

Virginia Community Flood Preparedness Fund Grant Application

April 8, 2022

Hydrology and Hydraulic Studies of Floodplains to update FEMA Flood Insurance Rate maps (FIRMS) for the Town of Front Royal



Town of Front Royal



Town of Front Royal, Virginia

Town of Front Royal

102 East Main Street

Front Royal, VA 22630

Phone: 540-635-8007

1. Community Information and Grant Application Category

The Town of Front Royal is located within a Virginia Opportunity Zone (Census Tract ID: 51187020601)

Community Identification Number (CID #): 510167 – Town of Front Royal, Warren County

Virginia Vulnerability Social Index- Front Royal, VA: 0.2

Grant Category: B. Studies

1.1 Introduction

The Town of Front Royal (Warren County, VA) is located within the Shenandoah River Watershed a major contributing member of the Potomac River, and ultimately the Chesapeake Bay. Front Royal was one of the first areas of the Shenandoah Valley to become occupied by European settlements, due to the confluence of the South Fork and the North Fork Shenandoah Rivers, which served as a main point of commerce in the Valley. (**Fig. 1**). Besides the North and South Fork of the Shenandoah River, Cabin Run, Leach Run and Happy Creek, there are watersheds within the Town limits, which contribute to significant flooding.

The South Fork Shenandoah River begins at the confluence of the North River and South River near Port Republic and flows north 97 miles to meet the North Fork Shenandoah at the Town of Front Royal. The South Fork Shenandoah watershed covers 1,659 square miles. Much of the western boundary of the Town abuts the South Fork, while a small northern portion abuts the North Fork of the Shenandoah. The Town is located at within -78.2205 to -78.1414 longitude and 38.8919 to 38.9538 latitude. Based on [census of 2020](#), the population is 15,011.

There are 1,329 parcels in Front Royal (~25% of total households) that are susceptible to being severely affected by flooding (see **Fig. 2** for the FEMA Flood Hazard Layer). Although flood risk can never be eliminated, communities can develop policies to help minimize impacts to the

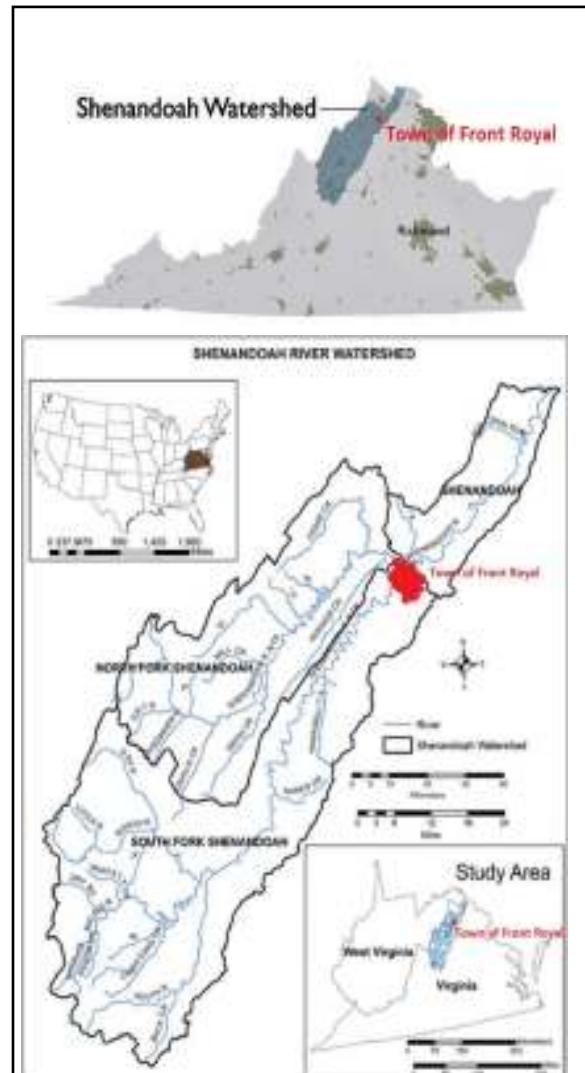


Fig. 1. Town of Front Royal location within the Shenandoah Watershed.

public during floods, through an updated flood study of the major watersheds within the community.

With the planning tools of a modern and relevant flood study, more informed decisions in the extent of flood risk within the community can be realized. The National Flood Insurance Program allows communities to develop planning tools to reduce the risk of flooding, which also allow for lower flood insurance costs that can be shared with the community.



Fig. 2 FEMA's National Flood Hazard Layer (NFHL) at Town of Front Royal

The current Flood Insurance Rate Map (FIRM) shows the flood zones at the Town of Front Royal are 51187C0103C, 51187C0104C, 51187C0108C, 51187C0110C, 51187C0111C, 51187C0112C, 51187C0115C, 51187C0116C, 51187C0117C and 51187C0118C. Most of the flood zone delineations were initially evaluated in 1974 and the flood hazard boundary map revised in 1976 and then in 1988 the entire study was converted to the North American Vertical Datum of 1988 (NAVD 88) but it has not been updated since then. Thus, the hydrology and hydraulics evaluations of the special flood hazard areas (SFHAs) has not been re-evaluated for over 45 years.

1.2 The Impacts of Historical Floods

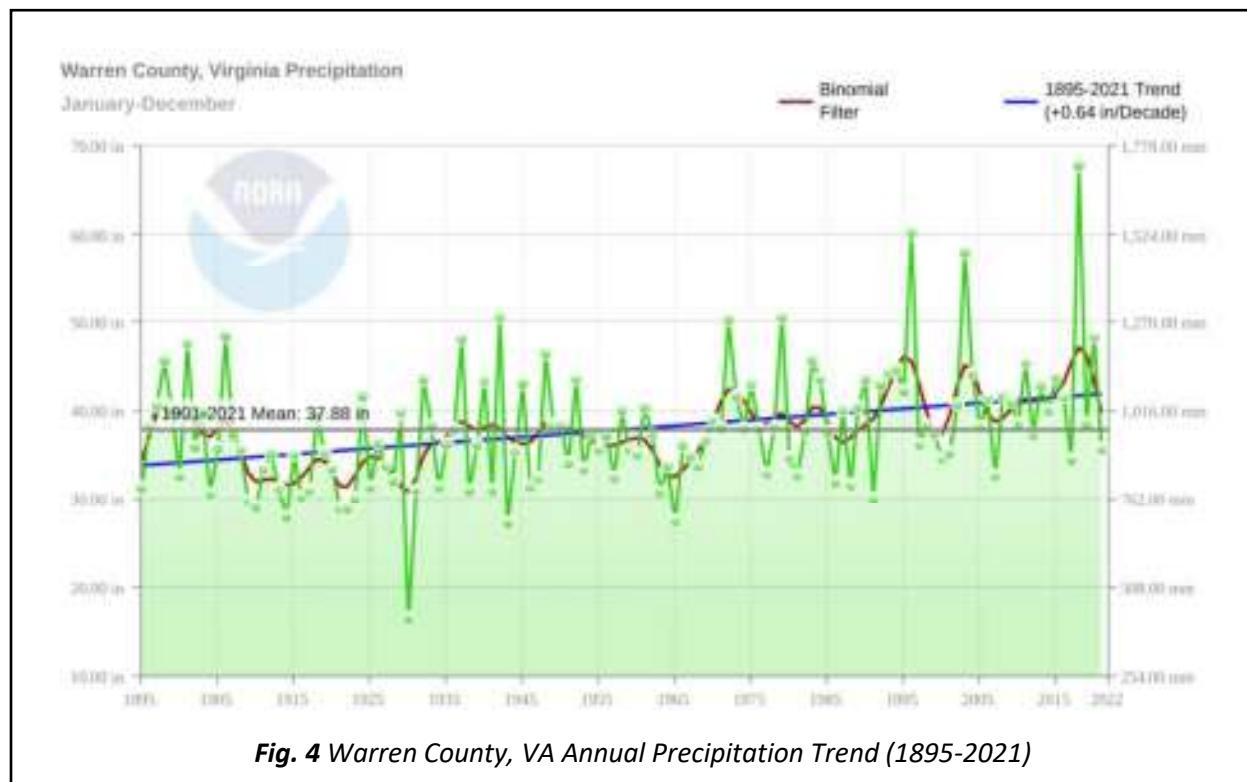
The Shenandoah River has contributed to major flood events, historically speaking. The five largest flood events on record, have occurred in 1943, 1996, 1986, 1936, and 1902.

Water Year	Date	Gage Height (feet)	Stream-flow (cfs)
1943	1942-10-16	34.80	130,000
1996	1996-09-07	32.57	121,000
1986	1985-11-06	32.43	120,000
1936	1936-03-18	26.01	98,000
1902	1902-03-01	21.50 ³	76,800
1972	1972-06-22	23.98	75,100
1955	1955-08-19	22.54	68,200
1973	1972-10-07	21.35	62,500
1949	1949-06-19	19.20	52,900
1937	1937-04-27	18.94	51,500
1975	1975-03-20	18.74	50,500
1987	1987-04-18	18.51	49,400

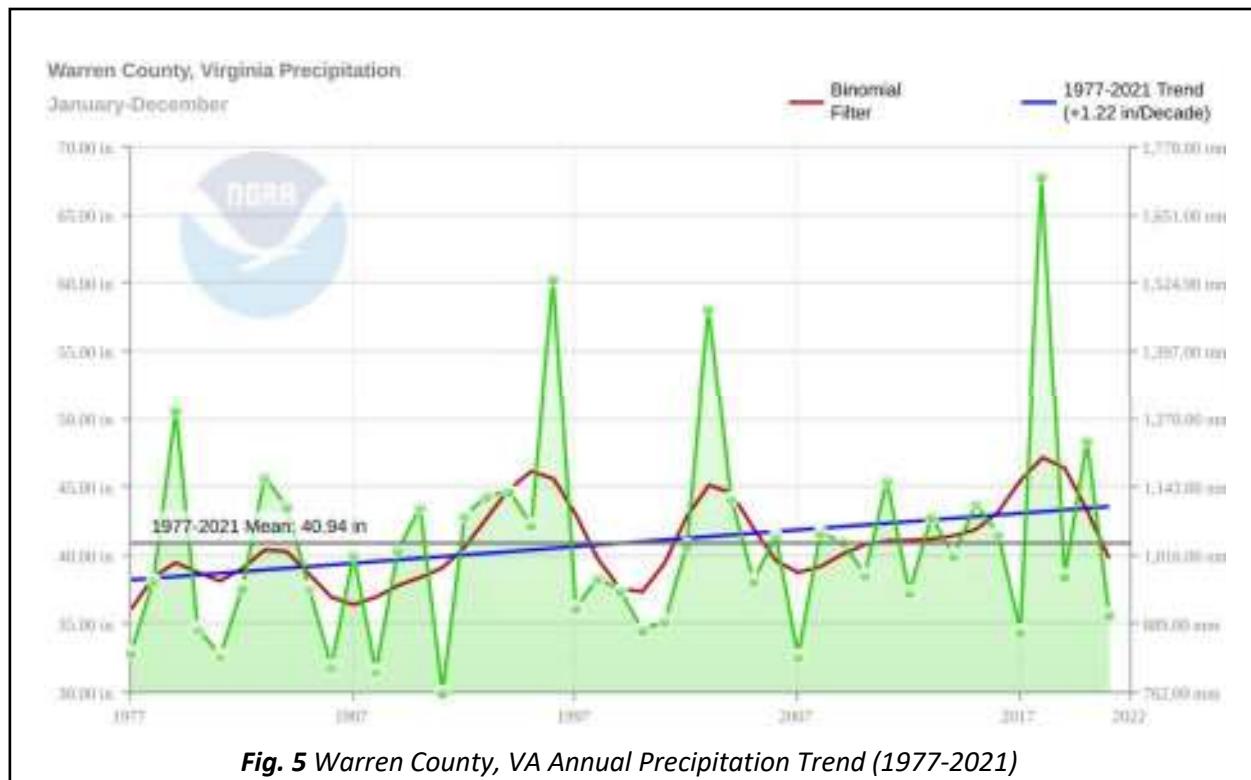
Fig. 3 Peak Annual Flow (cfs) SF Shenandoah River at Front Royal, VA

In September 2003, flooding was reported in Shenandoah Farms along the Warren County border. The following roads closed by high water included Happy Creek Road, Route 55 East, Free Land Road, Morgan Hollow Road, and Newton Road. The South Fork of the Shenandoah River rose above its flood stage of 12 feet at Front Royal caused the worst flooding in over 20 years which led to inundate many homes and businesses and force many evacuations along the river. The high density of urban and suburban development within this watershed, including a high percentage of impervious surfaces, have significantly contributed to the severity of this and other more recent flooding events. The frequent and larger flooding events in the past century were primarily a result of the pronounced increase in precipitation from 1930 to 2018. The average annual precipitation for Virginia is increasing at a rate of more than 1 inch every 10 years. In fact, the frequency of days having one inch of rainfall has nearly doubled.

1.3 The Necessity of this Study Flood risks each year are increasing due to a number of climatic, environmental, and planning related changes. The risks related to floods also disproportionately impact low-income residents more than higher income residents. This is recognized by the Virginia Department of Environmental Quality statement on climate, as “impacts of climate change, which not only affect the environment, but also human health”.



While the Town of Front Royal is located many hundreds of miles inland of any tidal waters of the Atlantic Ocean and Chesapeake Bay, the influence of climate change does directly influence many climatic weather conditions here. Above, is a trend analysis of the recorded annual precipitation from 1895 to 2021. Whereby, when averaging the annual rainfall from 1895 to 2021, the past century has a trend of annual precipitation increasing 0.64 inch per decade (**Fig. 4**). It is easy to observe in the above graphic that occurrence and magnitude of recorded annual precipitation is increasing within the last 40 years. In **Fig. 5**, below, the trend analysis of the recorded annual precipitation for a shorter time period of 1977 to 2021 shows the trend of annual precipitation increasing 1.22 inch per decade. Considering precipitation directly contributes to stream flow, an increase in annual precipitation and intensity of events will require flood studies of the major streams within the Town of Front Royal limits to be updated to ensure flood mapping is up to date and future planning for growth is properly informed of the flood risks around major floodplain areas.



Changing environment means higher sea levels, new weather patterns, and stronger storms. As the atmosphere warms, there is more evaporation, and consequently, more water available when it rains. A warmer atmosphere also means warmer oceans, which can intensify flooding from hurricanes and offshore storms. Sea level rise also increases coastal flood risks, as higher sea levels mean there is more water available when high tides and coastal storms cause flooding. Adaptation at the local, state, and federal levels is often more effective and cost-efficient than individual efforts, but each plays an important role in reducing physical and financial flood risks. Town of Front Royal is considered a low-income community since the median household income (\$51.9 K)¹ is less than 70% of the state median household income (\$74.2 K)². The area is also located within the moderate social vulnerability range according to the Virginia vulnerability viewer³.

The current FIRMs showing the Special Flood Hazard Areas (SFHA) flood zones (A, AE and X) for the Town of Front Royal were prepared mostly in 1988. Accordingly, the updated rainfall data

¹ U.S. Census, <https://www.census.gov/quickfacts/fact/table/frontroyaltownvirginia/INC110219>

² U.S. Census, <https://www.census.gov/quickfacts/fact/table/VA,US/INC1102193>

³ https://cmap2.vims.edu/SocialVulnerability/SocioVul_SS.html

should be applied to do the hydrology and hydraulic modeling and assessment to revise the FIRMs in the region.

A recent hydrologic and hydraulic analysis was performed for a possible bridge replacement for the 8th street bridge over Happy Creek, a FEMA Zone AE floodplain. The Town's civil engineering consultant, RK&K, requested the effective flood analysis from FEMA for Happy Creek observed a number of items in the effective study which highlights a need to revisit the floodplain analysis in the Town. The first item of concern is the hydrology used for flood study on Happy Creek was derived from a statistical analysis of a gauge along Happy Creek, which no longer exists. Secondly, the gauge record for this former gauge was only for 28 years (1949 to 1977). Generally, good engineering practice indicates statistical based analysis of gauges should use closer to 50 years of gauge record to accurately derive the correct flow values to be used to establish the 100-year flood event, or 1% return interval. RK&K also highlighted to the Town that a comparison of the gauge record for Happy Creek versus the historical gauge record of the South Fork of Shenandoah River, an active USGS gauge (01631000), would indicate the Happy Creek gauge missed the top five flood events recorded on the SF Shenandoah River (1943, 1996, 1986, 1936, and 1902).

2. Scope of Work Narrative - Studies

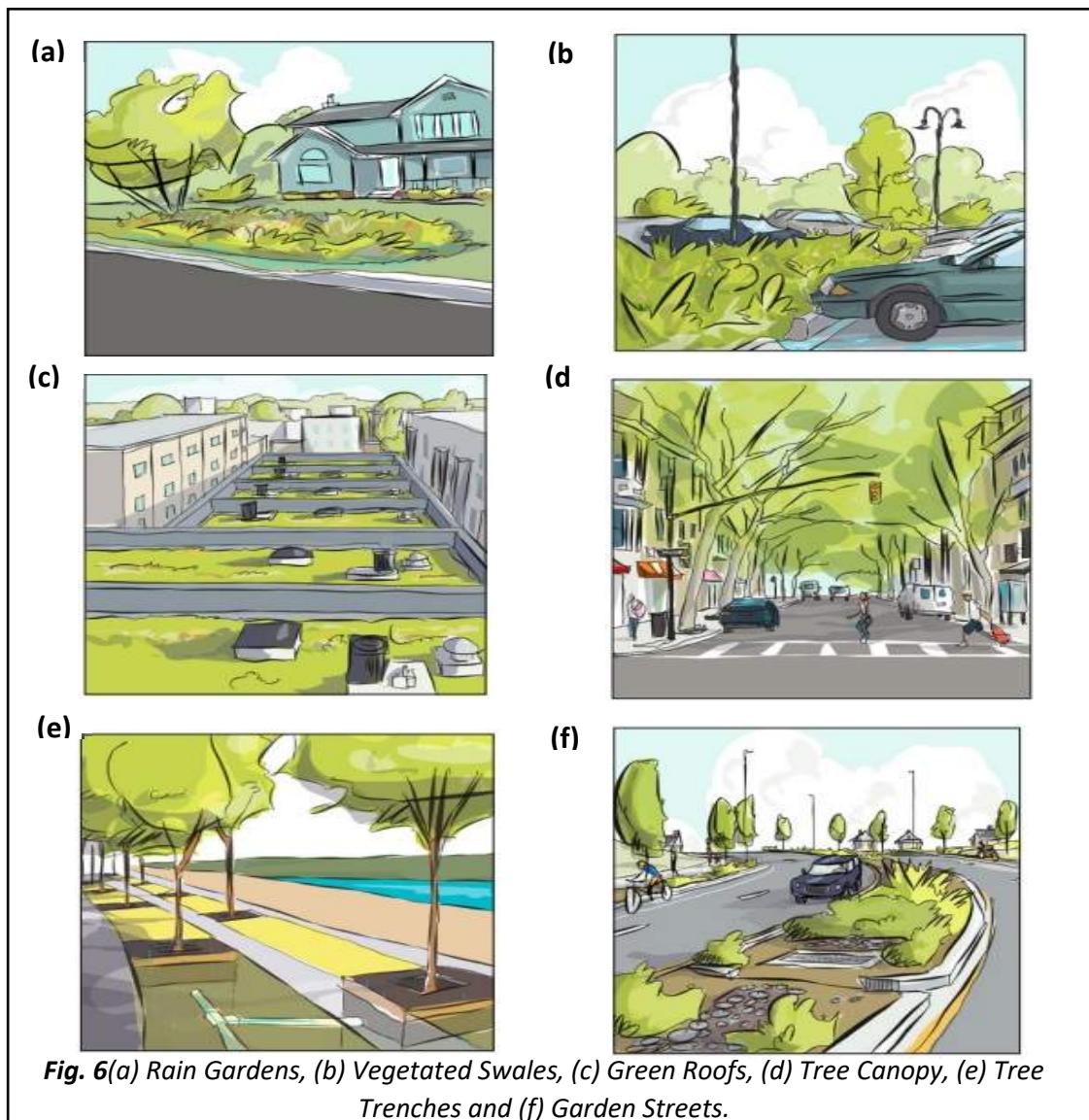
The hydrologic and hydraulic analyses for the Flood Insurance Study (FIS), dated July 15 1988, was prepared by the USGS for the Federal Emergency Management Agency (FEMA) under Inter-Agency Agreement No. EMW-84-1548. This work was completed in June 1986. The hydraulic analyses for the streams were conducted by approximate methods in the Town of Front Royal which were determined through using the USGS WSPRO computer program.

1. Specific type of study proposed including whether the study is new or updates a prior study:

New spatially distributed hydrological and hydraulic models will be developed for the watersheds and main streams within the Town of Front Royal. Specifically, the study will utilize HEC-HMS using NOAA Atlas 14 rainfall distribution curves applicable to the Town's zone and associated rainfall depths published in NOAA Atlas 14. The hydraulic model will be a 1-D HEC RAS model. The model will include the river structure and geometry allowing an analysis of the historical behavior of the watershed-river system. Furthermore, the model will continuously map the flood extent for the river floodplain during the past events as well as for specific scenarios (e.g., 25-yr event). This tool will then be used to provide recommendations on flood mitigation and planning. The project will be a steppingstone for a real time forecasting tool, which not only predicts the stage levels at selected locations, but also the areas that are predicted to be inundated and accordingly all the FIRMs will be updated. Successful fulfilment of the proposed project will also enable the community to apply for indexing in CRS, which will allow for lower flood insurance premiums to be made available to properties located within the regulated floodplains.

2. Relationship of Study to the local Government's needs for flood prevention and protection, equity, community improvement, identification of nature-based solutions or other priorities contained in this manual:

The proposed study will investigate the highly flood prone areas in the Town through various flooding scenarios using the developed hydrology and hydraulic models. It will re-establish floodplain limits and magnitudes within the Town's study limits. We will then propose site appropriate rainwater management solutions which will built into sites, corridors, or neighborhoods without requiring significant space. Any rainwater capture and treatment facilities will enable predicted flood flows to be maintained or decreased over time, especially with any in-fill and re-development projects. Thereby reducing future damage related to flooding, especially properties located in flood prone areas of the Town. **Fig. 6** depicts examples of nature-based rainwater management solutions which will be considered in this study.



3. Qualifications of the individuals or organizations charged with conducting the study or the elements of any request for proposal that define those qualifications:

The Town of Front Royal Manager, Steven Hicks, oversees all the Town's operations and employees. Some of the more specific responsibilities of this office include but are not limited to: Preparation of the annual budget; Preparation of Town Council agendas; Authorization of notices; Authorization of specific permits; Updating the Front Royal website; Updating the Town Code; and preparing a Quarterly Newsletter to Citizens. He also oversees the Planning Department, which is responsible for updating, administering, and enforcing the floodplain ordinance within the Town. The planning department will utilize an engineering consultant with specialized experience in conducting FEMA Letters of Map Revision (LOMR), utilizing HEC HMS and HEC RAS, with interfacing in the GIS environment for floodplain and floodway mapping to FEMA standards.

4. The expected use of the study results in the context of the local resilience plan or, in the case of regional plans, how the study improves any regional approach:

Currently, there is no available local flood protection resilience plan. The proposed restudy will provide a complete hydrology and hydraulic model of the special hazard areas. The output data set can be used by Warren County for upstream and downstream portions of Shenandoah River, Happy Creek, and Leach Run. Moreover, the updated flood data can be utilized by neighboring upstream and downstream communities, which also have outdated studies.

5. If applicable, how the study may improve Virginia's flood protection and prevention abilities in a statewide context:

The modeling methodology and application procedures in this study will revise and re-establish the floodplain based on updated FIRMs to maintain compliance with the NFIP and to incorporate higher standards that may reduce the risk of flood damage. This also enables the community to join a voluntary incentive CRS program that recognizes and encourages community floodplain management practices exceeding the minimum requirements of the NFIP. Currently, over 1,500 communities participate nationwide in the program. In CRS communities, flood insurance premium rates are discounted reflecting the reduced flood risk resulting from the community's efforts. The efforts seek to address the three goals of the program: reduce and avoid flood damage to insurable property, strengthen and support the insurance aspects of the National Flood Insurance Program, and foster comprehensive floodplain management.

2.1 Deliverables and outcomes

- 1. A validated GIS-based watershed/river model for the Town of Front Royal:** This model will be used for further flood impact studies and sensitivity analysis related to planned development encroachments near floodplains.

2. Assessment of the watershed issues using the developed model

We will investigate the updated flood zones and effect of the nearby structures on heavily affected regions, as vulnerability assessments and propose action-oriented approaches, to bolster flood preparedness and nature-based resilience solutions.

3. Final report: It will summarize the application, calibration, and validation of the hydrological/hydraulic model to the Town of Front Royal and discuss the implications of the model results and recommendations for flood mitigation and nature-based solutions. All the FEMA Flood Insurance Rate Maps, Flood Profiles, Discharge Tables, and FIS narratives within the Town will need to be updated. The modeling methodology and application procedures will utilize industry standard models and techniques, future engineers and planners can continue to utilize for the foreseeable future.

Application in real-time forecasting and emergency management

The validated model will be able to predict the extent of the flood for any rainfall scenario in the past or future. In this study, we will simulate historical events and floods with different return periods (2-yr, 10-yr, 25-yr, 50-yr, 100-yr and 500-yr), however, the development and maintenance of a real-time web-based forecasting model needs additional analysis and study. Accordingly, for the next phase, this can be done based on the work that will be developed in this study.

Stakeholder process, coordination, and management plan

With the development of new flood mapping and studies, a public notice and public hearing regarding the new flood maps will be anticipated.

3. Approach, Milestones, and Deliverables

The expected duration of the project is 20 months with the following schedule:

- 1. Start (July 1, 2022)**
- 2. Integrated watershed/river model development (October 2022):** The US Army Corp of Engineers, Hydrological Engineering Center, Hydrological Modeling System and River Analysis System, integrated to ArcGIS, will be used for this task.
- 3. Incorporation of hydraulic structures in the models (December 2022):** An advantage of the modeling systems is its ability to include river and watershed structures. The detail geometry of each structure is necessary for this step. During this task, hydraulic structures will be incorporated in the model.

4. ***Validations against historical events (January 2023):*** Using historical rainfall and runoff data at gauging stations, the models will be first calibrated for a portion of the data and then will be validated against the rest of the data.
5. ***Simulation of extreme events and sensitivity analysis (February 2023):*** By employing the validated model, predictions of the top ranked extreme events and 10/25/50/100/500-yr water levels will be provided at selected gauging stations. Other scenarios which might be of interest of stakeholders will be also modeled.
6. ***Writing the report and delivery of the final model (February 2023):*** For the development and validation of watershed and river models, many types of data are required including watershed Digital Elevation Model, land use, soil type, rainfall data, river geometry (Cross Sections), geometry of river/watershed structures, and stream flow data. This project will use the most recent available data; no surveying or field data will be included in this effort.
7. ***Coordination with FEMA for Approval of FIRMS (March 2023):*** Submit to FEMA LOMR package for updated hydrology and hydraulic modeling, mapping, floodway analysis.
8. ***Public Outreach (May 2023):*** Conduct a public hearing regarding the update FEMA maps for final approval. This will include a public notice in the local newspaper to review the updated maps.
9. ***Obtain official FEMA Approval of update mapping and hydrology (December 2023):*** With approval of the updated mapping and study, the project close out will be conducted with supporting documentation archived by the Town of Front Royal Planning Department.

8.Budget

The anticipated budget for this study is \$100,000. The use of these funds will be used to procure the professional services of the Town's engineering consultant to perform the hydrologic and hydraulic analysis, with updated flood insurance mapping, and GIS shapefiles of the revised floodplains.

- **Estimated Total Cost: \$100,000**
- **Amount of Funds Requested from the Fund: \$90,000**
- **Amount of cash funds available: \$10,000**
 - Authorization to request funding is attached in Appendix D-8-
Authorization to request funding from the Fund from governing body of
the local government

Appendices:

Appendix A: Application Form for Grant Request

Appendix B: Scoring Criteria for studies

Appendix C: Checklist for All Categories

Appendix D: Supporting Documentation

1. Detailed map of the project area (s)
2. FIRMette of the project Area(s)
 - a. FIRM Panels:
 - i. 51187C0103C, 51187C0104C, 51187C0108C,
51187C0110C, 51187C0111C, 51187C0112C,
51187C0115C, 51187C0116C, 51187C0117C and
51187C0118C
 3. Historic flood damage data and/or images
 4. Copy of current floodplain ordinance
 5. Link to current hazard mitigation plan
 6. Link to current comprehensive plan
 7. Social vulnerability index scores for project area
 8. Authorization to request funding from the Fund from governing body
of the local government

Appendix A: Application Form for Grant Requests for All Categories

Appendix A: Application Form for Grant Requests for All Categories

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

Name of Local Government:

Town of Front Royal, VA

Category of Grant Being Applied for (check one):

Capacity Building/Planning

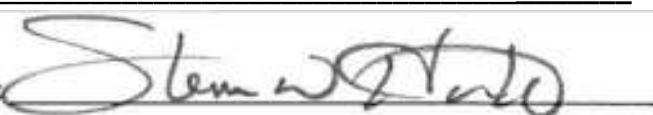
Project

Study

NFIP/DCR Community Identification Number (CID) 510167

If a state or federally recognized Indian tribe, Name of tribe _____

Name of Authorized Official: Steven Hicks

Signature of Authorized Official: 

Mailing Address (1): 102 East Main Street

Mailing Address (2): _____

City: Front Royal State: VA Zip: 22630

Telephone Number: (540) 635-8007 Cell Phone Number: () _____

Email Address: shicks@frontroyalva.com

Contact Person (If different from authorized official): Lauren Kopishke

Mailing Address (1): 102 East Main Street

Mailing Address (2): _____

City: Front Royal State: VA Zip: 22630

Telephone Number: (540)635-4236 Cell Phone Number: (____) _____

Email Address: lkopishke@frontroyalva.com

Is the proposal in this application intended to benefit a low-income geographic area as defined in the Part 1 Definitions? Yes X No _____

Categories (select applicable project):

Project Grants (Check All that Apply)

- Acquisition of property (or interests therein) and/or structures for purposes of allowing floodwater inundation, strategic retreat of existing land uses from areas vulnerable to flooding; the conservation or enhancement of natural flood resilience resources; or acquisition of structures, provided the acquired property will be protected in perpetuity from further development.
- Wetland restoration.
- Floodplain restoration.
- Construction of swales and settling ponds.
- Living shorelines and vegetated buffers.
- Structural floodwalls, levees, berms, flood gates, structural conveyances.
- Storm water system upgrades.
- Medium and large scale Low Impact Development (LID) in urban areas.
- Permanent conservation of undeveloped lands identified as having flood resilience value by *ConserveVirginia* Floodplain and Flooding Resilience layer or a similar data driven analytic tool.
- Dam restoration or removal.
- Stream bank restoration or stabilization.
- Restoration of floodplains to natural and beneficial function.
- Developing flood warning and response systems, which may include gauge installation, to notify residents of potential emergency flooding events.

Study Grants (Check All that Apply)

- Studies to aid in updating floodplain ordinances to maintain compliance with the NFIP or to incorporate higher standards that may reduce the risk of flood damage. This must include establishing processes for implementing the ordinance, including but not limited to, permitting, record retention, violations, and variances. This may include revising a floodplain ordinance when the community is getting new Flood Insurance Rate Maps (FIRMs), updating a floodplain ordinance to include floodplain setbacks or freeboard, or correcting issues identified in a Corrective Action Plan.
- Revising other land use ordinances to incorporate flood protection and mitigation goals, standards and practices.
- Conducting hydrologic and hydraulic studies of floodplains. Applicants who create new maps must apply for a Letter of Map Revision or a Physical Map Revision through the Federal Emergency Management Agency (FEMA). For example, a local government might conduct a hydrologic and hydraulic study for an area that had not been studied because the watershed is less than one square mile. Modeling the floodplain in an area that has numerous letters of map change that suggest the current map might not be fully accurate or doing a detailed flood study for an A Zone is another example.
- Studies and Data Collection of Statewide and Regional Significance.
- Revisions to existing resilience plans and modifications to existing comprehensive and hazard.
- Other relevant flood prevention and protection project or study.

Capacity Building and Planning Grants

- Floodplain Staff Capacity.
- Resilience Plan Development
 - Revisions to existing resilience plans and modifications to existing comprehensive and hazard mitigation plans.
 - Resource assessments, planning, strategies and development.
 - Policy management and/or development.
 - Stakeholder engagement and strategies.

Location of Project (Include Maps): Town of Front Royal, VA- See Appendix D-1

NFIP Community Identification Number (CID#):(See appendix F) 510167

Is Project Located in an NFIP Participating Community? Yes No

Is Project Located in a Special Flood Hazard Area? Yes No

Flood Zone(s) (If Applicable): Zones A, AE, and X

Flood Insurance Rate Map Number(s) (If Applicable): 51187C0110C, 51187C0111C, 51187C0112C, 51187C0115C, 51187C0116C, 51187C0117C and 51187C0118C

Total Cost of Project: \$100,000

Total Amount Requested \$90,000

Appendix B: Scoring Criteria for Studies

Appendix B: Scoring Criteria for Studies

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

Applicant Name:			
Eligibility Information			
Criterion	Description		Check One
1. Is the applicant a local government (including counties, cities, towns, municipal corporations, authorities, districts, commissions, or political subdivisions created by the General Assembly or pursuant to the Constitution or laws of the Commonwealth, or any combination of these)?			
Yes	Eligible for consideration		<input checked="" type="checkbox"/>
No	Not eligible for consideration		
2. Does the local government have an approved resilience plan and has provided a copy or link to the plan with this application?			
Yes	Eligible for consideration under all categories		
No	Eligible for consideration for studies, capacity building, and planning only		<input checked="" type="checkbox"/>
3. If the applicant is <u>not</u> a town, city, or county, are letters of support from all affected local governments included in this application?			
Yes	Eligible for consideration		
No	Not eligible for consideration		
4. Has this or any portion of this project been included in any application or program previously funded by the Department?			
Yes	Not eligible for consideration		
No	Eligible for consideration		<input checked="" type="checkbox"/>
5. Has the applicant provided evidence of an ability to provide the required matching funds?			
Yes	Eligible for consideration		<input checked="" type="checkbox"/>
No	Not eligible for consideration		
N/A	Match not required		

Studies Eligible for Consideration		<input checked="" type="checkbox"/> Yes	No
Applicant Name:	Town of Front Royal		
Scoring Information			
Criterion		Point Value	Points Awarded
6. Eligible Studies (Select all that apply)			
Revising floodplain ordinances to maintain compliance with the NFIP or to incorporate higher standards that may reduce the risk of flood damage. This must include establishing processes for implementing the ordinance, including but not limited to, permitting, record retention, violations, and variances. This may include revising a floodplain ordinance when the community is getting new Flood Insurance Rate Maps (FIRMs), updating a floodplain ordinance to include floodplain setbacks or freeboard, or correcting issues identified in a Corrective Action Plan.		30	30
Creating tools or applications to identify, aggregate, or display information on flood risk or creating a crowd-sourced mapping platform that gathers data points about real-time flooding. This could include a locally or regionally based web-based mapping product that allows local residents to better understand their flood risk.		15	15
Conducting hydrologic and hydraulic studies of floodplains. Applicants who create new maps must apply for a Letter of Map Revision or a Physical Map Revision through the Federal Emergency Management Agency (FEMA).		35	35
Studies and Data Collection of Statewide and Regional Significance. Funding of studies of statewide and regional significance and proposals will be considered for the following types of studies:			
<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Updating precipitation data and IDF information (rain intensity, duration, frequency estimates) including such data at a sub-state or regional scale on a periodic basis. 		45	45
<ul style="list-style-type: none"> <input type="checkbox"/> Regional relative sea level rise projections for use in determining future impacts. 		45	
<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Vulnerability analysis either statewide or regionally to state transportation, water supply, water treatment, impounding structures, or other significant and vital infrastructure from flooding. 		45	45
<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Flash flood studies and modeling in riverine regions of the state. 		45	45
<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Statewide or regional stream gauge monitoring to include expansion of existing gauge networks. 		45	45

<input checked="" type="checkbox"/> New or updated delineations of areas of recurrent flooding, stormwater flooding, and storm surge vulnerability in coastal areas that include projections for future conditions based on sea level rise, more intense rainfall events, or other relevant flood risk factors.	45	45
<input checked="" type="checkbox"/> Regional flood studies in riverine communities that may include watershed-scale evaluation, updated estimates of rainfall intensity, or other information.	50	50
<input checked="" type="checkbox"/> Regional hydrologic and hydraulic studies of floodplains.	45	45
<input checked="" type="checkbox"/> Studies of potential land use strategies that could be implemented by a local government to reduce or mitigate damage from coastal or riverine flooding.	40	40
○ Other proposals that will significantly improve protection from flooding on a statewide or regional basis	35	
7. Is the study area socially vulnerable? (Based on ADAPT VA's Social Vulnerability Index Score.)		
Very High Social Vulnerability (More than 1.5)	15	
High Social Vulnerability (1.0 to 1.5)	12	
Moderate Social Vulnerability (0.0 to 1.0)	8	8
Low Social Vulnerability (-1.0 to 0.0)	0	
Very Low Social Vulnerability (Less than -1.0)	0	
8. Is the proposed study part of an effort to join or remedy the community's probation or suspension from the NFIP?		
Yes	10	10
No	0	
9. Is the proposed study in a low-income geographic area as defined in this manual?		
Yes	10	10
No	0	
10. Projects eligible for funding may also reduce nutrient and sediment pollution to local waters and the Chesapeake Bay and assist the Commonwealth in achieving local and/or Chesapeake Bay TMDLs. Does the proposed project include implementation of one or more best management practices with a nitrogen, phosphorus, or sediment reduction efficiency established by the Virginia Department of Environmental Quality or the Chesapeake Bay Program Partnership in support of the Chesapeake Bay TMDL Phase III Watershed Implementation Plan?		
Yes	5	
No	0	
Total Points	468	

Appendix C: Checklist All Categories

APPENDIX C: Checklist All Categories

Virginia Department of Conservation and Recreation

Community Flood Preparedness Fund Grant Program

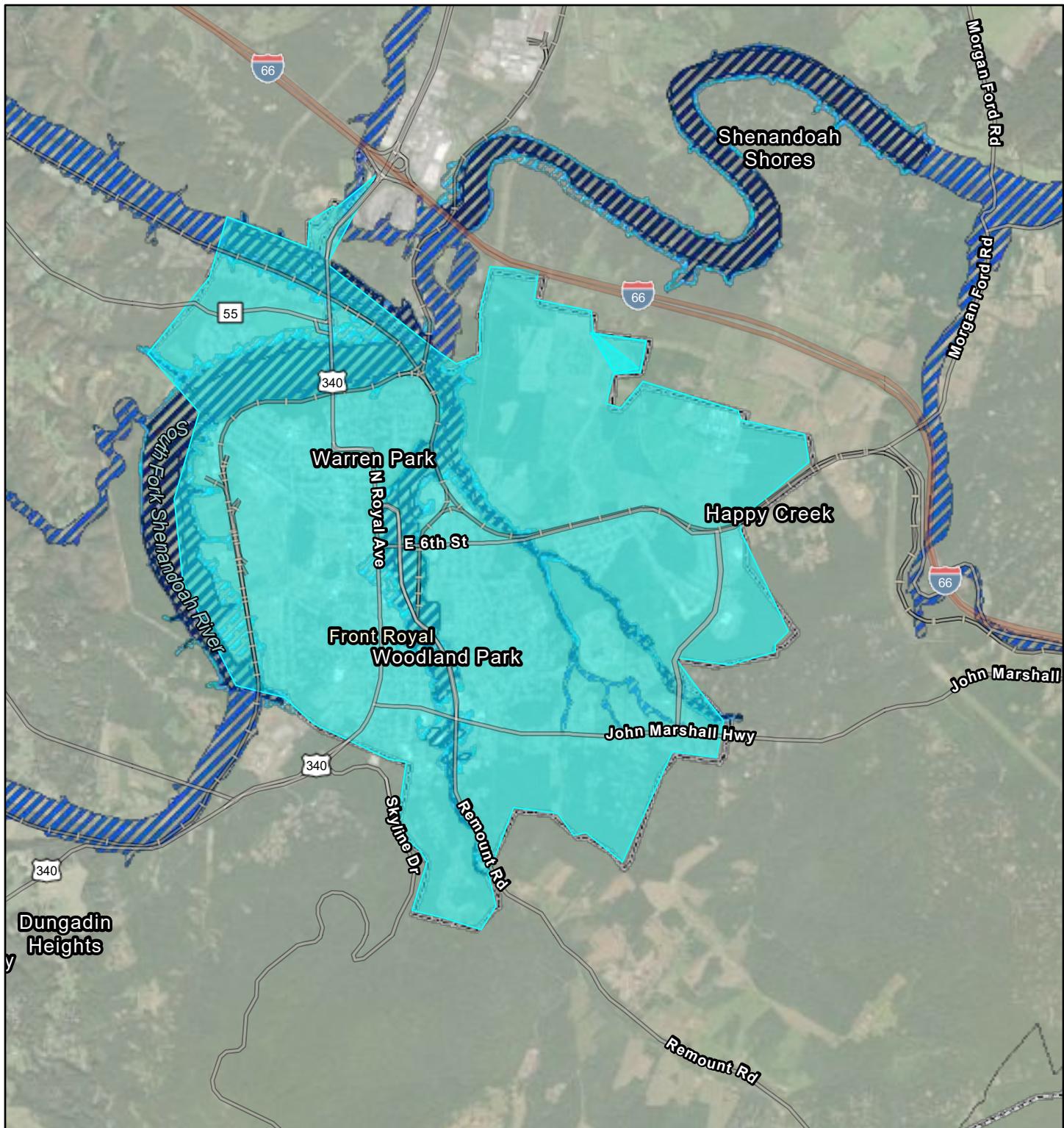
Scope of Work Narrative		
Supporting Documentation	Included	
Detailed map of the project area(s) (Projects/Studies)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
FIRMette of the project area(s) (Projects/Studies)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Historic flood damage data and/or images (Projects/Studies)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
A link to or a copy of the current floodplain ordinance	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Non-Fund financed maintenance and management plan for project extending a minimum of 5 years from project close	<input type="checkbox"/> Yes	<input type="checkbox"/> No
A link to or a copy of the current hazard mitigation plan	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
A link to or a copy of the current comprehensive plan	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Social vulnerability index score(s) for the project area from ADAPT VA's Virginia Vulnerability Viewer	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
If applicant is not a town, city, or county, letters of support from affected communities	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Completed Scoring Criteria Sheet in Appendix B, C, or D	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Budget Narrative		
Supporting Documentation	Included	
Authorization to request funding from the Fund from governing body or chief executive of the local government	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Signed pledge agreement from each contributing organization	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No

Appendix D: Supporting Documentation

9. Detailed map of the project area (s)
10. FIRMette of the project Area(s)
 - a. FIRM Panels:
 - i. 51187C0103C, 51187C0104C, 51187C0108C,
51187C0110C, 51187C0111C, 51187C0112C,
51187C0115C, 51187C0116C, 51187C0117C and
51187C0118C
 11. Historic flood damage data and/or images
 12. Copy of current floodplain ordinance
 13. Link to current hazard mitigation plan
 14. Link to current comprehensive plan
 15. Social vulnerability index scores for project area
 16. Authorization to request funding from the Fund from governing body
of the local government

1. Detailed map of the project area (s)

Front Royal Study Limits



April 6, 2022

1:72,224

0 0.5 1 1.5 2 mi
0 0.75 1.5 3 km

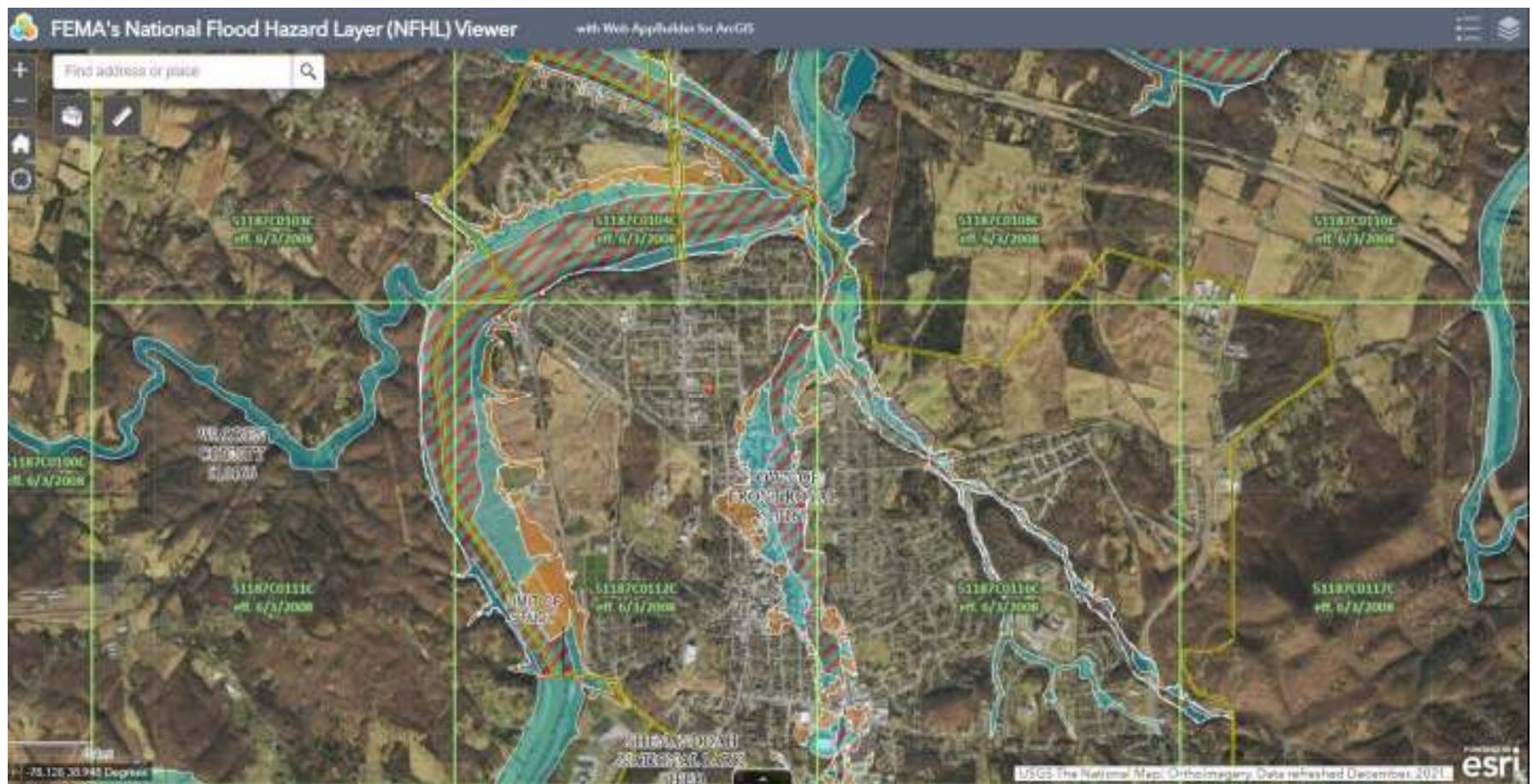
Flood Study Limits

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community.

2. FIRMette of the project Area(s)

a. FIRM Panels:

- i. 51187C0103C, 51187C0104C,
51187C0108C, 51187C0110C,
51187C0111C, 51187C0112C,
51187C0115C, 51187C0116C,
51187C0117C and 51187C0118C



NOTES TO USERS

It is for use in administering the National Flood Insurance Program. It is recommended that all plans related to flooding, particularly those based on the purposes of flood insurance. The accompanying map resolution should be used to determine potential or additional flood hazard information.

more often than not, in areas where Rock Structures have been identified, are implemented in the Fixed Facility and Recovery Cite areas. Examples of these include various types of mobile structures designed with the Rock Inventory Model (RIM) model. These items from the RIM Users Guide should be given the **RIMA** label on the back of mounted wheelchair elevators. These RIMA set standards will provide for a safe source of lifting equipment and will not be used as the sole source of information regarding the use of mobile structures.

use of the **Residence** name composed of three buildings and surrounding grounds. The Residences were based on original construction plans by architects of the National Wood Home Program. Recently completed and active patient Residence sites are planned at the Forest Hospital and the Inverness.

www.hi-m.com. Printed Areas may be submitted by Good
Methods, 7000 S. 130th St., Suite 244, "Wood Products," Milwaukee, WI 53217.
Please Note: Due to limitations on 2004 entries submitted, no fee
will be charged.

position and in the presence of the new one. However, the AT&T study did not find any significant differences between the two groups.

Individuals can make their own assessments of their health knowledge. Variables such as education, gender, profession or marital status were used in this production. The dependent variable may result in slight positive differences in males versus females assessments. These differences are not within the range of statistical significance.

U 7500 These Word documents must be submitted to Microsoft and uploaded/referenced to the same Microsoft account. No communication between the Reference Standard/Original Document or 100% and the Microsoft Word document of note, and the Reference Standard/Original Document is allowed. If contact the Reference Standard/Original Document or

Reference sources
A glossary of terms - PDKA
Using Photo-courses
and online resources

[View Report](#)

All information was derived from available sources. Standardized flow units were used for the hydrograph. Data were plotted by month. Data are from U.S. Geological Survey and provided by USGS, US Department of the Interior.

and road signs for Town of Port Engineering Department, Rogers Co. Commissioners also work

In the case of standard logistic regression programs, two-step iterative and coordinate descent algorithms configurations must allow enough iterations to converge.

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The FRSN Map Service Number at 1-800-226-8888 for information on products associated with the FRSN. Available brochures may include: Early Warning Letters or Value Change, a Financial-Security Study report, and/or a copy of *Financial Security*, The FRSN's Adult Investor Committee's new monthly publication.

Want questions about this map or questions concerning the Universal Education Program in general? Please call 1-877-FIRMA MAP (1-877-367-6267) and ask FEDRA's experts at [FEDRA.org](http://www.fedra.org)!

www.mechanicsinstitute.org | 1933-1934 | 1934-1935

10.000-15.000 €

Journal of Oral Rehabilitation 2003 30: 103–109

10.1002/anie.201907002

10.1002/anie.201907002

10.000-15.000 €

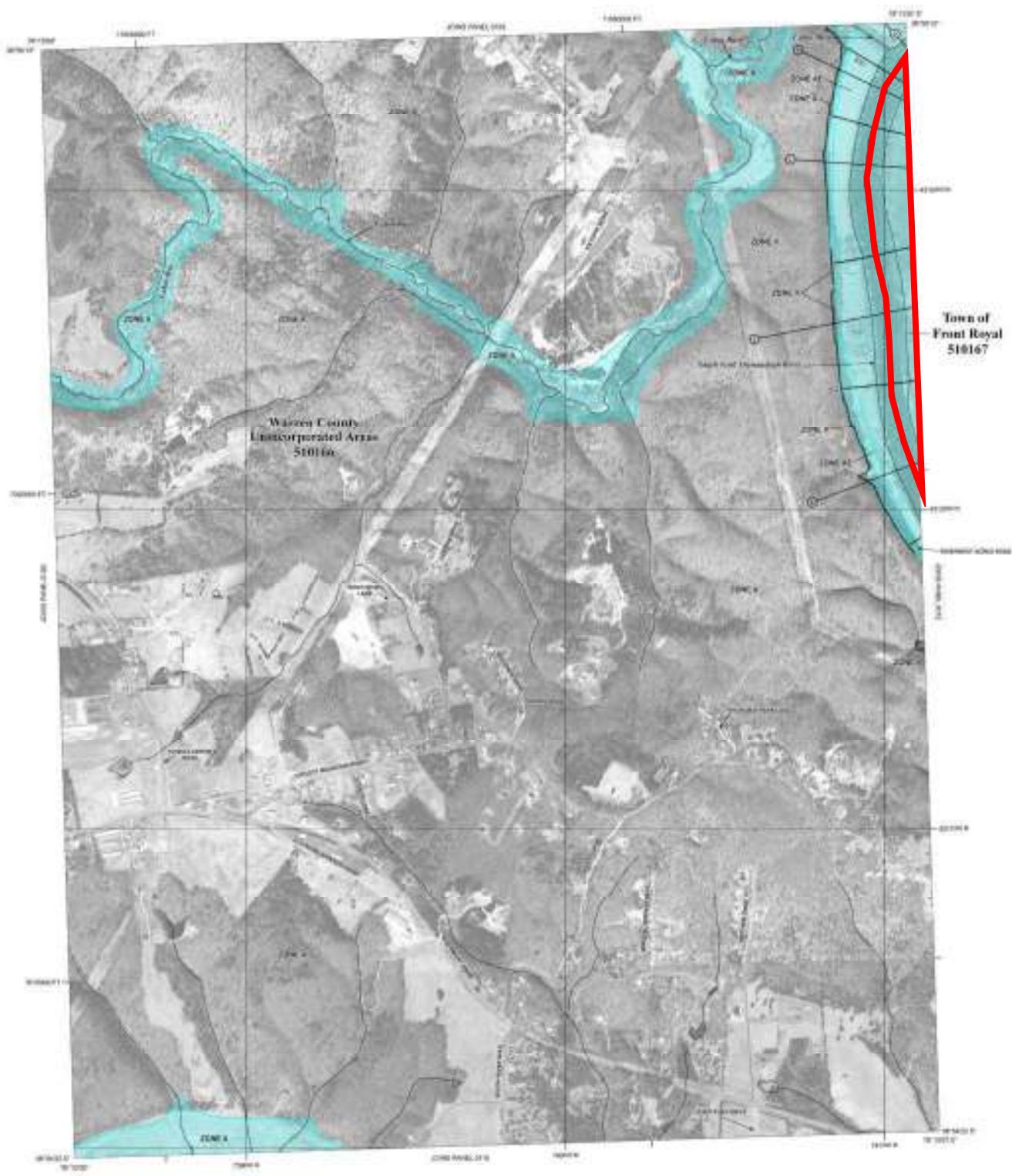
10.000-15.000 €

10.1002/anie.201907002

10.000-15.000 €

10.000-15.000 €

10.000-15.000 €



FIRM
FLOOD INSURANCE RATE
WARREN COUNTY,
VIRGINIA
AND INCORPORATED IN

PANEL 111 OF 258

(See Map Index for Firm Panel)

NAME	ADDRESS	CITY	STATE	ZIP CODE
WARRIOR CO. LTD.	PO BOX 100	BROWN	VA	24062

MAP INDEX NO. 111-100

EFFECTIVE JUNE 1986



MAP NO.
111-100
EFFECTIVE
JUNE
1986

Federal Emergency Management Agency

3. Historic flood damage data and/or images

August 21, 2021 Flooding of Happy Creek at 8th Street



April 17, 2011 Flood



Criser Road Bridge over Happy Creek



Criser Road Bridge over Happy Creek

Happy Creek at Bing Crosby Stadium (Public Park)



April 17, 2011 Flood Cont'd



Main Street/Downtown – Flooding from Happy Creek



Fantasyland Park – Happy Creek

Flood of 1936



SF Shenandoah River- Front Royal



USGS 01631000 S F SHENANDOAH RIVER AT FRONT ROYAL, VA

Available data for this site: Surface-water: Peak streamflow

▼

89

Warren County, Virginia

Hydrologic Unit Code 02070005

Latitude 38°54'50", Longitude 78°12'40" NAD27

Drainage area 1,634 square miles

Gage datum 468.93 feet above NAVD88

Output formats

[Table](#)[Graph](#)[Text-separated file](#)[genefn \(waterflow\) format](#)[Select output format](#)

Water Year	Date	Gage Height (feet)	Streamflow (cfs)
1945	1945-01-15	24.82	120,000
1946	1946-01-07	15.87	121,000
1947	1947-01-05	12.43	20,000
1948	1948-01-18	25.01	180,000
1949	1949-01-01	21.62	76,000
1950	1950-01-22	25.63	75,000
1951	1951-01-12	22.04	88,000
1952	1952-01-07	21.05	89,000
1953	1953-01-15	8.55	50,000
1954	1954-01-27	18.94	51,000
1955	1955-01-20	8.74	50,000
1956	1956-01-18	8.71	50,000

Peak Stream Flow since 1900 of SF Shenandoah River

Town of Front Royal

The principal flood problem on the South and North Fork Shenandoah Rivers in the town is that the floodplains are subject to periodic, disastrous flooding, and yet are the most amenable areas for development. Flow records for the period 1900 to the present are available for USGS gaging station (No. 01631000) located on the South Fork Shenandoah River at Front Royal. Historic floods, recorded at this gage, occurred in September 1996, November 1985, October 1942 and March 1936.

The September 1996 and the November 1985 flood had a peak discharge of 121,000 cubic feet per second (cfs). The recurrence interval for these storms is not available. The October 1942 flood had an estimated recurrence interval of 53 years with a peak discharge of 130,000 (cfs). The March 1936 flood had a recurrence interval of 25 years with a peak discharge of 98,000 cfs.

Another USGS gaging station (No. 01634000) is located on the North Fork Shenandoah River at Strasburg, approximately 10 miles upstream from Front Royal. Flow records are available at this site for the period 1926 to the present. Historic floods and their estimated recurrence intervals as recorded by this gage occurred in September 1996 (114,000 cfs, recurrence interval not available) and October 1942 (100,000 cfs, greater than 100 years) and March 1936 (89,000 cfs, greater than 100 years).

Another major flood occurred on the Shenandoah River in October 1870. The stage of this flood was estimated to be the same as the flood of 1936 (Reference 1). Damage figures for the June 1972 flood of Tropical Storm Agnes are available for the drainage basins of the South and North Fork Shenandoah Rivers (Reference 2). Most serious conditions developed along mountain streams that received heavy runoff resulting in flash flooding. Total damage in both basins was estimated at \$9,411,000. Most damage was to residential property (\$3,564,000) and business (\$2,227,000) in the South Fork Shenandoah River basin. Damage to transportation (\$311,000) and agriculture (\$298,000) accounted for most of the total in the North Fork Shenandoah River basin. The peak discharge at the gage on the South Fork Shenandoah River at Front Royal was 71,200 cfs with an estimated recurrence interval of 13 years; while the peak at the North Fork Shenandoah River gage at Strasburg was 25,100 cfs with an estimated recurrence interval of less than 10 years.

Most damage in the town from the flood of November 1985 occurred on the banks of the South and North Fork Shenandoah Rivers. Most permanent residences in the floodplain received water damage. Floodwaters were several feet above the first flood level in some instances. A number of vacation homes and mobile homes were completely submerged. Some structures came loose from their foundations and were carried downstream. A peak discharge of 120,000 cfs was recorded at the South Fork Shenandoah River gage at Front Royal, and its estimated recurrence interval is 47 years. The North Fork Shenandoah River gage at Strasburg recorded a peak discharge of 62,300 cfs with an estimated recurrence interval of 33 years.

Flood problems on Happy Creek are the result of the inadequate capacity of the Happy Creek channel, a number of restricted bridge openings, abrupt changes in the course of the stream at two places, and encroachments on the floodplain. Major floods occurred in March 1936 and October 1942. Much of the downtown area and the surrounding residences were inundated by these floods. A detailed account of the 1942 flood and estimates of the resulting damages are available (Reference 3). Total damages, adjusted to 1950 dollars, were estimated to be \$145,600. Business and residential damages were \$73,000 and \$26,500, respectively. A USGS gaging station was located on Happy Creek near the southern corporate limits. Flow records are available for the period 1948 to 1977. Peak discharge estimates for the 1942 and 1936 floods are 7,100 cfs and 5,600 cfs, respectively. By comparing these estimates to the 29 years of flow record at the Happy Creek gage, the estimated recurrence intervals for the 1942 and 1936 floods are greater than 100 years and 60 years, respectively.

No historic flood information was available for Leach Run and its tributaries.

4. Copy of current floodplain ordinance

Current Floodplain Ordinance

FLOODPLAIN ZONING

(Amended Entirely 7-11-88, 10-14-08)

175-74 GENERAL PROVISIONS (Floodplain)

A. Statutory Authority: This ordinance is adopted pursuant to the authority granted to localities by Virginia Code § 15.2-2280.

(Amended 3-28-16-Effective Upon Passage)

B. Purpose: The purpose of these provisions is to prevent: the loss of life and property, the creation of health and safety hazards, the disruption of commerce and governmental services, the extraordinary and unnecessary expenditure of public funds for flood protection and relief, and the impairment of the tax base by:

1. Regulating uses, activities, and development which, alone or in combination with other existing or future uses, activities, and development, will cause unacceptable increases in flood heights, velocities, and frequencies;

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2. Restricting or prohibiting certain uses, activities, and development from locating within districts subject to flooding;

3. Requiring all those uses, activities, and developments that do occur in flood-prone districts to be protected and/or flood-proofed against flooding and flood damage; and,

4. Protecting individuals from buying land and structures which are unsuited for intended purposes because of flood hazards.

C. Applicability: These provisions shall apply to all lands within the jurisdiction of the Town of Front Royal and identified as being in the 1% annual chance of a flood (Special Flood Hazard Area), by the Federal Insurance Administration.

D. Compliance and Liability:

1. No land shall hereafter be developed and no structure shall be located, relocated, constructed, reconstructed, enlarged, or structurally altered except in full compliance with the terms and provisions of this ordinance and any other applicable ordinances and regulations which apply to uses within the jurisdiction of this ordinance.

2. The degree of flood protection sought by the provisions of this ordinance is considered reasonable for regulatory purposes and is based on acceptable engineering methods of study. Larger floods may occur on rare occasions. Flood heights may be increased by man-made or natural causes, such as ice jams and bridge openings restricted by debris. This ordinance does not imply that districts outside the Floodplain District or that land uses permitted within such district will be free from flooding or flood damages.

3. Records of actions associated with administering this ordinance shall be kept on file and maintained by the Zoning Administrator.

4. This ordinance shall not create liability on the part of the Town of Front Royal or any officer or employee thereof for any flood damages that result from reliance on this ordinance or any administrative decision lawfully made there under.

E. Abrogation and Greater Restrictions: This ordinance supersedes any ordinance currently in effect in flood-prone districts. However, any underlying ordinance shall remain in full force and effect to the extent that its provisions are more restrictive than this ordinance.

F. Severability: If any section, subsection, paragraph, sentence, clause, or phrase of this ordinance shall be declared invalid for any reason whatever, such decision shall not affect the remaining portions of this ordinance. The remaining portions shall remain in full force and effect; and for this purpose, the provisions of this ordinance are hereby declared to be severable.

G. Administration:

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1. Designation of the Floodplain Administrator. The Floodplain Administrator is hereby appointed to administer and implement these regulations and is referred to herein as the Floodplain Administrator. The Zoning Administrator is hereby designated as the Floodplain Administrator for the Town of Front Royal. The Floodplain Administrator may:

- a. Do the work themselves. In the absence of a designated Floodplain Administrator, the duties are conducted by the Town of Front Royal chief executive officer.
- b. Delegate duties and responsibilities set forth in these regulations to qualified technical personnel, plan examiners, inspectors, and other employees.

c. Enter into a written agreement or written contract with another community or private sector entity to administer specific provisions of these regulations. Administration of any part of these regulations by another entity shall not relieve the community of its responsibilities pursuant to the participation requirements of the National Flood Insurance Program as set forth in the Code of Federal Regulations at 44 C.F.R. Section 59.22.

2. Duties and Responsibilities of the Floodplain Administrator: The duties and responsibilities of the Floodplain Administrator shall include but are not limited to:

a. Review applications for permits to determine whether proposed activities will be located in the Special Flood Hazard Area (SFHA).

b. Interpret floodplain boundaries and provide available base flood elevation and flood hazard information.

c. Review applications to determine whether proposed activities will be reasonably safe from flooding and require new construction and substantial improvements to meet the requirements of these regulations.

d. Review applications to determine whether all necessary permits have been obtained from the Federal, State or local agencies from which prior or concurrent approval is required; in particular, permits from state agencies for any construction, reconstruction, repair, or alteration of a dam, reservoir, or waterway obstruction (including bridges, culverts, structures), any alteration of a watercourse, or any change of the course, current, or cross section of a stream or body of water, including any change to the 100-year frequency floodplain of free-flowing non-tidal waters of the State.

e. Verify that applicants proposing an alteration of a watercourse have notified adjacent communities, the Department of Conservation and Recreation (Division of Dam Safety and Floodplain Management), and other appropriate agencies (VADEQ, USACE) and have submitted copies of such notifications to FEMA.

f. Advise applicants for new construction or substantial improvement of structures that are located within an area of the Coastal Barrier Resources System established by the Coastal Barrier Resources Act that Federal flood insurance is not available on such structures;

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areas subject to this limitation are shown on Flood Insurance Rate Maps as Coastal Barrier Resource System Areas (CBRS) or Otherwise Protected Areas (OPA).

g. Approve applications and issue permits to develop in flood hazard areas if the provisions of these regulations have been met, or disapprove applications if the provisions of these regulations have not been met.

h. Inspect or cause to be inspected, buildings, structures, and other development for which permits have been issued to determine compliance with these regulations or to determine if non-compliance has occurred or violations have been committed.

i. Review Elevation Certificates and require incomplete or deficient certificates to be corrected.

j. Submit to FEMA, or require applicants to submit to FEMA, data and information necessary to maintain FIRMs, including hydrologic and hydraulic engineering analyses prepared by or for the Town of Front Royal within six months after such data and information becomes available if the analyses indicate changes in base flood elevations.

k. Maintain and permanently keep records that are necessary for the administration of these regulations, including:

[1] Flood Insurance Studies, Flood Insurance Rate Maps (including historic studies and maps and current effective studies and maps) and Letters of Map Change; and

[2] Documentation supporting issuance and denial of permits, Elevation Certificates, documentation of the elevation (in relation to the datum on the FIRM) to which structures have been floodproofed, inspection records, other required design certifications, variances, and records of enforcement actions taken to correct violations of these regulations.

l. Enforce the provisions of these regulations, investigate violations, issue notices of violations or stop work orders, and require permit holders to take corrective action.

m. Advise the Board of Zoning Appeals regarding the intent of these regulations and, for

each application for a variance, prepare a staff report and recommendation.

n. Administer the requirements related to proposed work on existing buildings:

[1] Make determinations as to whether buildings and structures that are located in flood hazard areas and that are damaged by any cause have been substantially damaged.

[2] Make reasonable efforts to notify owners of substantially damaged structures of the need to obtain a permit to repair, rehabilitate, or reconstruct. Prohibit the non-compliant repair of substantially damaged buildings except for temporary emergency

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protective measures necessary to secure a property or stabilize a building or structure to prevent additional damage.

o. Undertake, as determined appropriate by the Floodplain Administrator due to the circumstances, other actions which may include but are not limited to: issuing press releases, public service announcements, and other public information materials related to permit requests and repair of damaged structures; coordinating with other Federal, State, and local agencies to assist with substantial damage determinations; providing owners of damaged structures information related to the proper repair of damaged structures in special flood hazard areas; and assisting property owners with documentation necessary to file claims for Increased Cost of Compliance coverage under NFIP flood insurance policies.

p. Notify the Federal Emergency Management Agency when the corporate boundaries of the Town of Front Royal have been modified and:

[1] Provide a map that clearly delineates the new corporate boundaries or the new area for which the authority to regulate pursuant to these regulations has either been assumed or relinquished through annexation; and

[2] If the FIRM for any annexed area includes special flood hazard areas that have flood zones that have regulatory requirements that are not set forth in these regulations, prepare amendments to these regulations to adopt the FIRM and appropriate requirements, and submit the amendments to the governing body for adoption; such

adoption shall take place at the same time as or prior to the date of annexation and a copy of the amended regulations shall be provided to Department of Conservation and Recreation (Division of Dam Safety and Floodplain Management) and FEMA.

q. Upon the request of FEMA, complete and submit a report concerning participation in the NFIP which may request information regarding the number of buildings in the SFHA, number of permits issued for development in the SFHA, and number of variances issued for development in the SFHA.

r. It is the duty of the Community Floodplain Administrator to take into account flood, mudslide and flood-related erosion hazards, to the extent that they are known, in all official actions relating to land management and use throughout the entire jurisdictional area of the Community, whether or not those hazards have been specifically delineated geographically (e.g. via mapping or surveying).

3. Use and Interpretation of FIRMs. The Floodplain Administrator shall make interpretations, where needed, as to the exact location of special flood hazard areas, floodplain boundaries, and floodway boundaries. The following shall apply to the use and interpretation of FIRMs and data:

a. Where field surveyed topography indicates that adjacent ground elevations:

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[1] Are below the base flood elevation, even in areas not delineated as a special flood hazard area on a FIRM, the area shall be considered as special flood hazard area and subject to the requirements of these regulations;

[2] Are above the base flood elevation, the area shall be regulated as special flood hazard area unless the applicant obtains a Letter of Map Change that removes the area from the SFHA.

b. In FEMA-identified special flood hazard areas where base flood elevation and floodway data have not been identified and in areas where FEMA has not identified SFHAs, any other flood hazard data available from a Federal, State, or other source shall be reviewed and reasonably used.

c. Base flood elevations and designated floodway boundaries on FIRMs and in FISs shall take precedence over base flood elevations and floodway boundaries by any other sources if such sources show reduced floodway widths and/or lower base flood elevations.

d. Other sources of data shall be reasonably used if such sources show increased base flood elevations and/or larger floodway areas than are shown on FIRMs and in FISs.

e. If a Preliminary Flood Insurance Rate Map and/or a Preliminary Flood Insurance Study has been provided by FEMA:

[1] Upon the issuance of a Letter of Final Determination by FEMA, the preliminary flood hazard data shall be used and shall replace the flood hazard data previously provided from FEMA for the purposes of administering these regulations.

[2] Prior to the issuance of a Letter of Final Determination by FEMA, the use of preliminary flood hazard data shall be deemed the best available data pursuant to Section 3.1.A.3. and used where no base flood elevations and/or floodway areas are provided on the effective FIRM.

[3] Prior to issuance of a Letter of Final Determination by FEMA, the use of preliminary flood hazard data is permitted where the preliminary base flood elevations or floodway areas exceed the base flood elevations and/or designated floodway widths in existing flood hazard data provided by FEMA. Such preliminary data may be subject to change and/or appeal to FEMA.

4. Jurisdictional Boundary Changes. In accordance with the Code of Federal Regulations, Title 44 Subpart (B) Section 59.22 (a) (9) (v), the Town will notify the Federal Insurance Administration and optionally the State Coordinating Office in writing whenever the boundaries of the Town have been modified by annexation or the Town has otherwise assumed or no longer has authority to adopt and enforce floodplain management regulations for a particular area. A copy of a map of the Town, suitable for reproduction, and clearly delineating the new corporate limits or new area for which the Town has

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assumed or relinquished floodplain management regulatory authority must be included with

the notification.

5. District Boundary Changes. The delineation of any of the Floodplain Districts may be revised by the Town where natural or man-made changes have occurred and/or where more detailed studies have been conducted or undertaken by the U. S. Army Corps of Engineers or other qualified agency, or an individual documents the need for such change.

However, prior to any such change, approval must be obtained from the Federal Emergency Management Agency. A completed Letter of Map Revision (LOMR) is a record of this approval.

6. Interpretation of District Boundaries. Initial interpretations of the boundaries of the Floodplain Districts shall be made by the Zoning Officer. Should a dispute arise concerning the boundaries of any of the Districts, the Board of Zoning Appeals shall make the necessary determination. The person questioning or contesting the location of the District boundary shall be given a reasonable opportunity to present his case to the Board and to submit his own technical evidence if he so desires.

7. Submitting Model Backed Technical Data. A community's base flood elevations may increase or decrease resulting from physical changes affecting flooding conditions. As soon as practicable, but not later than six months after the date such information becomes available, a community shall notify the Federal Emergency Management Agency of the changes by submitting technical or scientific data. The community may submit data via a LOMR. Such a submission is necessary so that upon confirmation of those physical changes affecting flooding conditions, risk premium rates and flood plain management requirements will be based upon current data.

8. Letters of Map Revision. When development in the floodplain will cause or causes a change in the base flood elevation, the Town shall require the applicant of the development to notify FEMA by applying for a Conditional Letter of Map Revision and then a Letter of Map Revision.

9. Penalty for Violations. Any person who fails to comply with any of the requirements or provisions of this article or directions of the director of planning or any authorized employee of the Town shall be guilty of the appropriate violation and subject to the penalties thereof.

Violations and associated penalties related to the floodplain provisions are found under Section 175-145 of this Chapter. In addition to the above penalties, all other actions are hereby reserved, including an action in equity for the proper enforcement of Sections 175-74 through 175-81.3. The imposition of a fine or penalty for any violation of, or noncompliance with, the provisions of Sections 175-74 through 175-81.3, shall not excuse the violation or noncompliance or permit it to continue; and all such persons shall be required to correct or remedy such violations within a reasonable time. Any structure constructed, reconstructed, enlarged, altered or relocated in noncompliance with this article may be declared by the Town to be a public nuisance and abatable as such. Flood insurance may be withheld from structures constructed in violation of this article.

(Added Entire "G – Administration" 3-28-16-Effective Upon Passage)

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175-75 DEFINITIONS (Floodplain)

The following definitions apply to the floodplain regulations found within this chapter, specifically Sections 175-74 through 175-81.3:

(Added 3-28-16-Effective Upon Passage)

A. ACCESSORY STRUCTURE or APPURTEnant STRUCTURE – For purposes of the floodplain regulations of this chapter, shall mean an accessory building not in excess of 200 square feet. (Added 3-28-16-Effective Upon Passage)

B. BASE FLOOD - The flood having a one percent chance of being equaled or exceeded in any given year.

C. BASE FLOOD ELEVATION – The water surface elevations of the base flood, that is, the flood level that has a one percent or greater chance of occurrence in any given year. The water surface elevation of the base flood in relation to the datum specified on the community's Flood Insurance Rate map. For the purposes of this ordinance, the base flood is the 1% annual chance flood.

(Amended 3-28-16-Effective Upon Passage)

D. BASEMENT - Any area of the building having its floor sub-grade (below ground level) on all sides.

E. BOARD OF ZONING APPEALS - The Board appointed to review appeals made by individuals with regard to decisions of the Zoning Administrator in the interpretation of this ordinance.

F. BREAKAWAY WALL - A wall that is not part of the structural support of the building and is intended through its design and construction to collapse under specific lateral loading forces, without causing damage to the elevated portion of the building or supporting foundation system.

G. DEVELOPMENT - Any man-made change to improved or unimproved real estate, including, but not limited to, buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations or storage of equipment or materials.

H. ELEVATED BUILDING - A non-basement building built to have the lowest floor elevated above the ground level by means of fill, solid foundation perimeter walls, pilings, or columns (posts and piers).

I. ENCROACHMENT - The advance or infringement of uses, plant growth, fills, excavation, buildings, permanent structures or development into a floodplain, which may impede or alter the flow capacity of a floodplain.

J. EXISTING CONSTRUCTION – Structures for which the “start of construction” commenced before the effective date of the FIRM or before January 1, 1975 for FIRMs

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effective before that date “existing construction” may also be referred to as “existing structures”.

(Added 3-28-16-Effective Upon Passage)

K. FLOOD OR FLOODING -

1. A general or temporary condition of partial or complete inundation of normally dry land areas from:

a. The overflow of inland or tidal waters; or,

- b. The unusual and rapid accumulation or run-off of surface waters from any source.
- c. Mudflows which are proximately caused by flooding as defined in paragraph (1)(b) of this definition and are akin to a river of liquid and flowing mud on the surfaces of normally dry land areas, as when earth is carried by current of water and deposited along the path of the current.

(Added "c" 3-28-16-Effective Upon Passage)

- 2. The collapse or subsistence of land along the shore of a lake or other body of water as a result of erosion or undermining caused by waves or currents of water exceeding anticipated cyclical levels or suddenly caused by an unusually high water level in a natural body of water, accompanied by a severe storm, or by an unanticipated force of nature such as flash flood or an abnormal tidal surge, or by some similarly unusual and unforeseeable event which results in flooding as defined in paragraph (1) (a) of this definition.

L. FLOOD INSURANCE RATE MAP (FIRM) – An official map of a community, on which the Federal Emergency Management Agency has delineated both the special hazard areas and the risk premium zones applicable to the community. A FIRM that has been made available digitally is called a Digital Flood Insurance Rate Map (DFIRM).

(Added 3-28-16-Effective Upon Passage)

M. FLOOD INSURANCE STUDY (FIS) – A report by FEMA that examines, evaluates and determines flood hazards and, if appropriate, corresponding water surface elevations, or an examination, evaluation and determination of mudflow and/or flood-related erosion hazards.

(Added 3-28-16-Effective Upon Passage)

N. FLOODPLAIN OR FLOOD-PRONE AREA - Any land area susceptible to being inundated by water from any source.

O. FLOODWAY - The channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height.

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P. FREEBOARD - A factor of safety usually expressed in feet above a flood level for purposes

of floodplain management. "Freeboard" tends to compensate for the many unknown factors that could contribute to flood heights greater than the height calculated for a selected size flood and floodway conditions, such as wave action, bridge openings, and the hydrological effect of urbanization in the watershed.

Q. FLOOD-PROOFING - Any combination of structural and non-structural additions, changes, or adjustments to structures which reduce or eliminate flood damage to real estate or improved real property, water and sanitary facilities, structures and their contents.

R. HIGHEST ADJACENT GRADE – The highest natural elevation of the ground surface prior to construction next to the proposed walls of a structure.

(Added 3-28-16-Effective Upon Passage)

S. HISTORIC STRUCTURE – Any structure that is:

1. Listed individually in the National Register of Historic Places (a listing maintained by the Department of Interior) or preliminarily determined by the Secretary of the Interior as meeting the requirements for individual listing on the National Register;
2. Certified or preliminarily determined by the Secretary of the Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined by the Secretary to qualify as a register historic district;
3. Individually listed on a state inventory of historic places in states with historic preservation programs which have been approved by the Secretary of the Interior; or,
4. Individually listed on a local inventory of history places in communities with historic preservation programs that have been certified either
 - a. by an approved state program as determined by the Secretary of the Interior; or,
 - b. directly by the Secretary of the Interior in states without approved programs.

(Added "S" 3-28-16-Effective Upon Passage)

T. HYDRAULIC AND HYDRAULIC ENGINEERING ANALYSIS – Analyses performed by a licensed profession engineer, in accordance with standard engineering practices that are accepted by the Virginia Department of Conservation and Recreation and FEMA, used to determine the base flood, other frequency floods, flood elevations, floodway information and boundaries, and flood profiles.

(Added 3-28-16-Effective Upon Passage)

U. LETTERS OF MAP CHANGES (LOMC) – A letter of Map Change is an official FEMA determination, by letter, that amends or revises an effective Flood Insurance Rate Map or Flood Insurance Study. Letters of Map Change include:

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1. LETTER OF MAP AMENDMENT (LOMA) – An amendment based on technical data showing that a property was incorrectly included in a designated special flood hazard area. A LOMA amends the current effective Flood Insurance Rate Map and establishes that a land as defined by meets and bounds or structure is not located in a special flood hazard area.

2. LETTER OF MAP REVISION (LOMR) – A revision based on technical data that may show changes to flood zones, flood elevations, floodplain and floodway delineations, and planimetric features. A Letter of Map Revision based on Fill (LOMR-F), is a determination that a structure or parcel of land has been elevated by fill above the base flood elevation and is, therefore, no longer exposed to flooding associated with the base flood. In order to qualify for this determination, the fill must have been permitted and placed in accordance with the community's floodplain management regulations.

(Added "U" 3-28-16-Effective Upon Passage)

V. LOWEST ADJACENT GRADE – The lowest natural elevation of the ground surface next to the walls of structure.

(Added 3-28-16-Effective Upon Passage)

W. LOWEST FLOOR – The lowest floor of the lowest enclosed area (including basement). An unfinished or flood-resistant enclosure, usable solely for parking of vehicles, building access or storage in an area other than a basement area is not considered a building's lowest floor provided, that such enclosure is not built so as to render the structure in violation of the applicable non-elevation design requirements of Federal Code 44CFR §60.3.

X. MANUFACTURED HOME – A structure, transportable in one or more sections, which is built on a permanent chassis and is designed for use with or without a permanent foundation when

connected to the required utilities. For floodplain management purposes the term “manufactured homes” also include park trailers, travel trailers and other similar vehicles placed on a site for greater than 180 consecutive days.

(Added 3-28-16-Effective Upon Passage)

Y. MANUFACTURED HOME PARK OR SUBDIVISION – A parcel (or contiguous parcels) of land divided into two or more manufactured home lots for rent or sale.

(Added 3-28-16-Effective Upon Passage)

Z. MEAN SEA LEVEL – Is an elevation point that represents the average height of the ocean’s surface (such as the halfway point between the mean high tide and the mean low tide) which is used as a standard in reckoning land elevation.

(Added 3-28-16-Effective Upon Passage)

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aa. NEW CONSTRUCTION - For the purposes of determining insurance rates, structures for which the “start of construction” commenced on or after the effective date of an initial Flood Insurance Rate Map July 15, 1988, whichever is later, and includes any subsequent improvements to such structures. For floodplain management purposes, new construction means structures for which start of construction commenced on or after the effective date of a floodplain management regulation adopted by a community and includes any subsequent improvements to such structures.

bb. POST-FIRM STRUCTURES – A structure for which construction or substantial improvement occurred after July 15, 1988. (Added 3-28-16-Effective Upon Passage)

cc. PRE-FIRM STRUCTURES – A structure for which construction or substantial improvement occurred on or before July 15, 1988.

(Added 3-28-16-Effective Upon Passage)

dd. RECREATIONAL VEHICLE - A vehicle which is:

1. Built on a single chassis;
2. 400 square feet or less when measured at the largest horizontal projection;
3. Designed to be self-propelled or permanently towable by a light-duty truck; and,

4. Designed primarily not for use as a permanent dwelling but as temporary living quarters for recreational camping, travel, or seasonal use.

ee. REPETITIVE LOSS STRUCTURE – A building covered by a contract for flood insurance that has incurred flood-related damages on two occasions, in which the cost of the repair, on the average, equaled or exceeded 25 percent of the market value of the structure at the time of each such flood event; and at the time of the second incidence of flood-related damage, the contract for flood insurance contains increased cost of compliance coverage.

(Added 3-28-16-Effective Upon Passage)

ff. SEVERE REPETITIVE LOSS STRUCTURE – A structure that: (a) is covered under a contract for flood insurance made available under the NFIP; and (b) has incurred flood related damage – (i) for which 4 or more separate claims payments have been made under flood insurance coverage with the amount of each such claim exceeding \$5,000, and with the cumulative amount of such claims payments exceeding \$20,000; or (ii) for which at least 2 separate claims payments have been made under such coverage, with the cumulative amount of such claims exceeding the market value of the insured structure.

(Added 3-28-16-Effective Upon Passage)

gg. SPECIAL FLOOD HAZARD AREA - The land in the floodplain subject to a one (1%) percent or greater chance of being flooded in any given year, commonly known as the one-hundred (100) year floodplain.

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hh. START OF CONSTRUCTION - The date the building permit was issued, provided the actual start of construction, repair, reconstruction, rehabilitation, addition, placement, substantial improvement or other improvement was within 180 days of the permit date. The actual start means either the first placement of permanent construction of a structure on a site, such as the pouring of slab or footings, the installation of piles, the construction of columns, or any work beyond the stage of excavation. Permanent construction does not include land preparation, such as clearing, grading and filling; nor does it include the installation on the property of accessory buildings, such as garages or sheds not occupied as dwelling units or not part of the main structure. For a substantial

improvement, the actual start of the construction means the first alteration of any wall, ceiling, floor, or other structural part of a building, whether or not that alteration affects the external dimensions of the building.

ii. STRUCTURE – For floodplain management purposes, a walled and roofed building, including a gas or liquid storage tank, that is principally above ground, as well as a manufactured home.

(Added 3-28-16-Effective Upon Passage)

jj. SUBSTANTIAL DAMAGE - Damage of any origin sustained by a structure whereby the cost of restoring the structure to its before damaged condition would equal or exceed 50 percent of the market value of the structure before the damage occurred.

kk. SUBSTANTIAL IMPROVEMENT - Any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds 50 percent of the market value of the structure before the start of construction of the improvement. This term includes structures which have incurred substantial damage regardless of the actual repair work performed. The term does not, however, include either:

1. Any project for improvement of a structure to correct existing violations of state or local health, sanitary, or safety code specifications which have been identified by the local code enforcement official and which are the minimum necessary to assure safe living conditions, or

2. Any alteration of a historic structure, provided that the alteration will not preclude the structure's continued designation as a historic structure, or

3. Historic structures undergoing repair or rehabilitation that would constitute a substantial improvement as defined above, must comply with all ordinance requirements that do not preclude the structure's continued designation as a historic structure. Documentation that a specific ordinance requirement will cause removal of the structure from the National Register of Historic Places or the State Inventory of Historic Places must be obtained from the Secretary of the Interior or the State Historic Preservation Officer. Any exemption from ordinance requirements will be the minimum necessary to preserve the historic character and design of the structure.

(Added "kk" 3-28-16-Effective Upon Passage)

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II VIOLATION – The failure of a structure or other development to be fully compliant with the community's floodplain management regulations. A structure or other development without the elevation certificate, other certifications, or other evidence of compliance required in Sections 175-74 through 175-81.3 of this Chapter is presumed to be in violation until such time as that documentation is provided.

(Added 3-28-16-Effective Upon Passage)

mm. WATERCOURSE - A lake, river, creek, stream, wash, channel or other topographic feature on or over which waters flow at least periodically. Watercourse includes specifically designated areas in which substantial flood damage may occur.

175-76 ESTABLISHMENT OF FLOODPLAIN DISTRICTS

A. Basis of Districts - The various floodplain districts shall include special flood hazard areas. The basis for the delineation of these districts shall be the Flood Insurance Study (FIS) for the Town of Front Royal prepared by the Federal Emergency Management Agency, Federal Insurance Administration, dated June 3, 2008, as amended.

(Amended "A" 5-12-08-Effective Upon Passage)

B. The Floodway District, also referred to as the AE zone, is delineated, for purposes of this ordinance, using the criterion that certain areas within the floodplain must be capable of carrying the waters of the Special Flood Hazard Area without increasing the water surface elevation of that flood more than one (1) foot at any point. The areas included in this District are specifically defined in Table 4 of the above-referenced Flood Insurance Study and shown on the accompanying Flood Boundary and Floodway Map or Flood Insurance Rate Map. The following provisions shall apply within the Floodway District of an AE zone:

1. Within any floodway area, no encroachments, including fill, new construction, substantial improvements, or other development shall be permitted unless it has been demonstrated through hydrologic and hydraulic analysis performed in accordance with standard engineering practice that the proposed encroachment will not result in any increase in flood levels within the community during the occurrence of the base flood discharge. Hydrologic

and hydraulic analyses shall be undertaken only by professional engineers or others of demonstrated qualifications, who shall certify that the technical methods used correctly reflect currently-accepted technical concepts. Studies, analyses, computations, etc., shall be submitted in sufficient detail to allow a thorough review by the Floodplain Administrator. Development activities which increase the water surface elevation of the base flood may be allowed, provided that the applicant first applies – with the Town’s endorsement – for a Conditional Letter of Map Revision (CLOMR), and receives the approval of the Federal Emergency Management Agency. If the requirements of this section are satisfied, all new construction and substantial improvements shall comply with all applicable flood hazard reduction standards.

2. The placement of manufactured homes (mobile homes) is prohibited, except when replacing an existing manufactured home in an existing manufactured home park or

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subdivision. A replacement manufactured home may be placed on a lot in an existing manufactured home park or subdivision provided the anchoring, elevation and encroachment standards are met.

(Amended “B” 6-23-08-Effective Upon Passage)

(Amended “B” and Added (1-2) 3-28-16-Effective Upon Passage)

C. The Flood-Fringe District shall be that area of the Special Flood Hazard Area not included in the Floodway District. The basis for the outermost boundary of the District shall be the Special Flood Hazard Area elevations contained in the flood profiles of the above-referenced Flood Insurance Study and as shown on the accompanying Flood Boundary and Floodway Map or Flood Insurance Rate Map.

D. The Approximated Floodplain District, also referred to as the A Zone, as illustrated on the FIRM accompanying the Flood Insurance Study (FIS) shall be those areas for which no detailed flood profiles or elevations are provided, but the one percent annual chance floodplain boundary has been approximated. For these areas, the following provisions shall apply:

1. The Approximated Floodplain District shall be that floodplain area for which no detailed

flood profiles or elevations are provided, but where a one percent annual chance floodplain boundary has been approximated. Such areas are shown as Zone A on the maps accompanying the FIS. For these areas, the base flood elevations and floodway information from federal, state, and other acceptable sources shall be used, when available. Where the specific one percent annual chance flood elevation cannot be determined for this area using other sources of data, such as the U. S. Army Corps of Engineers Floodplain Information Reports, U. S. Geological Survey Flood-Prone Quadrangles, etc., then the applicant for the proposed use, development and/or activity shall determine this base flood elevation. For development proposed in the approximate floodplain the applicant must use technical methods that correctly reflect currently accepted practices, such as point on boundary, high water marks, or detailed methodologies hydrologic and hydraulic analyses. Studies, analyses, computations, etc., shall be submitted in sufficient detail to allow a thorough review by the Floodplain Administrator.

2. The Floodplain Administrator reserves the right to require a hydrologic and hydraulic analysis for any development. When such base flood elevation data is utilized, the lowest floorshall be elevated to or above the base flood plus twelve (12) inches. Additional elevation above 12 inches over the base flood is recommended if possible because it may reduce the cost of flood insurance.

3. During the permitting process, the Floodplain Administrator shall obtain:

- a. The elevation of the lowest floor (in relation to mean sea level),including the basement, of all new and substantially improved structures; and,
- b. If the structure has been flood-proofed in accordance with the requirements of this article, the elevation (in relation to mean sea level) to which the structure has been flood-proofed.

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4. Base flood elevation data shall be obtained from other sources or developed using detailed methodologies comparable to those contained in a FIS for subdivision proposals and other proposed development proposals (including manufactured home parks and subdivisions)

that exceed fifty lots or five acres, whichever is the lesser.

(Amended "D" and Added (1-4) 3-28-16-Effective Upon Passage)

175-77 OVERLAY CONCEPT (Floodplain)

A. The Floodplain Districts described above shall be overlays to the existing underlying districts as shown on the Official Zoning Ordinance Map, and as such, the provisions for the floodplain districts shall serve as a supplement to the underlying district provisions.

B. If there is any conflict between the provisions or requirements of the Floodplain Districts and those of any underlying district, the more restrictive provisions and/or those pertaining to the floodplain districts shall apply.

C. In the event any provision concerning a Floodplain District is declared inapplicable as a result of any legislative or administrative actions or judicial decision, the basic underlying provisions shall remain applicable.

175-78 FLOODPLAIN DISTRICT BOUNDARIES

A. The boundaries of the Special Flood Hazard Area and Floodplain Districts are established as shown on the Flood Boundary and Floodway Map and/or Flood Insurance Rate Map which is declared to be a part of this Ordinance and which shall be kept on file at the Town of Front Royal Planning Offices.

(Amended "A" 6-23-08-Effective Upon Passage)

B. District Boundary Changes: The delineation of any of the Floodplain Districts may be revised by the Town of Front Royal where natural or man-made changes have occurred and/or where more detailed studies have been conducted or undertaken by the U. S. Army Corps of Engineers or other qualified agency, or an individual documents the need for such change. However, prior to any such change, approval must be obtained from the Federal Insurance Administration.

C. Interpretation of District Boundaries: Interpretations of the boundaries of the Floodplain Districts shall be made by the Zoning Administrator. Should a dispute arise concerning the boundaries of any of the Districts, the Board of Zoning Appeals shall make the necessary determination. The person questioning or contesting the location of the District boundary shall be given a reasonable opportunity to present his case to the Board and to submit his own technical evidence if he so desires.

175-79 DISTRICT PROVISIONS (Floodplain)

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A. Permit Requirement: All uses, activities, and development occurring within any floodplain district shall be undertaken only upon the issuance of a Zoning Permit. Such development shall be undertaken only in strict compliance with the provisions of the Ordinance and with all other applicable codes and ordinances, as amended, and the Town of Front Royal Subdivision Regulations. Prior to the issuance of any such permit, the Zoning Administrator shall require all applications to include compliance with all applicable state and federal laws.

(Amended "A" 11-23-98-Effective Upon Passage)

(Amended "A" 6-23-08-Effective Upon Passage)

B. Site Plans and Permit Applications: All applications for development within any floodplain district and all building permits issued for the floodplain shall incorporate the following information:

1. For structures to be elevated, the elevation of the lowest floor (including basement).
2. For structures to be flood-proofed (non-residential only), the elevation to which the structure will be flood-proofed.
3. The elevation of the Base Flood at the site.
4. Topographic information showing existing and proposed ground elevations.

(Amended former "F" 4-19-99-Effective Upon Passage)

(Amended "B" 5-12-08-Effective Upon Passage)

(Added "B" (3 & 4) 3-28-16-Effective Upon Passage)

175-80 GENERAL STANDARDS (Floodplain)

In all special flood hazard areas the property owner is ultimately responsible for insuring the following provisions have been considered:

- A. New construction and substantial improvements shall be anchored to prevent floatation, collapse or lateral movement of the structure.
- B. New construction and substantial improvements shall be constructed with materials and utility equipment resistant to flood damage.

C. New construction or substantial improvements shall be constructed by methods and practices that minimize flood damage.

D. Electrical, heating, ventilation, plumbing, air conditioning equipment and other service facilities, including duct work, shall be designed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding.

E. New and replacement water supply systems shall be designed to minimize or eliminate infiltration of flood waters into the system.

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F. New and replacement sanitary sewage systems shall be designed to minimize or eliminate infiltration of flood waters into the systems and discharges from the systems into flood waters.

G. On-site waste disposal systems shall be located and constructed to avoid impairment to them or contamination from them during flooding.

H. Any alteration, repair, reconstruction or improvements to a building that is in compliance with the provisions of this ordinance shall meet the requirements of "new construction" as contained in this ordinance.

I. Any alteration, repair, reconstruction or improvements to a building that is not in compliance with the provisions of this ordinance, shall be undertaken only if said non-conformity is not furthered, extended, or replaced.

J. Prior to any proposed alteration or relocation of any channels or of any watercourse, stream, etc., within this jurisdiction a permit shall be obtained from the U. S. Corps of Engineers, the Virginia Department of Environmental Quality, and the Virginia Marine Resources Commission (a joint permit application is available from any of these organizations). Furthermore, notification of the proposal shall be given by the applicant to all affected adjacent jurisdictions, the Department of Conservation and Recreation (Division of Dam Safety and Floodplain Management) and the Federal Insurance Administration.

K. The flood carrying capacity within an altered or relocated portion of any watercourse shall be maintained.

L. Manufactured homes shall be anchored to prevent flotation, collapse or lateral movement.

Methods of anchoring may include, but are not limited to, use of over-the-top or frame ties to ground anchors. This standard shall be in addition to and consistent with applicable state anchoring requirements for resisting wind forces.

(Added "L" 3-28-16-Effective Upon Passage)

(Added Entire Section 10-14-08-Effective Upon Passage)

175-81 SPECIFIC STANDARDS (Floodplain)

In all special flood hazard areas where base flood elevations have been provided in the Flood Insurance Study or generated according to Section 175-81.1(A), the following provisions shall apply:

A. Residential Construction: New construction or substantial improvement of any residential structure shall have the lowest floor, including basement, elevated no lower than one (1) foot above the base flood elevation.

B. Non-Residential Construction: New construction or substantial improvement of any commercial, industrial, or non-residential building shall have the lowest floor, including basement, elevated to no lower than one (1) foot above the base flood elevation. Buildings located in all AE and AH zones may be flood-proofed in lieu of being elevated provided that all areas of the building

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components below the elevation corresponding to the Base Flood Elevation (BFE) plus one foot are water tight with walls substantially impermeable to the passage of water, and use structural components having the capability of resisting hydrostatic and hydrodynamic loads and the effect of buoyancy. A registered professional engineer or architect shall certify that the standards of this subsection are satisfied. Such certification, including the specific elevation (in relation to mean sea level) to which such structures are floodproofed, shall be maintained by the Floodplain Administrator.

(Amended "B" 3-28-16-Effective Upon Passage)

C. The Space Below the Lowest Floor: Enclosed areas, of new construction or substantially improved structures, which are below the regulatory flood protection elevation shall:

(Amended Title of "C" from Elevated Floor 3-28-16-Effective Upon Passage

1. Not be designed or used for human habitation, but shall only be used for parking of vehicles, building access, or limited storage of maintenance equipment used in connection with the premises. Access to the enclosed area shall be the minimum necessary to allow for parking of vehicles (garage door) or limited storage of maintenance equipment (standard exterior door), or entry to the living area (stairway or elevator). The interior portion of such enclosed area shall not be partitioned or finished into separate rooms, except to enclose storage areas;
2. Be constructed entirely of flood resistant materials below the regulatory flood protection elevation;
3. Include, in Zones A and AE measures to automatically equalize hydrostatic flood forces on walls by allowing for the entry and exit of floodwaters. To meet this requirement, the openings must either be certified by a professional engineer or architect or meet the following minimum design criteria:

- a. Provide a minimum of two openings on different sides of each enclosed area subject to flooding.
- b. The total net area of all openings must be at least one (1) square inch for each square foot of enclosed area subject to flooding.
- c. If a building has more than one enclosed area, each area must have openings to allow floodwaters to automatically enter and exit.
- d. The bottom of all required openings shall be no higher than one (1) foot above the adjacent grade.
- e. Openings may be equipped with screens, louvers, or other opening coverings or devices, provided they permit the automatic flow of floodwaters in both directions.
- f. Foundation enclosures made of flexible skirting are not considered enclosures for regulatory purposes, and, therefore, do not require openings. Masonry or wood

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underpinning, regardless of structural status, is considered an enclosure and requires openings as outlined above.

D. Standards for Recreational Vehicle: All recreational vehicles placed on sites must be either:

1. In all designated Special Flood Hazard Areas, all manufactured homes placed, or substantially improved, on individual lots or parcels, must meet all the requirements for the zone in which they are located for new construction, including the elevation and anchoring requirements in this ordinance; or,
2. All recreational vehicles placed on sites must either
 - a. Be on the site for fewer than 180 consecutive days, be fully licensed and ready for highway use (a recreational vehicle is ready for highway use if it is on its wheels or jacking system, is attached to the site only by quick disconnect type utilities and security devices and has no permanently attached additions); or
 - b. Where allowed under the general zoning regulations of this Chapter, may be kept on the site for 180 days or more when all applicable floodplain standards for manufactured homes are complied with.

(Amended "D" and Added (1-2) 3-28-16-Effective Upon Passage)

(Added Entire Section 10-14-08-Effective Upon Passage)

175-81.1 STANDARDS FOR APPROXIMATED FLOODPLAIN

A. When base flood elevation data or floodway data have not been provided, the Zoning Administrator shall obtain, review, and reasonably utilize any base flood elevation and floodway data available from a federal, state, or any other source, in order to administer the provisions of Section. When such base flood elevation data is utilized, the Zoning Administrator shall obtain:

1. The elevation (in relation to the mean sea level) of the lowest floor (including the basement) of all new and substantially improved structures; and,
2. If the structure has been flood-proofed in accordance with the requirements of Section 175-81(B) of this ordinance, the elevation in relation to the mean sea level to which the structure has been flood-proofed.

B. When the data is not available from any source as in Section 175-81.1(A), the lowest floor of the structure shall be elevated to no lower than one (1) foot above the highest adjacent grade.

C. Base flood elevation data shall be provided for subdivision proposals and other proposed development proposals that exceed fifty lots or five acres, whichever is the lesser.

D. Standards for Subdivision Proposals.

1. All subdivision proposals shall be consistent with the need to minimize flood damage;

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2. All subdivision proposals shall have public utilities and facilities such as sewer, gas, electrical and water systems located and constructed to minimize flood damage;
3. All subdivision proposals shall have adequate drainage provided to reduce exposure to flood hazards, and
4. Base flood elevation data shall be obtained from other sources or developed using detailed methodologies, hydraulic and hydrologic analysis, comparable to those contained in a Flood Insurance Study for all major subdivision proposals and major site development plans, as defined under Chapter 148 of the Town Code.

(Added "D" 3-28-16-Effective Upon Passage)

E. Existing Structures in the Floodplain Areas. Any structure or use of a structure or premises must be brought into conformity with these provisions when it is changed, repaired, or improved, unless one of the following exceptions is established before the change is made:

1. The floodplain manager has determined that
 - a. change is not a substantial repair or substantial improvement; and,
 - b. no new square footage is being built in the floodplain that is not complaint; and,
 - c. no new square footage is being built in the floodway; and,
 - d. the change complies with this ordinance and the VA USBC; and,
 - e. the change, when added to all the changes made during a rolling 5 year period does not constitute 50% of the structure's value.
2. The changes are required to comply with a citation for a health or safety violation.
3. The structure is a historic structure and the change required would impair the historic nature of the structure.

(Added "E" 3-28-16-Effective Upon Passage)

(Added Entire Section 10-14-08-Effective Upon Passage)

175-81.2 STANDARDS FOR THE FLOODWAY DISTRICT

The following provisions shall apply within the Floodway District:

Encroachments, including fill, new construction, substantial improvements and other developments are prohibited unless certification (with supporting technical data) by a registered professional engineer is provided demonstrating that encroachments shall not result in any increase in flood levels during occurrence of the base flood discharge. The preceding uses, activities and development occurring within any floodway district shall be undertaken only upon the issuance of Chapter 175 TOWN OF FRONT ROYAL MUNICIPAL CODE Chapter 175

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a Special Use Permit. Development activities in which an increase in the water surface elevation of the base flood may be allowed, provided that the applicant first applies – with the Town of Front Royal endorsement – for a conditional Flood Insurance Rate Map and floodway revision, and receives the approval of the Federal Emergency Management Agency. However, other activities such as demolition in which there is not an increase in the water surface elevation, will require a zoning permit in lieu of a special use permit.

175-81.3 FLOODPLAIN VARIANCES: FACTORS TO BE CONSIDERED

A. Variances shall be issued only upon (i) a showing of good and sufficient cause, (ii) after the Board of Zoning Appeals has determined that failure to grant the variance would result in exceptional hardship to the applicant, and (iii) after the Board of Zoning Appeals has determined that the granting of such variance will not result in (a) unacceptable or prohibited increases in flood heights, (b) additional threats to public safety, (c) extraordinary public expense; and will not (d) create nuisances, (e) cause fraud or victimization of the public, or (f) conflict with local laws or ordinances.

B. While the granting of variances generally is limited to a lot size less than one-half acre, deviations from that limitation may occur. However, as the lot size increases beyond one- half acre, the technical justification required for issuing a variance increases. Variances may be issued by the Board of Zoning Appeals for new construction and substantial improvements to be erected on a lot of one-half acre or less in size contiguous to and surrounded by lots with existing structures constructed below the base flood level, in conformance with the provisions of this section.

C. Variances may be issued for new construction and substantial improvements and for other development necessary for the conduct of a functionally dependent use provided that the criteria of this section are met, and the structure or other development is protected by methods that minimize flood damages during the base flood and create no additional threats to public safety.

D. In passing upon applications for variances, the Board of Zoning Appeals shall satisfy all relevant factors and procedures specified in other sections of the zoning ordinance and consider the following additional factors:

(Added (A-D) 3-28-16-Effective Upon Passage)

1. The showing of good and sufficient cause.
2. The danger to life and property due to increased flood heights or velocities caused by encroachments. No variance shall be granted for any proposed use, development, or activity within any Floodway District that will cause any increase in the Special Flood Hazard Area elevation.
3. The danger that materials may be swept on to other lands or downstream to the injury of others.

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4. The proposed water supply and sanitation systems and the ability of these systems to prevent disease, contamination, and unsanitary conditions.
5. The susceptibility of the proposed facility and its contents to flood damage and the effect of such damage on the individual owners.
6. The importance of the services provided by the proposed facility to the community.
7. The requirements of the facility for a waterfront location.
8. The availability of alternative locations not subject to flooding for the proposed use.
9. The compatibility of the proposed use with existing development and development anticipated in the foreseeable future.
10. The relationship of the proposed use to the comprehensive plan and floodplain management program for the area.
11. The safety of access by ordinary and emergency vehicles to the property in time of flood.

12. The expected heights, velocity, duration, rate of rise, and sediment transport of the flood waters expected at the site.
13. The historic nature of a structure. Variances for repair or rehabilitation of historic structures may be granted upon a determination that the proposed repair or rehabilitation will not preclude the structure's continued designation as a historic structure and the variance is the minimum necessary to preserve the historic character and design of the structure.

(Added (13) 3-28-16-Effective Upon Passage)

14. Such other factors which are relevant to the purposes of this ordinance.
 - E. The Board of Zoning Appeals may refer any application and accompanying documentation pertaining to any request for a variance to any engineer or other qualified person or agency for technical assistance in evaluating the proposed project in relation to flood heights and velocities, and the adequacy of the plans for flood protection and other related matters.

(Amended 3-28-16-Effective Upon Passage)

- F. Variances shall be issued only after the Board of Zoning Appeals has determined that the variance will be the minimum required to provide relief from exceptional hardship to the applicant.

- G. The Board of Zoning Appeals shall notify the applicant for a variance, in writing, that the issuance of a variance to construct a structure below the Special Flood Hazard Area elevation (a) increases the risks to life and property and (b) will result in increased premium rates for flood insurance.

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- H. A record shall be maintained of the above notification as well as all variance actions, including justification for the issuance of the variances. Any variances that are issued shall be noted in the annual or biennial report submitted to the Federal Insurance Administrator.

(Added Entire Section 10-14-08-Effective Upon Passage

5. Link to current hazard mitigation plan

http://www.nsvregion.org/assets/NSV_Hazard_Mitigation_Plan_2018.pdf

6. Link to current comprehensive plan

<https://www.frontroyalva.com/618/Comprehensive-Plan>

7. Social vulnerability index scores for project area

Virginia Vulnerability Index- Front Royal, VA

Source: http://cmap2.vims.edu/SocialVulnerability/SocioVul_SS.html

NOTES: Town of Front Royal Corporate Limits are comprised of Census Tracts 206.01, 205, 204, & 203. Vulnerability Index Scores shown below:

Social Vulnerability (1 of 1)

Social Vulnerability Index Classification: Low Social Vulnerability
Vulnerability Index Score: -0.3
Housing Vulnerability: other
Housing Characteristics: no significant characteristics.
Tract Name: Census Tract 206.01, Warren County, Virginia

[Learn More](#)

Social Vulnerability Classification (2 of 2)

Social Vulnerability Status: Not Socially Vulnerable
Socio-Economic Characteristics: No extreme values
Tract Name: Census Tract 206.01, Warren County, Virginia

[Learn More](#)

Social Vulnerability (2 of 2)

Social Vulnerability Index Classification: Moderate Social Vulnerability
Vulnerability Index Score: 0.4
Housing Vulnerability: other
Housing Characteristics: other
Tract Name: Census Tract 205, Warren County, Virginia

[Learn More](#)

Social Vulnerability Classification (2 of 2)

Social Vulnerability Status: Not Socially Vulnerable
Socio-Economic Characteristics: No extreme values
Tract Name: Census Tract 205, Warren County, Virginia

[Learn More](#)

Social Vulnerability (3 of 3)

Social Vulnerability Index Classification: Moderate Social Vulnerability
Vulnerability Index Score: 0.7
Housing Vulnerability: other
Housing Characteristics: other
Tract Name: Census Tract 204, Warren County, Virginia

[Learn More](#)

Social Vulnerability Classification (3 of 3)

Social Vulnerability Status: Not Socially Vulnerable
Socio-Economic Characteristics: No extreme values
Tract Name: Census Tract 204, Warren County, Virginia

[Learn More](#)

Social Vulnerability (4 of 4)

Social Vulnerability Index Classification: Moderate Social Vulnerability
Vulnerability Index Score: 0.0
Housing Vulnerability: other
Housing Characteristics: other
Tract Name: Census Tract 203, Warren County, Virginia

[Learn More](#)

Social Vulnerability Classification (4 of 4)

Social Vulnerability Status: Not Socially Vulnerable
Socio-Economic Characteristics: Mixed non-vulnerable, moderately high attorney population, moderate income, moderate income social security, high average home population, moderately high poverty levels, low education
Tract Name: Census Tract 203, Warren County, Virginia

[Learn More](#)

Virginia Vulnerability Viewer

A callout box displays the following information for Census Tract 203:

- Social Vulnerability Index Classification: Moderate Social Vulnerability
- Vulnerability Index Score: 0.0
- Housing Vulnerability: other
- Housing Characteristics: other
- Tract Name: Census Tract 203, Warren County, Virginia

Census Tract Number	Social Vulnerability Index Score
206.01	-0.3
205	0.4
204	0.7
203	0.0
Average Score in Project Area	
0.2	

8. Authorization to request funding from
the Fund from governing body of the
local government



TOWN OF FRONT ROYAL
TOWN MANAGERS OFFICE
102 E. MAIN STREET
PO BOX 1560
FRONT ROYAL, VIRGINIA 22630-1560
(540) 635-8007

STEVEN W. HICKS
Town Manager
shicks@frontroyalva.com

April 6, 2022

RE: Floodplain Study

The Town of Front Royal is requesting ninety thousand dollars (\$90,000) for a one hundred thousand dollar (\$100,000) Community Flood Preparedness Fund Grant. The Town of Front Royal will contribute ten thousand dollars (\$10,000) from the general fund and agree to pay the cash contribution during the agreement period. The grant will pay for the Flood Plain Study for the Town of Front Royal.

Sincerely,

A handwritten signature in black ink that reads "Steven W. Hicks".

Steven W. Hicks



CFPF, rr <cfpf@dcr.virginia.gov>

CFPF Grant Application- Round 3- Front Royal (CID# 510167)

1 message

Brian Finerfrock <bfinerfrock@rkk.com>
To: "cfpf@dcr.virginia.gov" <cfpf@dcr.virginia.gov>
Cc: Lauren Kopishke <lkopishke@frontroyalva.com>, Kathleen Leidich <kleidich@frontroyalva.com>

Fri, Apr 8, 2022 at 10:01 AM

On behalf of the Town of Front Royal, we are pleased to be submit CFPF Grant Application for a Flood Study. If you have any trouble with the attachment, please contact me.

Brian Finerfrock, PE

Manager



12600 Fair Lakes Circle, Suite 300

Fairfax, VA 22033

703.259.3719 D | 540.660.2542 C

www.rkk.com

Responsive People | Creative Solutions

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