of funding opportunities can serve to keep local money in the locality and provide the extra boost sometimes necessary to get small but impactful projects in the ground.

Developing partnerships between localities, agencies, and other organizations can provide valuable insights, manpower, and public relations opportunities that can be just as pivotal in seeing a project through to success as any amount of funding. These kinds of relationships can also lead to other funding avenues that may not be otherwise available. A preliminary list of potential partner organizations developed during this effort include:

- State and federal government agencies (VDOT, VDH, VADCR, etc.)
- Other cities and localities, especially those dealing with similar challenges
- Headwaters SWCD
- Central Shenandoah Planning District Commission
- Alliance for the Shenandoah Valley
- Shenandoah Green
- Staunton Tree Stewards
- Lewis Creek Watershed Advisory Committee
- Shenandoah Valley Bicycle Coalition
- Staunton City Schools
- Newtown Neighborhood Association
- Central United Methodist Church (and other religious/ministry groups)
- Youth Volunteers Corps
- Homegrown National Park
- Shenandoah Permaculture Institute
- Local gardens/nurseries/greenhouses
- James Madison University, Blue Ridge Community College, Mary Baldwin, and associated student organizations
- Local land trusts and/or conservation foundations
- Trout Unlimited
- Habitat for Humanity
- Southern Shenandoah Chapter of Virginia Voluntary Organizations Active in Disaster (VOAD)

6.6. Gap Analysis

Based on the City's vision and current efforts, there are some logical next steps that can be considered. These efforts are outlined in **Table 4** below with more specific recommendations in the following section. Generally, these gaps and next steps are logical extensions of implementing the Comprehensive Plan (Staunton Planning Commission, 2019) and the Hazard Mitigation Plan (CSPDC, 2020), continuing to assess likely impacts of climate change and how that influences City programs, and continuing to move forward with holistic stormwater projects to reduce flood risk.

Table 4. Gaps and potential actions to advance flood resilience of the City of Staunton.

Current Efforts	Gaps	Potential Actions
Critical Infrastructure	• Courthouse, Fire Station, Police Department locations at least partially within the SFHA	• Courthouse facilities and pump station recently relocated, evaluate options for relocating other critical infrastructure out of the SFHA while ensuring access to resources for citizens during an emergency
Plans	• Comprehensive Plan and related documents outline broad strategies to increase flood resilience but do not specify implementation steps • CIP FY2026-FY2030 outlines stormwater projects for only FY2026, 2027, and 2028	• Develop plan for flood resilience projects and incorporation of resilience principles into other planned projects where feasible. • Expand stormwater and flood related project plan through the full length of future CIP updates while maintaining flexibility in plan to take advantage of unanticipated opportunities
Practices and Programs	• Need for more engineering capacity in the City • Incomplete mapping of stormwater network and capacity analysis • Flood alert system present but limited •	• Evaluate possible hiring or outsourcing of engineering staff to support City needs • Continue ongoing mapping effort • Expand stream and rainfall monitoring network and explore methods of developing predictive warnings • Continue to look for resources to help flood-impacted properties • Expand education and awareness programs

Regulations	• Riparian buffer ordinance on books but not easily enforceable • Regulations generally derive from state requirements, which do not currently account for climate change/increased rainfall/flooding	• Repeal and/or update riparian buffer ordinance • Evaluate possible changes to stormwater regulations to protect downstream properties • Ensure enforcement of current regulations and inspection schedule to prevent erosion and deposition in stormwater network • Assess options for accounting for climate change in regulatory programs balancing current and future costs and impacts
Projects	• Backlog of complaints and potential projects related to stormwater system need organized and systematic approach	• Continuous tracking of complaints • Assessment of projects for viability/readiness and potential impact to direct efforts and funds to greatest return on investment • Support implementation of structural and non-structural mitigation activities on private or public property to reduce exposure to and provide protection from natural and manmade hazards. • Implement stream and natural systems protection actions that not only minimize damage and losses but also preserve and restore these systems
Funding	• The backlog of stormwater management and flood resilience work is substantial compared to City's annual budgets	• Continue to assess project selection and scoping to maximize project value • Assess a variety of funding sources to leverage City funds • Look at programs and partnerships to ensure that development activities and regular maintenance of properties aligns with City efforts • Evaluate Stormwater Utility fee funding to better support capital projects and/or discuss funding strategy to maximize grant fund capture

7.0 RECOMMENDED PROJECTS FOR FLOOD RESILIENCE

In this section, studies, planning efforts, and capital projects are proposed that will advance the City's existing efforts towards flood resilience consistent with the five key principles designated in this plan (**Section 1.2**, **Section 5.0**). As projects are identified or completed, they can be incorporated into the periodic updates of this plan.

7.1. Incorporating New Projects, Plans, and Studies

Much of resilience relates to being best prepared for events that can happen unexpectedly. While the City carefully plans its funding, unexpected opportunities do present themselves that need responses. Such items could include new project priorities identified in watershed plans, unexpected issues that arise that are not programmed into a capital program, an owner of a flood prone property that is willing to work with the City on solutions, or simply an opportunity to build flood resilience efforts into another effort or project. In these instances, the City needs to be prepared to assess these opportunities and act as appropriate.

A pair of factsheets were developed as part of this Plan to enable the City to evaluate the potential impact and readiness of individual projects in a flexible manner to help staff prioritize effort and funding efficiently. The factsheets are structured as checklists combined with fillable formats (**Appendix D**) that can be utilized as editable documents to be updated as information is gathered, conceptual solutions generated, and situations evolve. The documents will serve as an organizational tool as well as a form of documentation for maintaining records. They can be used as a quick-reference to help staff understand if a project can easily move forward once funding is secured, if it only needs a small amount of effort to then move forward, or if it has a fundamental flaw(s) that need to be addressed before proceeding. They also prompt evaluation of added benefits that could be incorporated which might otherwise be overlooked, such as nature-based solutions to replace or enhance a gray-infrastructure project with green infrastructure. It is anticipated that once a subset of projects are evaluated and determined to be adequately ready to progress, they can be shifted to a 'shortlist' set of projects to be implemented based on funding availability/ opportunities.

Separate factsheets have been developed for structural and programmatic projects. The Structural Project Readiness Evaluation Factsheet focuses on design-oriented questions and is intended for evaluating physical implementation of projects to improve flood resiliency, such as storm sewer improvements, stormwater BMP implementation, and stream restoration projects. The Programmatic Project Readiness Evaluation Factsheet is designed to help staff evaluate programmatic changes such as proposed regulatory changes, new practices, and studies. Future efforts may determine that additional local constraints or criteria would be beneficial to include in the project selection process and can be incorporated into future versions of these checklists.

7.2. Identified Plans, Studies, and Projects

7.2.1. Technical Studies and Programmatic Approaches

Expand Flood Awareness System

The City's Flood Awareness System (**Section 6.2.1**) currently monitors stream stage at five locations within the City limits and a sixth location upstream of the City on Lewis Creek, as well as rainfall monitoring at seven locations (some collocated with stream gauges) within and around the City. This system is equipped to provide near real-time data and alerts that can provide awareness of imminent flooding and valuable minutes needed to take actions to reduce property damage and potential loss of life. The city currently has an additional three sensors in-house ready to deploy. Finalizing the locations for deployment can enable rapid expansion of the alert system.

An additional avenue for increasing flood resiliency of the City would be to investigate the possibility of developing predictive modeling. Predictive models could use data such as current and antecedent rainfall amounts to anticipate the likelihood of flood conditions under projected rainfall accumulation. If adequately functional, these predictions could be used to increase the potential alert window, increasing available response time to imminent flooding.

Complete mapping of stormwater network and capacity analysis

While GIS mapping of the stormwater system in the City appears largely complete, the full extent of the stormwater system in the City has not been verified and is known to have some missing data critical to developing an accurate model of the whole system. Recently, new staff specializing in GIS have been brought onto the Public Works team, which will better enable the development of a uniform system for cataloging the stormwater system data and identifying gaps in the dataset. It is possible that the gaps analysis effort will warrant additional staffing to complete in a timely manner, and/or will identify gaps that will need an additional amount of temporary staffing or contracted work to fill the data and analysis gaps to help prioritize projects. Having spatial mapping of the stormwater system also enables the overlay of social vulnerability indices that can help the City identify underserved populations within the community.

Evaluate Engineering Staff Needs

Outside of physical bottlenecks in the stormwater network, a programmatic bottleneck exists within the City's available staff with the technical training to develop and/or evaluate engineering plans to improve stormwater resilience. Based on feedback from residents during the July 14, 2025 public meeting, there is interest in having qualified City personnel available to perform site visits to troubleshoot localized flooding issues related to public infrastructure (often outside the SFHA) that may be causing impacts to private property. The costs and benefits of hiring additional engineering staff to fill this role need to be evaluated. As this would be a new sort of initiative and the workload may change over time, an option to help evaluate the level of staffing needs could be to hire an outside consultant to provide this service for a duration. After the term of the contract,

the City could use the experiences gained to better evaluate the need for City staffing increases or continued consulting support.

Wharf Parking Lot Study

As noted in **Section 6.2.6**, this study will help City staff determine whether or not the daylighting of Lewis Creek and Peyton Creek where they run under the Wharf Parking lot would be a feasible project to implement. This study is currently underway. The study will include general mapping of the area, high level calculations to determine what general size of the stream channels would be needed to support storm events, and develop cost estimates for tunnel repair, tunnel replacement, and daylighting alternatives for the streams under the Wharf parking lot. -This study will allow the City to evaluate alternatives of tunnel repair, tunnel replacement, and daylighting alternatives for mitigating safety hazards and increasing flood resilience.

Debris Management Strategy

Proper and timely maintenance of the stormwater drainage systems throughout the City can be vital in mitigating the impacts of storm events on flooding of roadways and properties. When storm drains are even partially clogged with accumulated sediment and debris that decreases their effectiveness in stormwater as designed and increases the likelihood of stormwater backing up and flooding surrounding areas. The Staunton Public Works Department currently cleans storm drains and provides maintenance for outfalls, but does not have capacity to address all issues that are reported. Sweeping is performed nearly daily on some streets within the City, but this effort is also resource-limited. Increasing the capacity to better respond to reported sediment and debris accumulation and proactively clear drains prior to rain events would decrease the overall risk of flooding due to drainage limitations. The City could perform a cost-benefit analysis of expanding capacity within the City compared to contracting out the tasks.

Regardless of whether capacity for addressing storm drains and outfalls is increased, an improved tracking mechanism should be established to allow the City to take credit for associated pollutant reductions within their MS4 permit program. Successful, ongoing tracking of street sweeping efforts would offset money and effort currently earmarked for other MS4 permit compliance projects which could otherwise be allocated to further progress on flood resilience projects and strategies. Additionally, tracking sweeping efforts and results could help the City target areas needing more advanced debris management strategies. In the past, the City has relied on past experience and alerts from residents to guide targeted clearing of drainage paths and stormwater inlets that get clogged with debris such as leaves, sand, gravel, etc. If street sweeping records can help the City identify stretches of high and regular debris accumulation, that information can be used to guide preventative clearing prior to anticipated storm events and prevent clogging of the stormwater system. The tracking/reporting strategy should also include tracking of this clearing of drainage paths and inlets.

The City could also assess the development of a more formal reporting strategy for residents to alert the City to built-up debris that will impact the stormwater system's performance. Another avenue to explore would be an Adopt-a-Drain or similar program to help promote the clearing of reasonable debris by citizens. Several attendees at the public meeting reported already performing these sorts of services, and promoting civic action further and acknowledging or even rewarding it could make a significant impact.

Gravel driveways and parking spaces within the City were noted during the community engagement efforts as sources of additional sediment and debris that could clog stormwater inlets. The City could assess the benefits of outreach and assistance in encouraging landowners to either take measures to ensure gravel and sediment do not wash away during storms or convert the areas to non-erosive cover (e.g. vegetative cover, permeable pavement/pavers, or impervious surfacing). The City could also explore enacting new regulatory guidelines limiting additional gravel and sediment in future driveway and parking lot establishment or holding landowners accountable for sediment and debris being washed into the streets.

Evaluate Predicted Precipitation and Design Practices and Standards

The City understands the upward trend in the severity of precipitation events and the associated impacts that such storms will likely have in exacerbating flooding problems. The upcoming release of the NOAA Atlas 15 data will provide the City with an opportunity to evaluate the impacts of using this new dataset and its accompanying projected future temporal trends (through year 2100) on stormwater management and design. The study could include a review of the City's infrastructure to assess bottlenecks and flood potential under increased rainfall to further assist in decision making with infrastructure and development. The study could provide an economic evaluation of short-term cost of improvements compared to long-term costs associated with increased rainfall and flooding.

Ordinance Updates

A variety of different ordinance updates and/or changes that could be implemented to improve flood resiliency came up during the course of this plan development. The cost-benefit analysis and political will behind any ordinance changes should be evaluated for potential future changes to increase flood resiliency.

In 2024, the City updated their stormwater utility fee structure for the first time since its inception. Regularly scheduled re-evaluations of the fee structure should be planned activities. As noted in **Section 6.3.3**, there is a riparian buffer ordinance in place to maintain a riparian buffer along waterways to slow runoff, prevent erosion, and filter pollution from runoff to these features. However, as was noted in the gap analysis (**Section 6.6**), the ordinance as written has proven difficult to enforce. Repealing and/or replacing the riparian buffer ordinance should be evaluated for its benefits and if determined to be worthwhile scheduled for progression.

Also suggested is an evaluation of potential changes to the stormwater code. Currently Staunton's stormwater code is reflective of statewide regulations, but localities are entitled to implement more stringent regulations. The disturbed area threshold that triggers the need to develop ESC and/or SWM plans could be lowered, for example, or requirements added that the pre- and post-development runoff analysis be presented for each adjacent property. Ordinances requiring evaluation of future trends in storms could be enacted, such as requiring all calculations be based on NOAA Atlas 15 precipitation data when it becomes available (anticipated in 2026).

Land cover changes over time can increase the impact of storm events: increased impervious area increases the amount of rainfall that rapidly enters the stormwater system while well-implemented design practices can mitigate some of these impacts. It is possible that a limit to the percentage of impervious area acceptable in new development in certain zones could be worthwhile, or other changes to zoning ordinances could be useful to mitigate flood impacts.

7.2.2. Construction Projects

There are several specific construction projects evaluated in this plan. These projects are already identified in the CIP (City of Staunton, 2025) and can advance the City's flood resilience goals. Many of these projects in the CIP serve the primary purpose or meeting pollutant reduction goals to satisfy the City's MS4 permit obligations. While not the primary intent, these projects can also be valuable in advancing flood resilience for the City by reducing overall stormwater runoff. Further, addressing permit requirements in the most cost effective manners possible serve to free up future funding for other flood resilience projects more quickly. Various additional projects improving the stormwater drainage system throughout the City will be evaluated using the Structural Project Readiness Evaluation Factsheet (**Appendix D**) alongside the concerted efforts noted in **Section 7.2.1** towards completing digitized mapping updates of the stormwater system and performing additional comprehensive capacity analyses. Determining where bottlenecks can be eliminated and where the most cost effective changes can be made to improve system response to flooding will add projects to this list.

Lake Tams Continuous Monitoring/Control System

The City has identified Lake Tams as an ideal candidate for Opti's Continuous Monitoring and Adaptive Control (CMAC) technology. This is a cloud-based stormwater management system that allows for the remote and automated control over the water levels in Lake Tams. The CMAC technology uses weather forecasts and water level sensors to automatically lower water levels before a storm event occurs. The project will also help the City meet nutrient and sediment reduction requirements in the MS4 permit. The installation and startup of the system as well as structural changes to increase the lake's storage capacity are estimated at $120,000 for planning, $290,000 for construction.

Asylum Creek Stream Restoration

Restoration of approximately 1,500 linear feet of Asylum Creek as it runs through the Villages at Staunton property had been previously identified as a potential project to help the City meet the requirements of the MS4 permit. This project is not currently being pursued, but could be revisited in the future as priorities and funding opportunities evolve. This project could include measures to help address flooding issues as well as measures to improve water quality by reducing sediment and nutrient pollution. A walking trail and educational signage on stormwater and pollution reduction could also be included to increase awareness of various flooding and water quality-related concepts.

Staunton High School Stream Restoration

Restoration of approximately 1,300 linear feet of the tributary that runs behind Staunton High School had been previously identified as a potential project to help the City meet the requirements of the MS4 permit. This project could include measures to help address flooding issues as well as measures to improve water quality by reducing sediment and nutrient pollution. A walking trail and educational signage on stormwater and pollution reduction could also be included and could serve as an outdoor learning environment for the school. The project is not currently being pursued due to significant design constraints, but could be revisited in the future as priorities and funding opportunities evolve. In particular, if the adjacent sewer line requires maintenance in the future, the work may become more viable as part of a combined effort.

Green Hill Industrial Park Basin Retrofits

This project involves converting two existing dry detention basins in the Green Hills Industrial Park into wet ponds with sediment forebays. These basin retrofits are included in the FY2026-2030 CIP for design and construction in FY2028 at a current estimated $1,390,000. The retrofits will help the City meet its MS4 permit requirements by improving the pollution reduction capabilities of these basins.

7.2.3. Additional Considerations

Critical Infrastructure

While the courthouse facilities are in the process of being relocated out of the SFHA, the fire station at 500 N. Augusta Street and the multiple buildings and parking lots utilized by the police department and sheriff's office are in or perilously near the SFHA. These critical facilities should be relocated out of the floodplain. While there are additional fire and police department facilities in the City, for any amount of their resources to be unavailable during an emergency situation is a preventable issue that should be addressed as expediently as possible.

Increase Inter-departmental Coordination

Often, storm drainage improvement projects create opportunities for improvement in other facets of City management. For example, neighborhood drainage improvements made to reduce localized flooding may also allow for road resurfacing. The opposite is also true. Road improvements may

create opportunities for enhanced stormwater management (e.g. the addition of street trees, roadside water quality treatment areas, etc.). Quarterly meetings between the Public Works department and the Environmental Programs Division where upcoming project schedules and scope are discussed could help avoid misaligned implementation (i.e. damage to recently installed infrastructure by work from another department) and promote mutually beneficial projects. Additional Departments could be included in regular communication specific to flood resilience and/or specific meetings focusing on flood and other disaster preparation and response could be beneficial.

Educational Programs

Public awareness of flooding in the City of Staunton was bolstered by the very visible flooding events in August 2020. The City plans to make good use of that increased awareness and prioritize public understanding of flooding, flood resilience, and mitigation strategies that residents and business owners can implement to increase their own resiliency. Potential early methods for increasing public education on flood resiliency could take the form of a page on the City website highlighting strategies and linking to resources, awareness campaigns at various City functions and festivals, periodic mailers about flood resilience resources, and social media posts highlighting City efforts to increase resilience and resources for residents.

Programs to Incentivize Improvements to Increase Flood Resilience

As public infrastructure projects will not quickly address flood resilience for the entire community, flood resilience efforts should work to furnish flood prone small and mid-sized local businesses and homeowners with resources to reduce risk and improve recovery, particularly in areas of high social vulnerability. The City could assess options for assisting homeowners and businesses in evaluating and supporting projects that improve flood resilience and reduce flood risk in the community. Ideally, such a program would leverage state or federal funding to support resilience efforts of residents and business owners and work to furnish flood prone small and mid-sized local businesses with resources necessary to sustain operations during and after flood events. This strategy is especially important for businesses that lie in areas of high social vulnerability. Projects would vary based on the particular details of the locations, but could include a wide range of improvements such as sump pumps with backup power systems to ensure their usefulness during extreme events and rain barrels and rain gardens to improve overall stormwater infiltration and mitigate high peak flows. An education and awareness program could provide significant inroads to encouraging individual landowners to implement small-scale but wide-spread flood resilience strategies. This sort of program could be especially beneficial in encouraging residents to implement best management practices, as many properties are already in the lowest tier of the Stormwater Utility Fee structure and as such do not have the fee reduction incentive available.

Evaluate Land Management and Green Infrastructure Practices

The City could evaluate the costs and benefits of strategies that can be used to minimize impervious surface while encouraging resilient, compact urban development. The evaluation would look at a range of practices that can be used to reduce runoff and that can be incorporated into various City standards and programs. These could range from increasing tree canopy to various BMPs based on natural processes to harvesting rainwater for reuse. The study would look at example programs in other jurisdictions and how they were implemented. This effort would consider how future development of residential land can incorporate flood resilience into development plans.

8.0 CONCLUSION

This Flood Resilience Plan represents the City of Staunton's first step toward a coordinated resilience effort for the entire City. The goal is to build greater flood resilience in both natural and human systems, balancing development and growth with the need to better prepare for and recover from flooding. While many of the City's ongoing resilience efforts are already underway, this Plan brings together old and new initiatives to move the City forward. The Plan serves as a basis to apply for additional state funding to support resiliency efforts. City leadership will take the next steps in identifying where funding is needed to implement the most cost-effective and equitable solutions while continuing to align planning and actions with regional hazard mitigation efforts. Through this ongoing and iterative process, Staunton remains committed to engaging with the community and regional partners to improve its understanding of flood issues and resilience. City leaders will continue to evolve and update this Plan as conditions, data, and technologies change.

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Appendix A – VADCR Crosswalk

This crosswalk (**Table A-1**) is developed to assist with review of this flood resilience plan for completeness with the City's grant application. The plan elements included in the table below are based on the resilience plan requirements in the 2025 Community Flood Preparedness Fund grant round manual.

Table A-1. DCR Crosswalk.

Plan Element	Plan Location	Notes
1. It is project-based with projects focused on flood control and resilience.	Section 5.0 Principles of Flood Resilience Section 6.4 Projects Section 7.0 Recommended Projects for Flood Resilience	The Plan focuses on flood resilience throughout and has 5 key resilience principles.
2. It incorporates nature-based infrastructure to the maximum extent possible.	Section 5.0 Principles of Flood Resilience Section 6.4 Projects Section 7.0 Recommended Projects for Flood Resilience	The Plan focuses on 5 key principles, one of which is nature-based approach. Nature-based solutions/green infrastructure is a major component in project evaluation in the plan.
3. It includes considerations of all parts of a locality regardless of socioeconomics or race, and addresses flood resilience needs of underserved populations within the community.	Section 3.0 People, Land, Economy, and Equity Section 5.0 Principles of Flood Resilience Section 7.0 Recommended Projects for Flood Resilience	The Plan focuses on 5 key principles, one of which is equity. Strategies proposed to increase flood resilience are intended for City-wide implementation.
4. It identifies and includes all flooding occurring in all areas of the community, not just within the SFHAs, and provides the number and location of repetitive loss and severe repetitive loss properties. Repetitive loss and/or severe repetitive loss often occurs outside of the SFHA and to properties not captured in NFIP reporting. All flooding should be tracked and addressed by the community.	Section 2.1.2 Pluvial Flooding Section 2.4 Related Hazards Section 3.0 People, Land, Economy, and Equity Section 4.0 Community Engagement Section 6.0 Efforts to Date Section 7.0 Recommended Projects for Flood Resilience	The Plan focuses on 5 key principles, one of which is community-based benefits. The importance and prevalence of flooding outside of the SFHAs is highlighted repeatedly in the Plan and recommendations reflect the need for holistic approaches to flood resilience.
5. If property acquisition and/or relocation guidelines are included, the guidelines include equitable	Section 3.0 People, Land, Economy, and Equity	The Plan focuses on 5 key principles, one of which is economy and land use.

Plan Element	Plan Location	Notes
relocation strategies for all affected and where land is acquired. Property acquisitions must remain undeveloped, as permanent open space and under ownership or easement by the locality in perpetuity, except that flood control structures may be built on the property.	Section 5.0 Principles of Flood Resilience Section 7.0 Recommended Projects for Flood Resilience	
6. It includes a strategy for debris management.	Section 6.1.5 Staunton-Augusta-Waynesboro Emergency Operations Plan Section 7.2.1 Technical Studies and Programmatic Approaches	S-A-W EOP contains a debris management annex (appendix) to guide procedures for emergency response. Strategies to reduce debris clogging the stormwater system are explored.
7. It includes administrative procedures for substantial improvement/substantial damage of structures within the SFHA.	Section 6.3.1 Floodplain Management	City ordinances referenced in the Plan require a permitting process compliant with FEMA NFIP requirements
8. It includes coordination with other local and inter-jurisdictional projects, plans, and activities and has a clearly articulated timeline or phasing for plan implementation.	Section 6.0 Efforts to Date Section 7.0 Recommended Projects for Flood Resilience	The Plan incorporates local (Staunton) and inter-jurisdictional (Central Shenandoah Planning District Commission coverage area) efforts, as well as highlighting partnering opportunities for future project development and implementation..
9. Is based on the best available science, and incorporates climate change, sea level rise, and storm surge (where appropriate), and current flood maps.	Section 2.3 Climate Projections Using Best Available Science Section 5.0 Principles of Flood Resilience	The Plan focuses on 5 key principles, one of which is best available science.

Appendix B– Overview of Historic Floods in City of Staunton

Data on historic floods impacting the City of Staunton summarized from the Central Shenandoah Hazard Mitigation Plan 2020 Update (CSPDC, 2020) are presented below in (**Table B-1**). The Hazard Mitigation Plan 2020Update was finalized before the 2020 flood events, which are included here as well.

Table B-1. Overview of Historic Floods in City of Staunton.

Flood	Description and Damages
August 4, 1860	Flashflooding in the City of Staunton caused by a severe thunderstorm. Sidewalks were pulled up along Augusta Street. Many stores in downtown Staunton received thousands of dollars of damages. A chimney at St. Francis church was blown down. And a stable was lifted off its foundation and destroyed. "*It is sufficient to arouse our citizens to the absolute necessity of arming themselves against a recurrence of the disastrous results which have followed this freshet."* *- Staunton Spectator, August 10, 1896*
September 28-30, 1870	The flood of September 28-30, 1870 was one of the earliest floods in the history of the Shenandoah Valley where written accounts are widely available. The flood event occurred throughout the central Valley from the north in Rockingham County and to the south in Rockbridge. The rain was first welcomed after a period of drought and a summer where rivers had been running below normal. In Augusta and Rockbridge Counties, extensive damage occurred. Some reports measured nine inches of rain with this storm. In Staunton, flooding along Lewis Creek caused damage to its downtown and washed away a railroad bridge and wood and brick houses. The C & O railroad was damaged, including another bridge that washed away in Waynesboro.
September 29, 1896	On the twenty-sixth anniversary to the day of the flood of 1870, the Shenandoah Valley was hit by another significant flood event. This flood most likely occurred as a result of a tropical storm that was tracking through Virginia during this time. The rain, which fell steadily all day on September 30, 1896, increased in volume through the evening and culminated in torrential flooding that night.

Flood	Description and Damages
	"The gentle, soaking rain which gladdened the hearts of Rockingham farmers Tuesday morning, continuing its steady downpour all day long, at night became a raging equinoctial storm which carried death and destruction in its wake." *– Rockingham Register, October 2, 1896* The City of Staunton was the hardest hit locality in the region. Lewis Creek and its tributaries overflowed their banks, devastating Staunton's downtown. Houses, sheds, and stables were swept away. Thirty - forty horses drowned. This flood caused significant damage to the downtown business district. The archway under Augusta Street and the arch bridge over Middlebrook Road survived but nearby buildings in the vicinity of both were severely undermined and many homes were washed off their foundations. The dam at the Fair Grounds broke. Six lives were lost in Staunton. The Flood of 1896, believed to be part of a tropical system, was short lived but during its brief period was able to drop much rain in the northern part of the Central Shenandoah Region. The heavy, localized flooding was swift and its damage was difficult to grasp. **The Flood of 1896 is the flood of record for the City of Staunton.**
March 16 - 17, 1936 "The Great Spring Flood" "The Great St. Patrick's Day Flood"	In March of 1936, flooding, thunderstorms, landslides, and deep snows caused devastation up and down the East Coast of the United States. A harsh winter that was followed by an equally challenging spring wreaked havoc over many states. The Central Shenandoah Region was not exempt from the storms of 1936 that caused what would come to be known as "The Great Spring Flood". Up to 200 deaths nationwide were attributed to this storm. Damage estimates for the United States reached millions of dollars. In Virginia, the James, Potomac, Rappahannock, Shenandoah, and York River watersheds were flooded. Much of the Central Shenandoah Valley suffered the effects of this storm. In Rockingham County, 3.10 – 6.25 inches of rain fell over a two-day period. In Augusta County, torrential rains along with the melting of 18 inches of snow quickly filled Back Creek and the South River beyond their banks. In Waynesboro, many homes were flooded and cars washed away. Staunton reported heavy rainfall, at one point recording 2.5 inches of rain in a twelve-hour period.

Flood	Description and Damages
August 19, 1969 Hurricane Camille	In the western part of Virginia this name is synonymous with unequalled destruction. The remnants of Hurricane Camille caused flooding during the evening hours of August 19, 1969 and the morning hours of August 20, 1969 that broke all flooding records in modern history along the James and Maury Rivers. Two hundred and sixty lives were lost as the result of the hurricane and the flash flooding it created. Camille caused over 3 billion dollars (2019 dollars) in damages throughout Virginia. Nelson County was the hardest hit in all of Virginia receiving from between 27 to 31 inches of rain, most of which fell in a five-hour period during the middle of the night while people were sleeping. Homes in Massie's Mill and Lovingston were washed off their foundations and completely destroyed. Whole families died either in their homes or as they tried to escape the floodwaters. As the land became saturated, tons of topsoil streamed down the mountainsides, toppling trees and creating mammoth landslides. An example of this devastation could be seen after the flood where for a five-mile stretch of Davis Creek, logs were piled 30 feet high. One hundred and seventeen people died in Virginia and a majority of those people were in Nelson County. In the Central Shenandoah Region, three localities– Augusta, Bath and Rockbridge Counes were included in the federal major disaster declaration (DR-274). *"In 1969, Hurricane Camille dropped 27 inches of rain on Nelson County, Va., in just six hours. The storm hit the Blue Ridge Mountains with an intensity that no meteorologist had anticipated, and sleeping Virginians awoke to find their houses buried in muddy boulders or floating down what had previously been trickling streams. Catastrophic flash flooding killed 153 people — more than one percent of Nelson County's population—and obliterated entire towns. Fifty-five years later, Camille remains the deadliest and costliest natural disaster in Virginia's history."* *-How America Forgot a Crucial Lesson for Hurricane Disasters of the Past, October 9, 2024, Time.com, Justin McBrien*
June 19, 1972 Hurricane Agnes	Damage from Hurricane Agnes in the United States was over $19 billion (2019 dollars), the second costliest hurricane in U.S. history and caused 120 deaths. In Virginia, 13 lives were lost and damages equaled over $1

Flood	Description and Damages
	billion (2019 dollars). Rivers surpassed their banks throughout the State including the Appomattox, Dan, James, Potomac, and Roanoke Rivers. Like other parts of the State, the Central Shenandoah Region received flooding but not to the levels that had occurred three years earlier with Hurricane Camille. Eight localities (Bath, Buena Vista, Harrisonburg, Lexington, Rockbridge, Rockingham, Staunton and Waynesboro) were included in the federal major disaster declaration (DR-339) following the storm.
November 4, 1985 Hurricane Juan	The Flood of November 1985 will be remembered in Virginia for its flash flooding. Flooding was caused when a slow-moving low pressure system, possibly containing remnants of Hurricane Juan, moved northeasterly through West Virginia and Virginia dumping torrential rains over a four-day period. Known as the "Election Day Flood", because it occurred during election day, the storm caused 22 deaths. Damages across the state reached nearly $1.8 billion (2019 dollars). This flood was the worst flood for the City of Roanoke, where the Roanoke River rose seven feet in one hour and eighteen feet in six hours. Areas all across the Central Shenandoah Region were affected by the flooding. Nine localities– Augusta, Bath, Buena Vista, Harrisonburg, Highland, Lexington, Rockbridge and Rockingham- were included in the federal major disaster declaration (DR-755). Communities in Augusta County were inundated by floodwater. Damages to roads in Augusta County were estimated at $18 million (2019 dollars) and homes, businesses, and public facilities at $16.5 million (2019 dollars). The rains had minimal affects on the City of Staunton except for the water treatment plant that was damaged and the evacuation of residents of the Beverly Hotel where the flooded basement caused concerns.
June 22-28, 1995	A week-long period of ground saturating rains fell over the western part of Virginia, causing flash floods and landslides. Madison and Greene Counties were the most devastated in the State, when an intense rainfall stalled over the mountains. On June 27, 1995, in a fifty mile area of Madison County, 30 inches of rain fell in a 16-hour period, with as much as 25 inches falling in a five-hour period in some areas. This caused debris flows and mudslides that uprooted trees, removed topsoil, and caused

Flood	Description and Damages
	extensive altercations in the landscape. Rainfall had not been seen there in such a concentrated level over such a short duration since pre-historic times. In the Central Shenandoah Region, six localities– Augusta, Bath, Buena Vista, Lexington, Rockbridge and Staunton were included in a federal major disaster declaration (DR-1059). The week of rains caused flash flooding in Augusta and Rockbridge Counties. In the City of Staunton, Gypsy Hill Park was flooded when Lewis Creek overflowed its banks. The Park's duck pond also overflowed causing sinkholes and creating other problems.
January 13, 1996	Severe winter weather resulted in a blizzard, followed by two additional snowstorms bringing over a foot of snow. Snowpack was on the ground for an extended period of time. It was thawed by higher temperatures and heavy rain, resulting in severe flooding. Ten localities- Augusta, Bath, Buena Vista, Harrisonburg, Highland, Lexington, Rockbridge, Rockingham, Staunton and Waynesboro- were included in a federal major disaster declaration (DR-1086).
September 6, 1996 Hurricane Fran	Hurricane Fran made landfall in North Carolina as a Category Three hurricane on September 6, 1996. In the Central Shenandoah Region, ten localities– Augusta, Bath, Buena Vista, Harrisonburg, Highland, Lexington, Rockbridge, Rockingham, Staunton and Waynesboro were included in the federal major disaster declaration (DR-1135). The Counties of Augusta and Rockingham were most affected by Fran. Fran dropped eight inches of rain in parts of the Valley and up to thirteen inches of rain in the Big Meadows area of the Shenandoah National Park. Hurricane Fran broke almost all flood records along the Shenandoah River and its tributaries, including those set in 1972 with Hurricane Agnes and in 1985. Damages in the Shenandoah Valley were estimated at over $97 million (2019 dollars). In Augusta County, National Guard troops evacuated people in the Mount Solon and Churchville areas. In the City of Staunton, much of downtown was closed due to flooding in the Wharf parking lot area and damage was done to roads at the Frontier Culture Museum.

Flood	Description and Damages
September 18, 2003 Hurricane Isabel	Hurricane Isabel made landfall on September 18, 2003, along the Outer Banks of North Carolina. Isabel made landfall as a Category 2 Hurricane. It moved northwestward through Virginia and Maryland, finally dissipating near Erie, Pennsylvania. In Virginia, as Isabel passed through, some areas had sustained winds of 100 mph. Also, for twenty-nine hours tropical storm winds lasted throughout Virginia. Communities located along either the Chesapeake Bay or the Atlantic Coast felt the effects of a storm surge of 5-8 feet. In the Central Shenandoah Region, seven localities– Augusta, Buena Vista, Harrisonburg, Highland, Rockbridge, Rockingham, Staunton and Waynesboro- were included in a federal major disaster declaration (DR-1491). Augusta County received the most rainfall and Rockbridge County received the most damage due to severe flooding along the South River. In Augusta County, the heaviest rain occurred in the Sherando area, which is located at the foothills of the Blue Ridge Mountains. The Upper Sherando monitoring station recorded a rainfall total of 20.6 inches. In Augusta County, damage estimates equaled $2.2 million (2019 dollars). For the City of Waynesboro, damages equaled $1.39 million (2019 dollars). The South River at Waynesboro crested at 13.46 feet, above flood stage of 9.5 feet. In Staunton, damages were minimal, but one death occurred as a result of carbon monoxide poisoning from the improper use of a generator.
August 8, 2003	Flooding occurred in the City of Staunton after a thunderstorm cell stalled out over Staunton's downtown area, dropping between 4-6 inches of rain in an hour. This heavy rainfall caused structures downtown to fill with 2 - 7 feet of water. Floodwaters receded within several hours leaving $1.8 million (2019 dollars) in damages to 55 businesses and up to 70 homes. Gypsy Hill Park and the City's Johnson Street parking garage also sustained damage. In Augusta County, countywide impacts occurred from the storm.
June 21-22, 2018	A stalled out front caused flooding and damage in Rockingham County and the City of Staunton. In Staunton, a flash flood damaged two homes, four businesses, two vehicles and park amenities at Gypsy Hill Park.

Flood	Description and Damages
September 9-28, 2018	Hurricane Florence, a category 4 hurricane which downgraded to a tropical depression, widespread flooding in Staunton, Waynesboro and Augusta County closing roads and causing property damage.
June 29-30, 2019	Severe storms resulted in flooding, landslides and mudslides. Augusta, Highland, Rockingham, Harrisonburg, Staunton and Waynesboro were included in an agricultural disaster declaration (4455).
August 8 and 22, 2020	In August 2020, two greater than 500-year storms (0.02% annual chance, each) hit the City of Staunton and surrounding area just two weeks apart, causing massive flooding and millions of dollars of damage to downtown businesses. The City of Staunton received over a foot of rainfall in the month of August from just these two systems alone. On Saturday August 8th, precipitation estimates from the KLWX doppler radar were around 2-3 inches over Staunton. However, localized rainfall amounts of 6 inches or more were observed, with the worst hit area being the northwest side of town. The flooding caused $3.1 million of damage and impacted 164 properties. There was flooding throughout downtown Staunton and into Gypsy Hill Park. It was reported that water was as deep as 5-7′ in the Warf area downtown. Saturday August 22nd a second extreme rainfall event hit the City of Staunton, with radar estimated anywhere from 2-4 inches of rainfall across the City of Staunton. Locally higher amounts over 6 inches fell in portions of the City once again. The major impacts of the flooding occurred in the Wharf District along Byers Street where several establishments experienced high water conditions.

Appendix C - Community Survey Results

This section presents the results of the community survey that was open from July 1 through August 1, 2025.

Appendix D – Project Readiness Evaluation Factsheets

Programmatic Project Readiness Evaluation Factsheet

Project Name:
Date Identified:
Complaint Driven: ☐ No ☐ Yes (add details below as appropriate)

Project Description/Summary:

Cost Estimate

Breakout: Program development:_____
Long-term (e.g. personnel):_____

Are funding opportunities identified? Does this program require additional funding by citizens (i.e. tax/fee increases) or have other costs (including property use restrictions) been evaluated?

Benefits Evaluation

Has scale of benefit been evaluated? (e.g. # households/businesses benefitting, # negatively impacted)
☐ No ☐ Yes (add details below as appropriate)

Does the project address critical infrastructure protection (related to funding opportunities)?
☐ No ☐ Yes (add details below as appropriate)

Does the project benefit socially vulnerable groups (related to funding opportunities)?
☐ No ☐ Yes (add details below as appropriate)

Does the project address MS4/TMDL pollutant goals (related to funding opportunities)?
☐ No ☐ Yes (add details below as appropriate)

Does the project impact NFIP participation goals (related to funding opportunities)?
☐ No ☐ Yes (add details below as appropriate)

Does this fix a problem that will get more challenging over time if not implemented in a timely manner? (e.g. land cover change, climate model predictions, etc.)
☐ No ☐ Yes (add details below as appropriate)

Does the project provide revenue generation or open funding access for other projects?
☐ No ☐ Yes (add details below as appropriate)

Does the project facilitate future projects?
☐ No ☐ Yes (add details below as appropriate)

Have the impacts on future land development been assessed?
☐ No ☐ Yes (add details below as appropriate)

Project Name:

Readiness Checks

Have maintenance needs been assessed? (e.g. database, accounting)

☐ No ☐ Yes (add details below as appropriate)

Can/should the project be lumped with other projects for efficiency/funding?

☐ No ☐ Yes (add details below as appropriate)

Is there supportive political will behind the project/effort?

☐ No ☐ Yes (add details below as appropriate)

Has an educational/outreach strategy been developed?

☐ No ☐ Yes (add details below as appropriate)

Is data/information still needed to improve project readiness?

☐ No ☐ Yes (add details below as appropriate)

This factsheet should be used to evaluate the potential impact and readiness of individual projects in a flexible manner to help staff prioritize effort and funding efficiently. It can help staff understand if a project can easily move forward once funding is secured, if it only needs a small amount of effort to then move forward, or if it has a fundamental flaw(s) that need to be addressed before proceeding. This serves as an organizational tool as well as a form of documentation for maintaining records. It is anticipated that once a subset of projects are adequately ready to progress, they can be shifted to a 'shortlist' set of projects to be implemented based on funding availability/opportunities.

Completed by (Name, Date):
Updated:

Structural Project Readiness Evaluation Factsheet

Project Name:
Location:
Date Identified:
Complaint Driven: ☐ No ☐ Yes (add details below as appropriate)

Project Description/Summary:

Cost Estimate

Breakout: Design_____
Land/easement:_____
Construction_____

Are funding opportunities identified?

Benefits Evaluation

Has scale of benefit been evaluated? (e.g. # households/businesses benefitting, # negatively impacted)
☐ No ☐ Yes (add details below as appropriate)

Does the project address critical infrastructure protection (related to funding opportunities)?
☐ No ☐ Yes (add details below as appropriate)

Does the project benefit socially vulnerable groups (related to funding opportunities)?
☐ No ☐ Yes (add details below as appropriate)

Does the project address MS4/TMDL pollutant goals (related to funding opportunities)?
☐ No ☐ Yes (add details below as appropriate)

Have nature-based solutions been evaluated to address or supplement the design (related to funding opportunities)?
☐ No ☐ Yes (add details below as appropriate)

Does this fix a problem that will get more challenging over time if not implemented in a timely manner? (e.g. accumulating damages, climate model predictions, etc.)
☐ No ☐ Yes (add details below as appropriate)

Is the situation part of a network problem that can be addressed better elsewhere? (i.e., has this been assessed as part of the greater network – for example, is sediment accumulation that needs cleared simply going to come back due to erosion that can be addressed at the source?)
☐ No ☐ Yes (add details below as appropriate)

Are native plants prioritized?

☐ No ☐ Yes (add details below as appropriate)

Are there additional benefits or can those be incorporated into design? (e.g. recreation, safety)
☐ No ☐ Yes (add details below as appropriate)

Readiness Checks

Are there construction access concerns?
☐ No ☐ Yes (add details below as appropriate)

Are there infrastructure conflicts?
☐ No ☐ Yes (add details below as appropriate)

Will easements need to be obtained prior to construction?
☐ No ☐ Yes (add details below as appropriate)

Have maintenance needs been assessed? (e.g. landscaping, signage, equipment, infrastructure)
☐ No ☐ Yes (add details below as appropriate)

Can/should the project be lumped with other projects for efficiency/funding?
☐ No ☐ Yes (add details below as appropriate)

Is data/information still needed to improve project readiness?
☐ No ☐ Yes (add details below as appropriate)

Are there any regulations or restrictions that may prevent/ delay work or make the project approach infeasible (e.g. time of year restrictions or FEMA restrictions)?
☐ No ☐ Yes (add details below as appropriate)

This factsheet should be used to evaluate the potential impact and readiness of individual projects in a flexible manner to help staff prioritize effort and funding efficiently. It can help staff understand if a project can easily move forward once funding is secured, if it only needs a small amount of effort to then move forward, or if it has a fundamental flaw(s) that need to be addressed before proceeding. This serves as an organizational tool as well as a form of documentation for maintaining records. It is anticipated that once a subset of projects are adequately ready to progress, they can be shifted to a 'shortlist' set of projects to be implemented based on funding availability/opportunities.

Completed by (Name, Date):
Updated: