1952 - BATTLEFIELD BOULEVARD ROAD ELEVATION PROJECT

Application Details

Funding Opportunity:	1447-Virginia Community Flood Preparedness Fund - Project Grants - CY23 Round 4
Funding Opportunity Due Date:	Nov 12, 2023 11:59 PM
Program Area:	Virginia Community Flood Preparedness Fund
Status:	Under Review
Stage:	Final Application
Initial Submit Date:	Nov 8, 2023 3:30 PM
Initially Submitted By:	Crystal Bloom
Last Submit Date:	
Last Submitted By:	

Contact Information

Primary Contact Information

Active User*:	Yes
Type:	External User
Name*:	Mrs. (Salutation) Crystal (First Name) V (Middle Name) Bloom (Last Name)
Title:	Engineering Manager
Email*:	cbloom@cityofchesapeake.net
Address*:	306 Cedar Road
	Chesapeake (City) Virginia (State/Province) 23322 (Postal Code/Zip)
Phone*:	757-382-6101 Ext. (Phone ###-###-####)
Fax:	###-###-####
Comments:	

Organization Information

Status*:	Approved
Name*:	CHESAPEAKE, CITY OF
Organization Type*:	Local Government
Tax ID*:	30-0721442
Unique Entity Identifier (UEI)*:	GLBPCNCAQ4S4

Organization Website: https://www.cityofchesapeake.net/

Address*: City of Chesapeake

306 Cedar Road

Chesapeake (City) Virginia (State/Province) 23322- (Postal Code/Zip)

Phone*: (757) 382-6101 Ext.
###-###-####

Fax: ###-###-####

Benefactor:

Vendor ID:

Comments:

VCFPF Applicant Information

Project Description

Name of Local Government*: City of Chesapeake

Your locality's CID number can be found at the following link: Community Status Book Report

NFIP/DCR Community Identification Number (CID)*: 510034

If a state or federally recognized Indian tribe,

Name of Tribe:

Authorized Individual*: Crystal (First Name) Bloom (Last Name)

Mailing Address*: 306 Cedar Road
Address Line 1

Address Line 2

Chesapeake (City) Virginia (State) 23322 (Zip Code)

Telephone Number*: 757-382-6101

Cell Phone Number*: 757-621-7881

Email*: cbloom@cityofchesapeake.net

Is the contact person different than the authorized individual?

Contact Person*: Yes

Contact: Deva (First Name) Borah (Last Name)

306 Cedar Road
Address Line 1

Address Line 2

Chesapeake (City) Virginia (State) 23322 (Zip Code)

Telephone Number: 757-382-6101

Cell Phone Number: 757-382-6472

Email Address: dborah@cityofchesapeake.net

Enter a description of the project for which you are applying to this funding opportunity

Project Description*:

The proposed project will raise the roadway of Battlefield Blvd above the 100-year floodplain along a 1,800' segment of the road stretching north from where it crosses the Elizabeth River. The road, which is currently 4 ft above sea level at its lowest point, would be raised up to 3 ft to a new elevation of 7 ft above sea level. The project will address tidal, storm surge, and rain-driven flooding & improve transportation and public and mental health by providing a more secure evacuation route.

Low-income geographic area means any locality, or community within a locality, that has a median household income that is not greater than 80 percent of the local median household income, or any area in the Commonwealth designated as a qualified opportunity zone by the U.S. Secretary of the Treasury via his delegation of authority to the Internal Revenue Service. A project of any size within a low-income geographic area will be considered.

Is the proposal in this application intended to benefit a low-income geographic area as defined above?

Benefit a low-income geographic area*: Yes

Information regarding your census block(s) can be found at census.gov

Census Block(s) Where Project will Occur*: 1010 and 1011 of 209.07

Is Project Located in an NFIP Participating Community?*: Yes

Is Project Located in a Special Flood Hazard Area?*: Yes

Flood Zone(s) (if applicable): Zone AE (el 7)

Flood Insurance Rate Map Number(s) (if applicable): 5100340038D

Eligibility CFPF - Round 4 - Projects

Eligibility

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)?

Local Government*: Yes

Yes - Eligible for consideration
No - Not eligible for consideration

Does the local government have an approved resilience plan and has provided a copy or link to the plan with this application?

Resilience Plan*: Yes

Yes - Eligible for consideration under all categories
No - Eligible for consideration for studies, capacity building, and planning only

If the applicant is not a town, city, or county, are letters of support from all affected local governments included in this application?

Letters of Support*: N/A

Yes - Eligible for consideration
No - Not eligible for consideration
N/A - Not applicable

Has this or any portion of this project been included in any application or program previously funded by the Department?

Previously Funded*: No

Yes - Not eligible for consideration
No - Eligible for consideration

Has the applicant provided evidence of an ability to provide the required matching funds?

Evidence of Match Funds*: Yes

Yes - Eligible for consideration
No - Not eligible for consideration
N/A - Match not required

Scoring Criteria for Flood Prevention and Protection Projects - Round 4

Scoring

Category Scoring:
Hold CTRL to select multiple options

Project Category*: All other projects

Is the project area socially vulnerable? (based on ADAPT Virginia?s Social Vulnerability Index Score)
Social Vulnerability Scoring:
Very High Social Vulnerability (More than 1.5)
High Social Vulnerability (1.0 to 1.5)
Moderate Social Vulnerability (0.0 to 1.0)
Low Social Vulnerability (-1.0 to 0.0)
Very Low Social Vulnerability (Less than -1.0)

Socially Vulnerable*: Moderate Social Vulnerability (0.0 to 1.0)

Is the proposed project part of an effort to join or remedy the community?s probation or suspension from the NFIP?

NFIP*: No

Is the proposed project in a low-income geographic area as defined below?
"Low-income geographic area" means any locality, or community within a locality, that has a median household income that is not greater than 80 percent of the local median household income, or any area in the Commonwealth designated as a qualified opportunity zone by the U.S. Secretary of the Treasury via his delegation of authority to the Internal Revenue Service. A project of any size within a low-income geographic area will be considered.

Low-Income Geographic Area*: Yes

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?

Reduction of Nutrient and Sediment Pollution*: Yes

Does this project provide ?community scale? benefits?

Community Scale Benefits*: More than one census block

Expected Lifespan of Project

Expected Lifespan of Project*: Over 20 Years

Comments:

Expected Useful Life 50 years

Scope of Work - Projects - Round 4

Scope of Work

Upload your Scope of Work
Please refer to Part IV, Section B. of the grant manual for guidance on how to create your scope of work

Scope of Work*: SCOPEofWORKnarrative_Battlefield.pdf

Comments:

Provided is a Scope Narrative as required by the 2023 Funding Manual. All Scope of Work Narrative General Requirements in IV. B 1-4 as well as the Supporting Documents for Project Applications have been addressed in this narrative.

Budget Narrative

Budget Narrative Attachment*: BudgetNarrative_Battlefield.pdf

Comments:

As a project that benefits a low-income area, the required match is only 15%. The amount requested is only ~69% of the total cost, less than the 85% allowable. The City is able to contribute a higher percentage match than the 15% required.

Scope of Work Supporting Information - Projects

Supporting Information - Projects

Provide population data for the local government in which the project is taking place

Population*: 249422.00

Provide information on the flood risk of the project area, including whether the project is in a mapped floodplain, what flood zone it is in, and when it was last mapped. If the property or area around it has been flooded before, share information on the dates of past flood events and the amount of damage sustained

Historic Flooding data and Hydrologic Studies*: b_HistFloodData.pdf

Include studies, data, reports that demonstrate the proposed project minimizes flood vulnerabilities and does not create flooding or increased flooding (adverse impact) to other properties

No Adverse Impact*: c_NoAdvImpact.pdf

Include supporting documents demonstrating the local government's ability to provide its share of the project costs. This must include an estimate of the total project cost, a description of the source of the funds being used, evidence of the local government's ability to pay for the project in full or quarterly prior to reimbursement, and a signed pledge agreement from each contributing organization

Ability to Provide Share of Cost*: d_AbilityShareCost.pdf

A benefit-cost analysis must be submitted with the project application

Benefit-Cost Analysis*: e_BCAnarrative.pdf

Provide a list of repetitive loss and/or severe repetitive loss properties. Do not provide the addresses for the properties, but include an exact number of repetitive loss and/or severe repetitive loss structures within the project area

Repetitive Loss and/or Severe Repetitive Loss Properties*: g_i_RLproperties.pdf

Describe the residential and commercial structures impacted by this project, including how they contribute to the community such as historic, economic, or social value. Provide an exact number of residential structures and commercial structures in the project area

Residential and/or Commercial Structures*:

Description of the Area: The project is identified in the City of Chesapeake's 2002 Hazard Vulnerability Assessment and in the 2022 Hampton Roads Hazard Mitigation Plan, which is incorporated by reference into the DCR-approved City of Chesapeake Resilience Plan. Currently, this project directly benefits the Harbor Watch condominiums (pop.356), but it should be noted that this will be a foundational project that has the ability, in conjunction with other future projects to impact large portions of the communities directly south of the project site. Approximately 70,000 residents are located south of Battlefield Blvd and are impacted by road closures along this evacuation route. This project will therefore benefit approximately 27% of the overall population.

Exact number of residential structures and commercial structures within the project area: There are 237 residential structures and 18 commercial structures in the project area.

If there are critical facilities/infrastructure within the project area, describe each facility

Critical Facilities/Infrastructure*:

none

Explain the local government's financial and staff resources. How many relevant staff members does the local government have? To what relevant software does the local government have access? What are the local government's capabilities?

Financial and Staff Resources*:

The majority of City infrastructure improvements are funded through the Capital Improvement Budget. The approved FY24 CIB is available at: https://www.cityofchesapeake.net/DocumentCenter/View/12906/FY-2024-to-28-Adopted-Capital-Improvement-Program-PDF?bidId=
Number of relevant staff members:
- 1 Floodplain Administrator
- 1 additional Certified Floodplain Manager
- 7 Civil Engineers
- 1 Plan Review & Codes Administrator
- 1 Permit Services Administrator
- 1 Principal Planner
- 2 Senior Planners
- 1 Deputy Coordinator of Emergency Management

Relevant Software: Accela for plan review, numerous stormwater modeling programs (SWMM, Autodesk Hydraflow, Autodesk Storm & Sewer Analysis, Bentley Civil Storm, Culvert Master, etc.), Microsoft Office Suite, ArcGIS

Capabilities: The City has several teams within Public Works to manage the study, design and construction work performed by consultants and contractors. One of the teams also takes on in-house design for small projects that can be accomplished using on-call contractors. There is a team

that focuses solely on managing construction and includes engineers as well as inspectors.

Identify and describe the goals and objectives of the project. Include a description of the expected results of the completed project and explain the expected benefits of the project. This may include financial benefits, increased awareness, decreased risk, etc.

Goals and Objectives*:

The project will address transportation, public and mental health, providing a more secure evacuation route by elevating the lowest segment of the Road to above the 100 yr event, thereby removing the roadway from the 100-year floodplain, within the 3-year performance period allowed by the program. The project will address tidal flooding by storms or Hurricanes as well as heavy rain flooding events. The road lies within the FEMA 100-year floodplain and is anticipated to be regularly impacted by sea level rise by 2030. For additional rain and flooding information as well as the calculation of project benefits, refer to BCA report and documentation included as Attachment B.

The community lifelines addressed by this project include transportation and safety & security. The project reduces vulnerability of the community main evacuation route to flooding events by lessening disruptions to critical services.

Long-term changes to the protected areas are anticipated to include increased flooding due to sea level rise and a projected increase in the intensity and potential frequency of precipitation events. These changes bring about and heighten existing flood risks in the area and the potential disruption of access to multiple lifelines for local communities. When implemented, the project would mitigate these risks, particularly risks in accessing critical lifelines including health and medical facilities, essential transportation infrastructure (including mass transit), and safety and security. The project would specifically enable access to health and safety lifelines for local hospitals and medical facilities including Chesapeake Regional Medical Center, while supporting the City of Chesapeake Flood Management Program. By enabling access routes to residential and commercial areas in the local community, this project will also support faster response (including evacuation and reduced emergency response time) and enhance recovery time in the case of a future, 100- or 500-year flood event.

Please see the Goals and Objectives section of the Scope of Work Narrative for additional details.

Outline a plan of action laying out the scope and detail of how the proposed work will be accomplished with a timeline identifying expected completion dates. Determine milestones for the project that will be used to track progress. Explain what deliverables can be expected at each milestone, and what the final project deliverables will be. Identify other project partners

Approach, Milestones, and Deliverables*: Approach.pdf

Where applicable, briefly describe the relationship between this project and other past, current, or future resilience projects. If the applicant has received or applied for any other grants or loans, please identify those projects, and, if applicable, describe any problems that arose with meeting the obligations of the grant and how the obligations of this project will be met

Relationship to Other Projects*:

There is no relationship between this project and any other past, present, or future resilience project.

The City has applied for the following CFPF grants:
- Grant Round 1
o Planning & Capacity Building - Resilience Plan (awarded)
o Study - Southern Chesapeake Watershed 5 (awarded)
- Grant Round 3
o Study - Goose Creek Watershed (awarded)
o Project - Greenbrier Outfall Resiliency Improvements (awarded)
o Project - Oakdale Area BMP and Drainage Improvements (not awarded)

There have not been any problems that have arisen with meeting the obligations of any of the grants.

The obligations of this project grant will be met by contracting with a consultant to perform study and design which will be overseen and managed by City staff in the Public Works Department.

For ongoing projects or projects that will require future maintenance, such as infrastructure, flood warning and response systems, signs, websites, or flood risk applications, a maintenance, management, and monitoring plan for the projects must be provided

Maintenance Plan*: BattlefieldMaintPlanNarrative.pdf

Describe how the project meets each of the applicable scoring criteria contained in Appendix B. Documentation can be incorporated into the Scope of Work Narrative

Criteria*:

Appendix B is the Budget Narrative Template, assuming this is asking about criteria in Appendix D.

SCORING CRITERIA PER CATEGORY
Projects
Eligible Projects, 10 points.
- All other projects (10), Removal or relocation of structures from flood-prone areas where the land will not be returned to open space

Social Vulnerability Index Score, 5 points.
- Moderate Social Vulnerability (0.0 to 1.0) (5)
The project area has a SVI score of 0.57; see Attachment D.

Community scale of benefits, 30 points.
- More than one census block (30)
The project benefits approximately 27% of the population of Chesapeake and is located in census blocks 1010 & 1011 of 209.07

Expected lifespan of project, 10 points.
- Over 20 Years (10)
Expected Useful life is 50 years

Remedy for NFIP probation or suspension, 0 points.
No, the City of Chesapeake is in good standing with the NFIP.

Proposed project part of a low-income geographic area, 10 points.
Yes, the project is located in census tract 209.07, which has a median household income of less than 73% of that of the City of Chesapeake.

Proposed project implements a Chesapeake Bay TMDL BMP, yes 5
Yes, there is a living shoreline proposed with the road elevation project that can be applied towards the Chesapeake Bay TMDL.

Budget

Budget Summary

Grant Matching Requirement*:	LOW INCOME - All other Projects Fund 85%/Match 15%
I certify that my project is in a low-income geographic area:	Yes
Total Project Amount*:	$10,200,000.00
REQUIRED Match Percentage Amount:	$1,530,000.00

BUDGET TOTALS

Before submitting your application be sure that you meet the match requirements for your project type.

Match Percentage:	31.37% Verify that your match percentage matches your required match percentage amount above.
Total Requested Fund Amount:	$7,000,000.00
Total Match Amount:	$3,200,000.00
TOTAL:	$10,200,000.00

Personnel

Description	Requested Fund Amount	Match Amount	Match Source
No Data for Table			

Fringe Benefits

Description	Requested Fund Amount	Match Amount	Match Source
No Data for Table			

Travel

Description	Requested Fund Amount	Match Amount	Match Source
No Data for Table			

Equipment

Description	Requested Fund Amount	Match Amount	Match Source
No Data for Table			

Supplies

Description	Requested Fund Amount	Match Amount	Match Source
No Data for Table			

Construction

Description	Requested Fund Amount	Match Amount	Match Source
construction contract - see Cost Estimate provided as Attachment F	$4,795,295.00	$2,192,134.00	CIB
	$4,795,295.00	**$2,192,134.00**	

Contracts

Description	Requested Fund Amount	Match Amount	Match Source
design & cei - see Cost Estimate provided as Attachment F	$1,411,029.00	$645,042.00	CIB
	$1,411,029.00	**$645,042.00**	

Maintenance Costs

Description	Requested Fund Amount	Match Amount	Match Source
No Data for Table			

Pre-Award and Startup Costs

Description	Requested Fund Amount	Match Amount	Match Source
No Data for Table			

Other Direct Costs

Description	Requested Fund Amount	Match Amount	Match Source
property/easement acquisition - see Cost Estimate provided as Attachment F	$793,676.00	$362,824.00	CIB
	$793,676.00	**$362,824.00**	

Long and Short Term Loan Budget - Projects - VCFPF

Budget Summary

Are you applying for a short term, long term, or no loan as part of your application?

If you are not applying for a loan, select "not applying for loan" and leave all other fields on this screen blank

Long or Short Term*:	Not Applying for Loan
Total Project Amount:	$0.00
Total Requested Fund Amount:	$0.00
TOTAL:	$0.00

Salaries

Description	Requested Fund Amount
No Data for Table	

Fringe Benefits

Description	Requested Fund Amount
No Data for Table	

Travel

Description	Requested Fund Amount
No Data for Table	

Equipment

Description	Requested Fund Amount
No Data for Table	

Supplies

Description	Requested Fund Amount
No Data for Table	

Construction

Description	Requested Fund Amount
No Data for Table	

Contracts

Description	Requested Fund Amount
No Data for Table	

Other Direct Costs

Description	Requested Fund Amount
No Data for Table	

Supporting Documentation

Supporting Documentation

Named Attachment	Required	Description	File Name	Type	Size	Upload Date
Detailed map of the project area(s) (Projects/Studies)		project area maps	AttA_Maps.pdf	pdf	5 MB	11/08/2023 10:39 AM
FIRMette of the project area(s) (Projects/Studies)		See Appendix C of this BCA Report, included as Attachment B	AttB_VDEM-City of Chesapeake-N Battlefield Blvd-BCA Report.pdf	pdf	10 MB	11/06/2023 02:20 PM
Historic flood damage data and/or images (Projects/Studies)		Attachment G is the Flood History developed for BRIC 2022. Also See Appendix D of the BCA report, already provided as Attachment B	AttG_Flood Hazards from BRIC 2022.pdf	pdf	61 KB	11/06/2023 02:34 PM
A link to or a copy of the current floodplain ordinance		https://www.cityofchesapeake.net/DocumentCenter/View/7220/ADOPTED-Floodplain-Ordinance-7-16-2013-PDF?bidId=	AppC_Checklist.pdf	pdf	235 KB	11/08/2023 10:01 AM
Maintenance and management plan for project		comprehensive monitoring, inspection, and maintenance plan	AttC_PAVEMENT MAINTENANCE BINDER.pdf	pdf	21 MB	11/08/2023 11:42 AM
A link to or a copy of the current hazard mitigation plan		https://www.hrpdcva.gov/departments/emergency-management/2022-hampton-roads-hazard-mitigation-plan	AppC_Checklist.pdf	pdf	235 KB	11/08/2023 10:05 AM
A link to or a copy of the current comprehensive plan		https://resources.cityofchesapeake.net/comp-plan-2035/#page=1y	AppC_Checklist.pdf	pdf	235 KB	11/08/2023 10:06 AM
Social vulnerability index score(s) for the project area		0.57, Moderate Social Vulnerability, see Attachment D	AttD_SVI_Battlefield.docx	docx	1 MB	11/06/2023 02:22 PM
Authorization to request funding from the Fund from governing body or chief executive of the local government		funding request authorization & city council resolution	AttE_auth.pdf	pdf	1 MB	11/08/2023 10:41 AM
Signed pledge agreement from each contributing organization						
Maintenance Plan		comprehensive monitoring, inspection, and maintenance plan	AttC_PAVEMENT MAINTENANCE BINDER.pdf	pdf	21 MB	11/08/2023 11:42 AM

Benefit-cost analysis must be submitted with project applications over $2,000,000. in lieu of using the FEMA benefit-cost analysis tool, applicants may submit a narrative to describe in detail the cost benefits and value. The narrative must explicitly indicate the risk reduction benefits of a flood mitigation project and compares those benefits to its cost-effectiveness.

Benefit Cost Analysis		See the BCA report prepared for this project to accompany a BRIC 2022 application, included as Attachment B. Note that project costs have been revised since the development of that BCA report to reflect recent bids on similar projects. The current cost estimate and additional BCA discussion is provided as Attachment F.	AttB_VDEM-City of Chesapeake-N Battlefield Blvd-BCA Report.pdf	pdf	10 MB	11/06/2023 02:35 PM
Other Relevant Attachments		current cost estimate for project	AttF_N Battlefield Blvd Cost Estimate.pdf	pdf	87 KB	11/06/2023 02:30 PM

Letters of Support

Description	File Name	Type	Size	Upload Date
No files attached.				

Resilience Plan

Resilience Plan

Description	File Name	Type	Size	Upload Date
DCR-approved resilience plan	CID510034.Chesapeake.preliminaryresilienceplan.pdf	pdf	7 MB	11/06/2023 02:17 PM

PRELIMINARY RESILIENCE PLAN

CITY OF CHESAPEAKE, VIRGINIA

April 2022

PREPARED FOR:

THE CITY OF CHESAPEAKE

PREPARED BY:

TIMMONS GROUP
YOUR VISION ACHIEVED THROUGH OURS.

2901 S Lynnhaven Road, Suite 200

Virginia Beach, Virginia 23452

757.213.6679

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Executive Summary

The City of Chesapeake has developed this Preliminary Resilience Plan (Plan) to meet the requirements of the Department of Conservation and Recreation (DCR) Community Flood Preparedness Fund (CFPF) grant program. The Plan was developed using funding awarded during the inaugural round of the CFPF program. The Plan was crafted to incorporate all Resilience Plan requirements and criteria as provided in the 2022 Grant Manual for the Virginia Community Flood Preparedness Fund.

In addition to the overarching five (5) requirements for the Plan as provided below, the Plan incorporates all Elements of Resilience Plans (as provided in Appendix G of the Grant Manual) hereafter referred to as criteria. A guide those criteria and associated reference documents can be found in Appendix A while Plan content that addresses corresponding criteria is referenced throughout the Plan as "[c#]" at the end of applicable statements.

- It is project-based with projects focused on flood control and resilience
- It incorporates nature-based infrastructure to the maximum extent possible
- It includes considerations of all parts of a local government regardless of socioeconomics or race
- It includes coordination with other local and interjurisdictional projects, plans, and activities and has a clearly articulated timeline or phasing for plan implementation
- Is based on the best available science, and incorporates climate change, SLR, storm surge (where appropriate), and current flood maps

This Plan was developed by compiling a wide range of existing City of Chesapeake and regional documents and was done in collaboration with multiple City departments, though sponsored by the Department of Public Works. The Plan provides narrative on the requirements defined in the CFPF Grant Manual and has been organized into four (4) main sections:

Section 1, Introduction, provides a description of the Plan development process and a brief history of Chesapeake with respect to flooding.

Section 2, Natural Hazards & Vulnerabilities, describes those hazards that threaten the City as well as where socially vulnerable populations intersect with those hazards.

Section 3, Current Efforts to Reduce Flooding & Develop Resilience, details the various efforts already undertaken or underway by the City and regional partners that relate to flooding and resilience.

Section 4, A Plan for Resilience, provides information on ongoing coordination efforts, the current science guiding resilience efforts, and those study, program, and project opportunities that the City of Chesapeake plans to explore looking forward. At this time, the City has identified twenty-six (26) projects representing planned improvements to improve flooding resilience. These projects vary in scope, cost, funding availability, and anticipated implementation.

Ultimately, the City of Chesapeake seeks continued participation in the CFPF program through identification and application for funding assistance for opportunities as they are identified and vetted.

1.0 Introduction

As a coastal community, the City of Chesapeake has the benefit of enjoying the habitat associated with shore access. Unfortunately, life in coastal regions also comes at a cost. Flooding vulnerabilities not only threaten the safety of residents, but also have the potential to damage or destroy property and disrupt the local economy and overall quality of life. While impending natural hazards are impossible to prevent, designing for resilience can minimize the damage done and prepare the City to bounce back better.

1.1 Plan Development Process

The City of Chesapeake intends to participate in the CFPF grant program. This funding program was established to provide support for Virginia's localities efforts in reducing impacts of flooding – including flooding driven by climate change. The CFPF program intends to prioritize projects coinciding with local, state, and federal floodplain management standards, local resilience plans, and the Virginia Coastal Resilience Master Plan. This Fund will empower communities to complete studies and implement programs to bolster flood preparedness and resilience.

According to the CFPF program, a Resilience Plan describes the entire local government's approach to flooding and addresses the following five (5) requirements:

- It is project-based with projects focused on flood control and resilience
- It incorporates nature-based infrastructure to the maximum extent possible
- It includes considerations of all parts of a local government regardless of socioeconomics or race
- It includes coordination with other local and interjurisdictional projects, plans, and activities and has a clearly articulated timeline or phasing for plan implementation
- Is based on the best available science, and incorporates climate change, SLR, storm surge (where appropriate), and current flood maps

Intended to elaborate on the City's intentions to establish a resilient community, this Plan identifies the vulnerabilities: physical, natural, and social, due to flooding, reviews the previous and ongoing efforts, and provides information related to future opportunities to combat flooding and develop resilience. The aim of the proposed projects included in the Plan is to strengthen flood management systems to reduce damage caused by flooding. These projects identify opportunities to address weaknesses or provide additional hazard reduction in the City of Chesapeake.

To assist in the development of this Plan, a document review process was undertaken to identify documents or portions thereof that could be combined to meet the requirements of a resilience plan as presented in the 2022 Grant Manual for the Virginia Community Flood Preparedness Fund. The list of documents reviewed can be found in Appendix B.

In addition to addressing the overarching five (5) requirements for the Plan as listed above, the Plan incorporates all fifteen (15) Elements of Resilience Plans (as provided in Appendix G of the Grant Manual) hereafter referred to as criteria. A guide those criteria and associated reference documents can be found in Appendix A while Plan content that addresses corresponding criteria is referenced throughout the Plan as "[c#]" at the end of applicable statements.

Development of the Plan was sponsored by the Department of Publics Works. However, other City departments – including Planning, Development and Permits, and Emergency Management – were invited to participate and had the opportunity to provide input and review and comment on the Plan. Supporting documents were sourced from departments throughout the City as well as from regional partners, including the Hampton Roads Planning District Commission.

1.2 Chesapeake's History

The banks of the Elizabeth River were first settled by the British around 1620 beginning Chesapeake's history [c14]. In the early 1900's, the northern sector of the Chesapeake region began to develop as a Southern Norfolk suburb outside the growing City of Norfolk. By 1900, South Suffolk had independent waterworks, public schools, and post office. Today's Chesapeake grew from residential and commercial development of community crossroads; some still referred to with established names, such as: Deep Creek, Fentress, Great Bridge, Hickory, Indian River, Oak Grove, Pleasant Grove, South Norfolk, Portlock, and Western Branch. In June of 1962, the citizens voted to select the name of the new city, "Chesapeake," as both Norfolk County and Southern Norfolk agreed to merge. The present City of Chesapeake was established in 1963 through the consolidation of the City of South Norfolk and Norfolk County[1].

The City of Chesapeake is a diverse and growing community with a heritage deeply rooted in the history of our developing nation. Chesapeake's landmarks and communities have a long and diverse history, stretching back to the early days of the Colony of Virginia. Over the last fifty (50) years, the City of Chesapeake has experienced unprecedented changes in population and land use, the majority of new housing units being single-family units. In 2017 the 224,640-acre community had a population of around 222,000 individuals, or approximately 1 person per acre of land area [c14]. Although the growth rate has declined in recent years, the City continues to grow at a rate of approximately 1% each year. An increase in flooding and natural hazards has accompanied growth experienced by the City[2]. Chesapeake is located partially in the Elizabeth River Watershed, a tributary of the James River Watershed, which can be seen in Figure 1, along with the Southern Watershed. Approximately 58,880 acres of the City, or 26%, drains to the Chesapeake Bay, primarily through the Elizabeth River. Approximately 167,040 acres, or 74%, of the City lies within the Southern Watershed area.

For decades, the City has been committed to stormwater management. Chesapeake was one of the first in Hampton Roads to become a Municipal Separate Storm Sewer System (MS4) in 1996 through the Virginia Pollutant Discharge Elimination System (VPDES) program as well as abiding by their Virginia Stormwater Management Program (VSMP) in place since 1991 [c11]. The City's Master Drainage Plans for specified regions and MS4 documents address the quality and quantity of our stormwater runoff while meeting state and federal regulations[3].

Upon observing tide elevation data for the last 100-years, it is evident the City is facing escalating danger from SLR[4]. The Code of Virginia mandates localities to plan for and address flooding and SLR. Flooding, SLR, coastal storms, and shoreline erosion are considered the most significant hazards that threaten Hampton Roads Region[5] [c3]. Floodplain management plans which cover floodplains and City studies that cover broad areas of the City combine

[1] (Hampton Roads Planning District Commission, 2017)
[2] (Hampton Roads Planning District Commission, 2017)
[3] (Whitman Requardt and Associates, LLC, 2018)
[4] (Hampton Roads Planning District Comission, 2017)
[5] (Hampton Roads Planning District Comission, 2017)

together to create a unified pattern of identified hazards beyond those just identified in the National Flood Insurance Program (NFIP). These examine issues such as causations of localized flooding, identify vulnerabilities due to flooding, analyze the locality flood management practices, and provide feasible solutions to strengthen the flood management system, reducing damages caused by flooding[6].

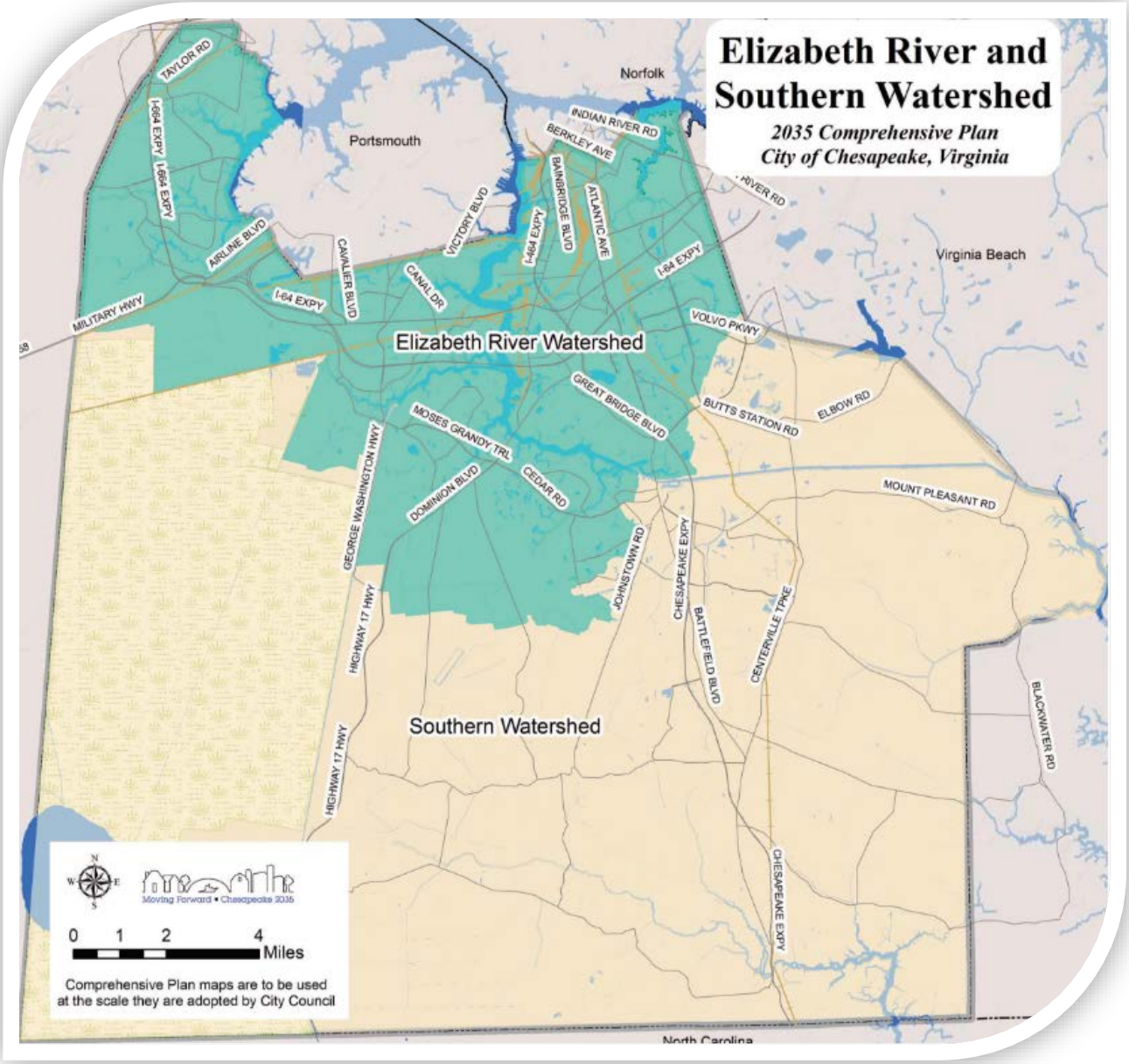


Figure 1: Elizabeth and Southern Watershed

[6] (Hampton Roads Planning District Comission, 2017)

2.0 Natural Hazards & Vulnerabilities

While natural hazards can be unavoidable, projects can be implemented to minimize the damage felt by the communities disturbed. Unfortunately, living in a coastal region means the likelihood of flooding events is elevated. Where communities most vulnerable to natural hazards coincide with societally vulnerable populations, addressing flooding in an equitable manner is essential. [c1]

2.1 Flooding & Related Hazards

Flooding is a major concern for a coastal city and has the potential to exacerbate other hazards and vulnerabilities. The City of Chesapeake experiences precipitation and tidal flooding, as well as the two in concert. The frequency and intensity of storms and consequently flooding events are increasing as a result of climate change, including sea level rise (SLR). In coastal areas, flood zones established by FEMA represent both riverine and coastal flooding hazards. However, what is often missing from these established data are localized areas of inland flooding. Chesapeake's floodplain can be seen in Figure 2[7]. [c3, c14]

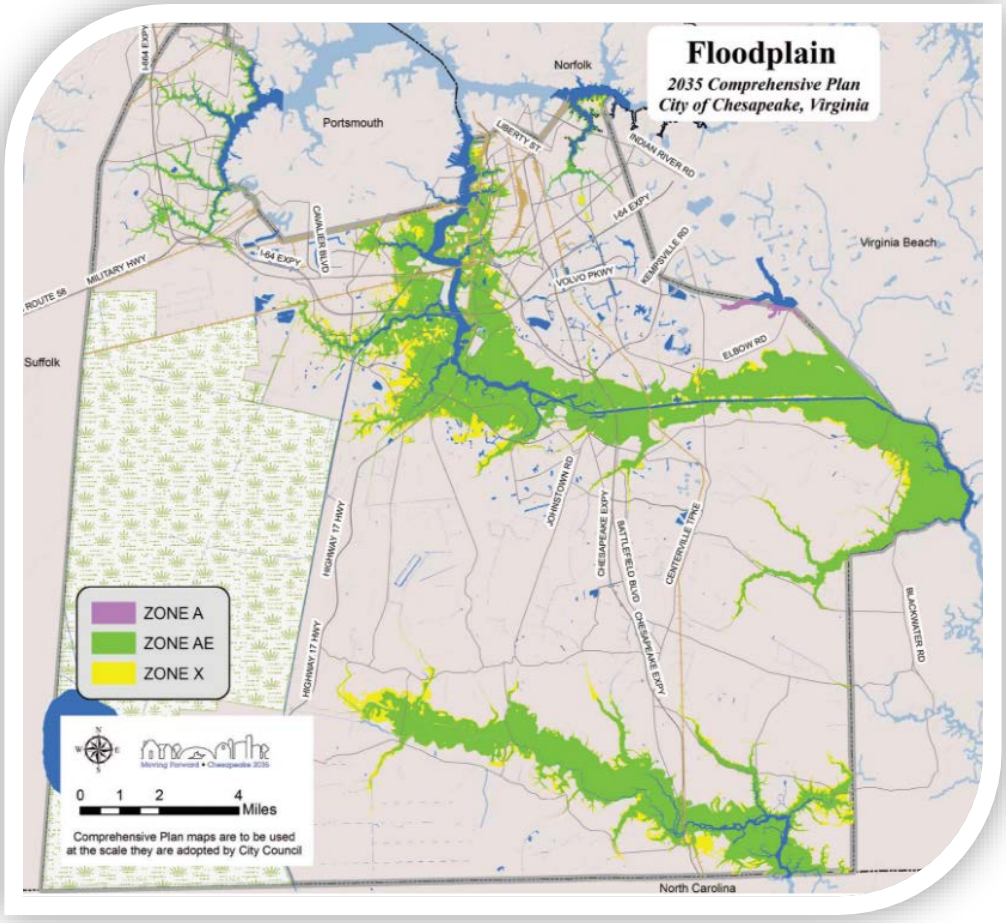


Figure 2: Floodplains in the City of Chesapeake

[7] (City of Chesapeake Planning Department, 2016)

- Zones A and AE shown are high flood risk areas, referred to as a 100-year (1% chance) floodplain
- Zone X (shaded) regions pose a moderate flood risk and is referred to as a 500-year (0.2% chance) floodplain.

Additionally, the city sees negative impacts of beavers and dams restricting flow in major outfall systems that results in flooding.

2.1.1 Precipitation Flooding

Old, undersized, stormwater infrastructure or lack thereof is a leading contributor to flooding issues; the capacity to which infrastructure is designed to convey relative quantities of water is essential to managing flooding. Policies and regulations pertaining to stormwater management requirements have changed over time. Depending on when a neighborhood or other development was established, the formal drainage system could be nonexistent or undersized compared to today's design standards. Systems designed to convey smaller storms will experience flooding more frequently. Since the 1990s, the City of Chesapeake has worked to develop and update studies throughout the City to identify and recommend improvements for undersized infrastructure. [c1] These studies will be discussed in greater detail in Section 3.3.4.

2.1.2 Tidal Flooding

Flat terrain, low ground elevation and minimal slope aid in the impact of flooding, including on sunny days, where there is no rain event, but water is backed up in the system due to high tides, storm events, or as a result of SLR. Downstream portions of drainage systems that connect to tidal water bodies often experience water backups due to tidal influence.

Wind-driven can impact non-coastal areas. In the Southern Watershed of Chesapeake, southerly winds influence water levels and can lead to flooding of inland areas.

2.1.3 Storm Events

Coastal regions, like Chesapeake, are especially vulnerable to flooding from extreme weather events, including hurricanes and nor'easters. Between 1851 and 2005, 78 storms have passed within 75-miles of the region. Of these, two were Category 3 hurricanes, eight were Category 2 hurricanes, 16 were Category 1 hurricanes and 49 were tropical storms. The remainder were tropical or extratropical depressions. An image of storm paths since 2005 within 75 miles of Hampton Roads can be seen in Figure 3 on the following page. These various tropical cyclones have caused approximately 230 deaths and cost the Commonwealth more than one billion dollars in damages[8].

The main destructive elements of these storms are high-level sustained winds, heavy precipitation, and tornadoes. Coastal regions are specifically prone to storm surge, wind-driven waves, and tidal flooding that could prove more damaging than cyclone wind[9]. A storm surge is a large dome of water often 50 to 100-miles wide and rising anywhere from 4 to 20-feet. A storm surge arrives in advance of the storm's landfall – the greater the storm is, the earlier the surge arrives. Water rise is extremely rapid, posing severe hazard to those who have not evacuated flood-prone areas. Such a surge of high water topped by waves driven by storm force winds are devastating to coastal regions, inflicting extreme beach erosion and property damage[10].

[8] (Hampton Roads Planning District Commission, 2017)
[9] (Hampton Roads Planning District Commission, 2017)
[10] (Hampton Roads Planning District Commission, 2017)

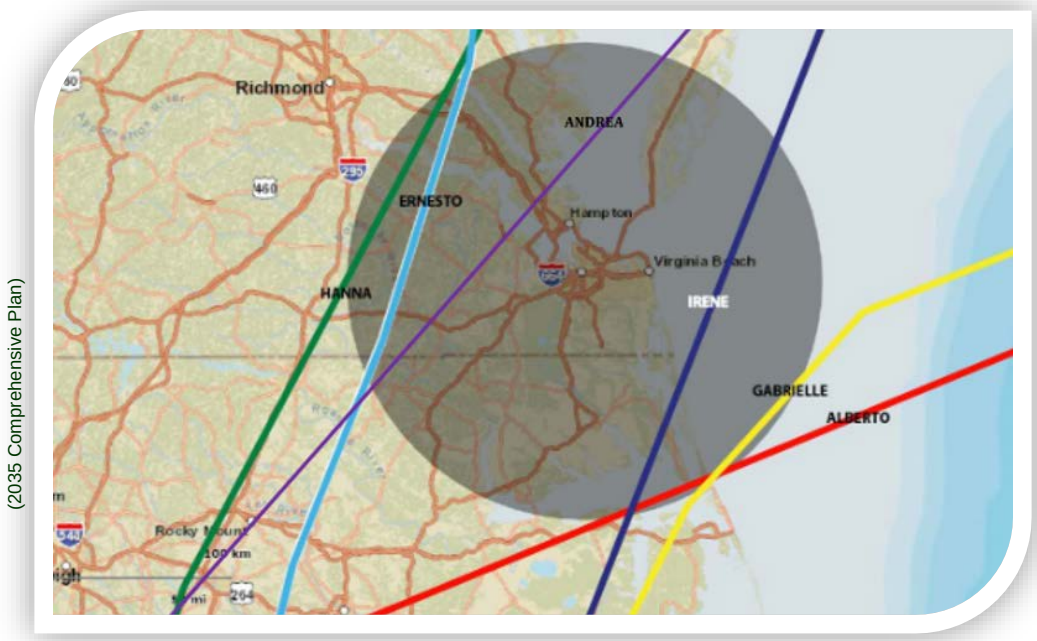


Figure 3: Storm Tracks in 75 miles of Hampton Roads since 2005

Wind damage in the area from events, in most recent accounts, have been marked by a wide variety of downed trees, damage to roofs, siding and signs, power outages due to downed power lines and trees across lines, and wind-blown debris accumulation. Since wind and flood events generally occur simultaneously, the combined effects are greater in flood-inclined regions. Roof damage from wind can also result in rain damage to structures, as well. Combined storm surge and wind affects to shorefront regions make some homes and businesses uninhabitable for days to weeks at a time[11].

The probability of Chesapeake experiencing a hurricane or tropical storm in the future is high. The Atlantic hurricane season typically runs from August 15th to Nov 30, peaking in mid-September. In Hampton Roads, it is uncommon to experience the direct affects from hurricanes category 3 and 4. This is a result of historical tracks remaining offshore or impacting land earlier than arriving in the Hampton Roads. Additionally, cooler Atlantic Ocean water temperatures north of Cape Hatteras decrease a storm's capacity to maintain intensity. A Category 5 hurricane is considered unlikely in Hampton Roads because of the cooler water temperatures mentioned above. The effects of smaller hurricanes and tropical storms will be frequent, as storms making landfall along the North Carolina and Virginia coastlines could impact the region in any given year[12].

Nor'easters are also a primary cause of coastal flooding as the wind's direction pushes water up into smaller creeks and tributaries, overwhelming their capacity for rainwater.

[11] (Hampton Roads Planning District Commission, 2017)
[12] (Hampton Roads Planning District Commission, 2017)

2.1.4 Shoreline Erosion

Shoreline erosion along the banks of the Elizabeth River is a concerning natural hazard pressing Chesapeake's community. Shoreline erosion is often correlated with extreme storm events and the impacts are expected to increase as sea level rises. Human activities can worsen erosion as well. While it is ideal to avoid sensitive regions entirely, it is imperative designs for land disturbing activities along the shore incorporate resilience[13].

2.2 Other Hazards

There are other natural (and manmade) hazards that could cause, affect, or result from flooding events. Strategies to address these hazards can be found in the Hampton Roads Hazard Mitigation Plan.[14] [c15]

2.2.1 Earthquakes & Landslides

An earthquake is the trembling of the ground produced by sudden displacement of rock in the Earth's crust. Earthquakes result from crustal strain, volcanism, landslides or the collapse of caverns. Hampton Roads is in an area which would feel effects of earthquakes in the Central Virginia Seismic Zone, an area of frequent, yet very weak, earthquake activity. Since 1774, there have been only three earthquake epicenters within 65 miles of Hampton Roads, two in the Hampton Roads area and one on the Delmarva Peninsula. Earthquakes of significant magnitude are unlikely occurrences for Hampton Roads, though the proximity of the region to the Charleston Fault could increase the possibility of feeling some impact of a large earthquake if it were to occur along that fault line[15] .

Only minor structural damage as a result of these earthquakes has been reported in the region. If a significant earthquake were to occur, damage to local structures would likely be severe because buildings in the region are not typically designed to withstand high magnitude quakes. Underground infrastructure damage is also expected to be severe and could cause long-term power, water, and sewer service interruptions in the region. Likewise, damage to bridges, tunnels and roads could disrupt transportation routes for much of the population[16].

2.2.2 Wildfires

With the exception of fire under prescription, a wildfire is any fire occurring in a wildland area. Wildfires are part of the natural management of the Earth's ecosystems; they may be caused by natural or human factors. Over 80% of forest fires are started by negligent human behavior such as improperly extinguishing campfires or smoking in wooded areas. The second most common cause for wildfire is lightning. Fire probability depends on local weather conditions, outdoor activities, debris burning, construction, and the degree of public cooperation with fire prevention measures. Drought conditions and other natural disasters (such as hurricanes, tornadoes, and lightning) increase the probability of wildfires by producing fuel in both urban and rural settings.

Great Dismal Swamp National Wildlife Refuge was struck by lightning on August 4, 2011 that hit land primed for wildfire due to drought. The Lateral West fire has burned a minimum of 2,000

[13] (Hampton Roads Planning District Commission, 2017)
[14] (Hampton Roads Planning District Commission, 2017)
[15] (Hampton Roads Planning District Commission, 2017)
[16] (Hampton Roads Planning District Commission, 2017)

acres. Forest damage from hurricanes and tornadoes may block interior access roads and fire breaks, pull down overhead power lines, or damage pavement and underground utilities[17].

The impacts of wildfire in the Hampton Roads region are both economic and environmental. From an economic perspective, fires destroy homes, businesses and infrastructure; communities in the region spend significant capital funds fighting wildfires, training staff, and preparing equipment to fight wildfire. Loss of life is a possible impact of severe wildfire in the region, although the lack of mountainous terrain makes escape somewhat easier. Environmentally, wildfires raise the temperature of forest soils, potentially eliminating organic value of the soil. Although soils eventually recover, impacts on watersheds in the interim can be detrimental to water bodies of the region. Burned soils may negatively affect infiltration and percolation, making soil surfaces water repellant – infiltration to groundwater decreases and runoff quantity increases. Both factors may negatively impact water quality downstream. Wildfires remain a highly likely occurrence for the region, though most will likely continue to occur in less urban areas and be small in size before being contained and suppressed[18].

2.2.3 Hazardous Material Incidents

Chesapeake's Code of Ordinances Sec. 26-606 prohibits storage or deposit of contaminants or hazardous, radioactive, nuclear or industrial waste in watershed areas[19]. [c15] Hazardous Material (HAZMAT) incidents can apply to fixed facilities as well as mobile, transportation-related accidents in the air, by rail, on the Nation's highways, and on the water. HAZMAT incidents can happen anywhere at any time. Per the Federal Emergency Management Agency (FEMA) approximately seven thousand HAZMAT events occur each year, 81% of those are highway incidents. In the Hampton Roads Region from 1988-2015, 454 documented HAZMAT events occurred; 73% of these HAZMAT incidents were in Chesapeake. HAZMAT incidents consist of solid, liquid, and/or gaseous contaminants released from their proper vessel. These events can have far reaching effects on the surrounding communities. In tandem with an extreme storm, the severity of the situation can escalate even further. A HAZMAT incident can last hours to days, while some chemicals can be corrosive or otherwise damaging over longer periods of time. In addition to the primary release, explosions and/or fires can result from a release and contaminants can be extended beyond the initial area by persons, vehicles, water, wind, and wildlife[20].

HAZMAT incidents can also occur as a result of, or in tandem with, natural hazard events which can also hinder response efforts. HAZMAT incidents can include the spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping or disposing into the environment of a hazardous material, but exclude:

- Any release which results in exposure to poisons solely within the workplace
- Emissions from the engine exhaust of a motor vehicle, rolling stock, aircraft, vessel, or pipeline pumping station engine
- Release of source, byproduct, or special nuclear material from a nuclear incident
- The proper application of fertilizer

[17] (Hampton Roads Planning District Commission, 2017)
[18] (Hampton Roads Planning District Commission, 2017)
[19] (Chesapeake, Code of Ordinances IV, VII, IX, X, and XI, 2013)
[20] (Hampton Roads Planning District Commission, 2017)

Negative impacts of hazardous materials incidents are dependent on the nature of the materials involved. While each chemical transported has unique qualities, there are generally three types of impacts:

1. Economic
2. Environmental
3. Safety of residents and first responders

In cases where evacuations are necessary to protect human life and safety, lost wages can be significant. Environmental impacts of highest concern in Hampton Roads include spills of petroleum products into the region's waterways. The region's emergency managers have contingency plans in place with the U.S. Coast Guard and others. However, a spill could still impact water quality, aquatic life, and valuable wetlands along the shoreline. Future occurrences of HAZMAT incidents, accidents, or issues within Hampton Roads are considered highly likely[21].

2.3 Critical Facilities

Impacts from flooding and other hazards can reduce or block access to emergency response activities; effects on roadways can prevent personnel from travelling and limit access to critical facilities [c3]. Critical facilities can be considered as those essential for delivery of critical services and crisis management, those identified by Chesapeake can be seen in the map provided in Appendix C. [c8]

Critical facilities can be broken into 6 categories, seen below in Figure 4[22] [c8].

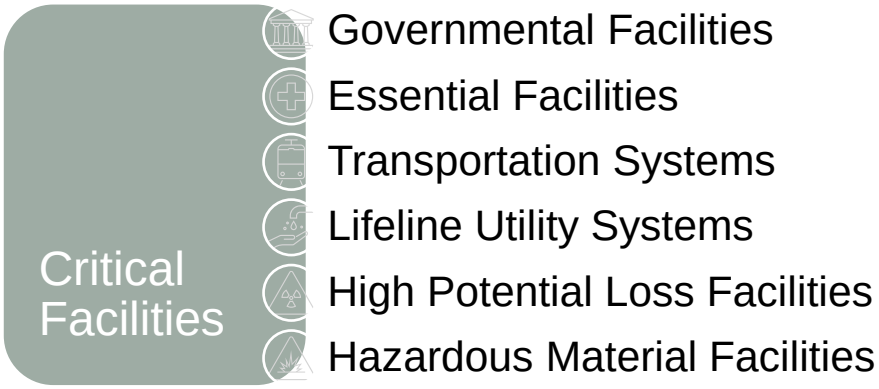


Figure 4: Critical Facilities

These facilities include data and communication centers, key government complexes, and similar facilities as determined by the floodplain administrator and emergency management department staff; those vital to health and welfare of entire populations, including hospit ,d other medical facilities, retirement homes, police and fire facilities, emergency operations centers, prisons, evacuation shelters, schools, and any other facilities such as:

- Systems necessary for transport of people and resources
- Facilities vital to public health and safety, including potable water, wastewater, oil, natural gas, electric power, communication systems, and similar facilities

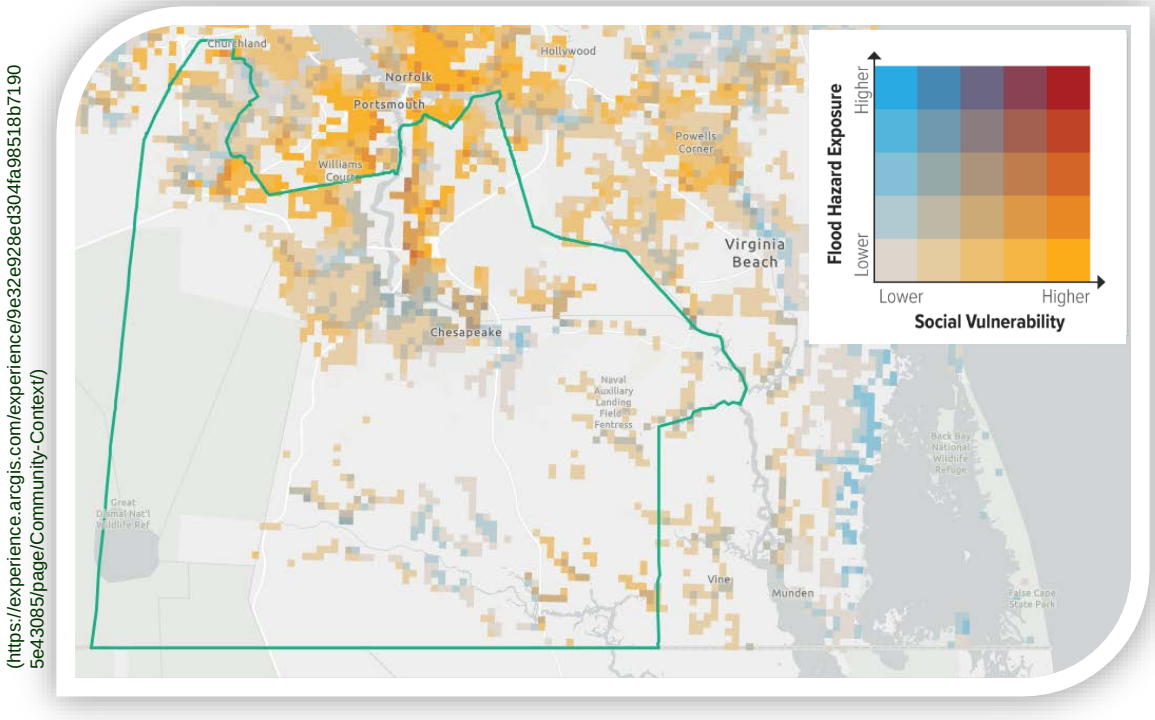
[21] (Hampton Roads Planning District Commission, 2017)
[22] (Hampton Roads Planning District Commission, 2021)

- Facilities whose disruption may significantly impact neighboring communities, including nuclear power plants, high hazard dams, and military installations
- Facilities involved in production, storage, and/or transport of hazardous materials

2.4 Vulnerable Populations

Flood damage and harm are more likely to occur in communities where many residents share economic and social traits that hinder their ability to prepare for and recover from flooding catastrophes. Disadvantaged groups and those with lesser incomes suffer the most from the physical and economic consequences of disasters, making recovery even more difficult. Flood-prone residents are more likely to suffer the direct consequences of coastal flooding, such as compromised health and safety, flooded highways, and school and business closures. Flooded properties may become hazardous or inconvenient to live in, making it impossible for residents to stay. Flooding that is severe or regular may force residents and businesses to relocate. [c4]

When addressing natural hazards, the communities facing the largest impending threats should be a focal point. Flood-affected citizens in Hampton Roads are more likely to be urban dwellers, economically pressured families, and individuals of color. The following graphic, borrowed from the Virginia Coastal Resilience Web Explorer, depicts the interaction of community socioeconomic vulnerability and coastal flood hazard exposure. Neighborhoods in red have a high level of social vulnerability (based on 2020 demographics) as well as a high level of exposure to coastal flood threats (based on all modeled 2080 flood scenarios).[23] [c3]



(https://experience.arcgis.com/experience/9e32e928ed304fa98518b7190 5e43085/page/Community-Context/)

Figure 5: Social Vulnerability and Flood Hazard Exposure in Chesapeake

[23] (Commonwealth of Virginia Department of Conservation and Recreation, 2021)

3.0 Current Efforts to Reduce Flooding & Develop Resilience

The City of Chesapeake has already established a myriad of processes, programs, and plans that address flooding and resilience.

3.1 Community Involvement, Outreach, and Notification

The City of Chesapeake strives to ensure that resilience efforts are all inclusive of the locality regardless of socioeconomics or race. Individual citizen involvement provides the City with a greater understanding of local concerns and increases the success of resilient efforts by developing an invested community and by involving those directly affected by public policy and future development.

3.1.1 Involvement

The City intends to continue encouraging its citizens to become more involved in decisions that affect their life and safety. Knowledge of the natural hazards present in their community will aid in the process of the community taking personal steps to reduce hazard impacts. Public awareness is a key component of an overall mitigation strategy aimed at making a home, neighborhood, school, business, or city safer from the effects of natural hazards[24]. [c12]

The City currently sponsors several committees or working groups that engage residents and create community leaders [c11, c12]:

- Chesapeake Environmental Improvement Council (CEIC) – comprised of 18 volunteers appointed by the Mayor to promote interest in improving the environment of Chesapeake, Virginia thereby making Chesapeake a greener, cleaner, and healthier city in which to live, work, and visit. The CEIC will accomplish its purpose through outreach, education, and volunteer efforts to include litter and pollution prevention, waster reduction and recycling, beautification, conservation landscaping, and other environmental and conservation issues.

- Chesapeake Stormwater Committee – comprised of 11 City Council appointed representatives and 3 Ex-Officio members from City staff, their duties include:
    - Reviewing the status of City-wide drainage projects, study areas, maintenance operations and issues of wetlands permitting
    - Reviewing rates and providing utility rate recommendations to the City Manager
    - Preparing drainage and stormwater utility-rated recommendations for the City Manager
    - Serving as a “sounding board for citizens concerned about drainage in neighborhoods and subdivisions
    - Reviewing recommendations from Public Works to improve drainage and maintenance operations
    - Providing recommendations on changes to the Stormwater Utility Fee, Capital Improvement Projects, and Level of Services

- Natural Event Mitigation Advisory Committee (NEMAC) – the committee monitors the efficiency and effectiveness of various natural hazard mitigation strategies and makes recommendations to city council for additional improvements.

[24] (Hampton Roads Planning District Commission, 2017)

3.1.2 Outreach

The City currently implements public education and outreach programs to help educate the community, focusing on impacts of stormwater discharge to surrounding water bodies[25]. The program provides information on how the community can help reduce these impacts and protect the waters quality. In order to promote public reporting of illicit discharges, the City provides stormwater education to the public through multiple media outlets such as web sites, radio, cable television, local television, publications, and a Customer Service Center.

Through a partnership with the HRPDC, the City participates in askHRgreen.org, a public awareness campaign administered by HRPDC. The website is a resource for environmental stewardship, including green landscaping practices and other topics related to stormwater quality and the MS4 permit. Beginning in 2011, HRPDC environmental programs were combined into a single public awareness program and central resource for environmental education in Hampton Roads known as askHRgreen.org – this and other resources are provided below[26] [c11, c12]:

http://askhrgreen.org/

http://www.cityofchesapeake.net/government/City-Departments/Departments/Public-Works-Department/stormwatermanagement-publiceducation.htm

http://www.cityofchesapeake.net/online-Services.htm

3.1.3 Notification

Chesapeake Alert was developed to establish a combine policy for the authorized use, administration, and support for the City of Chesapeake's Emergency notification/Citizen Information/Employee Notification System. The system has three designated purposes, as follows[27] [c12]:

- Citizen Information
- Emergency Notification
- Employee Notification

Utilizing a variety of telecommunications paths, Chesapeake Alert provides information to targeted recipients rapidly. Messaging may be in voice or text-data forms, depending upon the situation, capabilities of the receiving device(s), and choice(s) of the recipient[28].

3.2 Participation in State and Federal Programs

Regulations differ from a state and federal level. Localities must be sure to fall within both state and federal limits. Participation in both forms of programs is an active mode of ensuring this result.

[25] (City of Chesapeake, 2017)
[26] (Southern Rivers TMDL Action Plan, 2018)
[27] (City of Chesapeake, 2011)
[28] (City of Chesapeake, 2011)

3.2.1 FEMA

The City assists residents with acquiring federally funded hazard mitigation grants, including but not limited to, FEMA's Hazard Mitigation grant to acquire repetitive loss properties through the OEM Property Buyout Program City assistance. [c5, c7]

3.2.2 Community Rating System (CRS)

City of Chesapeake Participates in the CRS and recently graduated to a class 7 rating. This incentive program encourages communities to undertake defined flood mitigation activities that go above and beyond the minimum requirements of the NFIP, adding extra local measures to provide protection from flooding. The CRS mitigation activities are assigned a range of point values. As these points are accumulated and thresholds are reached, communities can apply for an improved CRS class rating. Class ratings, which run from 10 to 1, are tied to flood insurance premium reductions[29]. Currently, the City has been successful in acquiring points in the following activities: [c5]

- 310 Elevation Certificates
- 330 Outreach Projects
- 350 Flood Protection Information
- 420 Open Space Preservation
- 430 Higher Regulatory Standards
- 440 Flood Data Maintenance
- 450 Stormwater Management
- 510 Floodplain Management Planning
- 520 Acquisition and Relocation
- Flood Damage Reduction
- Mapping & Regulations

3.2.3 MS4

The City of Chesapeake is a Phase I MS4 and was first permitted in 1996 under the VPDES program administered by DEQ. As it relates to flooding, the City must manage construction site runoff as well as quantity and quality of post-construction site runoff. Chesapeake also manages various public outreach and education campaigns through the MS4 program. Through the HRPDC, the Regional Stormwater Management Program coordinates actions and leverages funding for technical and advisory assistance to help localities meet the requirements of state-issued stormwater permits. The program includes cooperative initiatives in the following areas[30]:

- Construction runoff control
- Environmental Education
- Illicit discharge detection & elimination
- Post-construction impacts management
- Monitoring of regulatory changes
- Municipal pollution prevention
- Regional cooperative data tracking
- Regional cooperative monitoring

[29] (Hampton Roads Planning District Commission, 2017)
[30] (City of Chesapeake, 2017)

3.3 City Planning, Policies, and Guidance

Planning and regulatory capabilities are based on implementation of plans, ordinances, and programs which demonstrate the City's commitment to guiding and managing growth, including:

- Capital improvements planning
- Comprehensive land use planning
- Emergency response
- Enforcement of zoning or subdivision ordinances and building codes
- Mitigation and recovery planning
- Reconstruction after disaster
- Transportation planning

These planning initiatives present significant opportunities to integrate hazard mitigation principles and practices into local decision-making processes. Conservation efforts have far reaching benefits to affected ecosystems as well as surrounding populations. Abiding by and maintaining resilient goals and objectives is crucial to ensuring the success of the City's existing and future effort. Types of action can be interrelated and broken down into the categories seen in Figure 6 [c4].

Figure 6: Chesapeake's Action Efforts

The focus of parking strategies includes improving parking utilization and connectivity, managed properly including internal and external instillations. Parking lots create ample impervious space; runoff increases with percentage of impervious groundcover. Multimodal strategies highlight an expanded and improved transit and improving cyclist/pedestrian access; flood mitigation strategies identify approaches to combat flooding along critical corridors for accessing instillations and providing important network functionality. Improving accessibility enables ease of access during emergency situations. Controlling land use and development targets using recommended joint use planning efforts to manage responsible growth, reuse, and redevelopment considering both local and federal lands. Responsible growth is critical to a resilient community. Access strategies focus on improving instillation access points and enhancing directional signage and information to assist commuters and visitors. Access is beneficial in everyday life and especially under emergency circumstances. Utility strategies focus on improving resiliency for instillations and local economic development opportunities. Resilience is the way to ensure longevity in a community.

Chesapeake has multiple policies and programs in place to benefit the community, as follows[31]:

- Building and Fire Code
- Capital Improvements Plan
- Comprehensive Land Use Plan
- Continuity of Operations Plan
- Disaster Recovery Plan
- Economic Development Program
- Emergency Operations Plan
- Evacuation Plan
- Flood Damage
- Hazard Mitigation Plan
- Historic Preservation Plan
- National Flood Insurance Program
- NFIP Community Rating System
- Open Space Management Plan
- Prevention Ordinance
- Radiological Emergency Plan
- SARA Title III Plan
- Stormwater Management Program
- Subdivision Ordinance
- Zoning Ordinance

3.3.1 Comprehensive Plan

The City's current growth management system has evolved during the past two decades or so since adoption of the 1990 Comprehensive Plan. It is now firmly rooted in a three-pronged approach addressing timing, form, and funding of new development. City Council recognized that all three factors have to be integrated and be in relative harmony to create and sustain a community that is resilient, viable, healthy, and livable now and into the future[32].

The central component of the City's system is the process of controlling the approval of new development projects, rezoning applications, based upon the levels of service (LOS) available for major public facilities. The LOS policies were adopted in 1995 and subsequently amended in 1997, 2001, 2004 and 2009. Current City LOS standards address three areas of adequate public facilities: school capacity, road capacity and sewer utility capacity. Responsible land development is a major component in creating a resilient community. In terms of growth management, Chesapeake puts forth good effort – particularly with its use of a LOS approach for managing growth. LOS standards focus on the two most critical aspects of growth management, timing and funding of new development[33].

Responsible timing can be seen through the City's ability to plan density and intensity of land development generally to be highest in areas with utilities. These include public water and sewer service, as well as good roads and transit access; in this regard, the City will design and locate its future utility and transportation facilities in an effort to guide location, pattern, character and timing of growth [c5]. Targeted funding is the City's objective. Chesapeake plans to enact this through coordination and balance of policy for funding and construction of public facilities. This includes maintaining a reasonable, moderate tax rate to support an optimum level of City services[34] [c1].

The City will achieve an economic development base that is both flexible and resilient by supporting a diverse work force that takes advantage of Chesapeake's economic and physical assets. The City will educate residents and business owners concerning environmental contamination and will investigate and prosecute environmental crimes. Chesapeake will enhance citizen preparedness through expanded public outreach and education programs[35].

[31] (Hampton Roads Planning District Commission, 2017)
[32] (City of Chesapeake Planning Department, 2016)
[33] (City of Chesapeake Planning Department, 2016)
[34] (City of Chesapeake Planning Department, 2016)
[35] (City of Chesapeake Planning Department, 2016)

The City will protect, maintain, and improve the quality of the natural environmental systems – air, water, natural habitats, and wetlands. [c9, c10] In order to fulfil its resource conservation goals and objectives set forth in the Comprehensive Plan, the City must continue to work toward implementing a comprehensive environmental program; suggested action strategies and recommendations from the City of Chesapeake Sustainability Plan would be incorporated into this program. To properly gauge the success in fulfilling these goals and objectives, a primary component of this program should include a periodic update of the natural resource inventory, as well as a report to be issued to City Council on the status of the health of the City's natural resources. The Chesapeake City Council generated a list to contribute to ecological stewardship, that list is as follows[36] [c11, 12]:

1. Provides for renewal of the environment through reducing, reusing, and recycling
2. Encourages energy conservation and green initiatives through incentives, awareness, education, and community involvement
3. Ensures preservation of green and open spaces, protects its natural resources, and safeguards its agricultural lands
4. Develops, regulates, and maintains a clean and orderly community
5. Mitigates factors which impact the environmental quality of its water and air

The City will continue to promote water quality protection by implementing its existing protection program as well as seeking new solutions as additional information and technology become available. Although the City currently implements a variety of water quality protection programs, surface water quality in the City continues to show signs of impairment, potentially threatening human and environmental health[37].

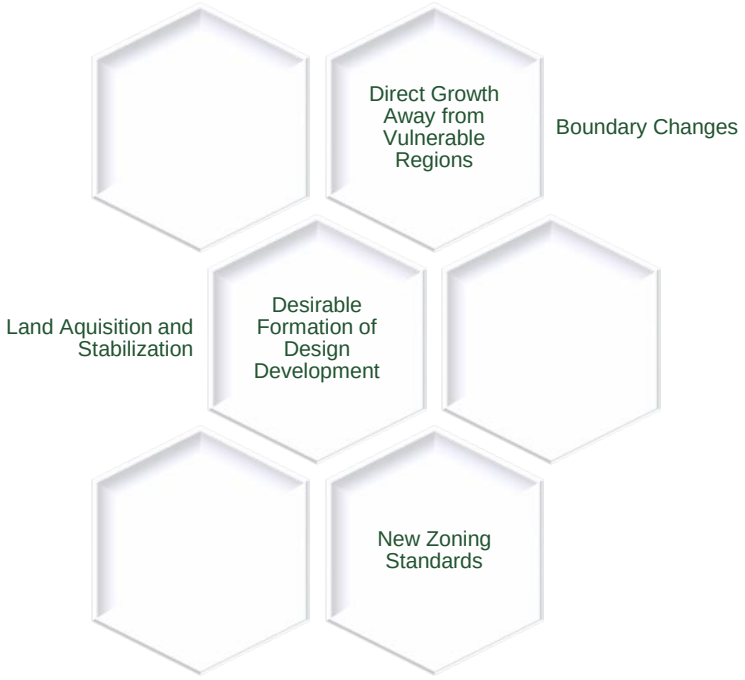


Figure 7: 2035 Action Strategies

[36] (City of Chesapeake Planning Department, 2016)
[37] (City of Chesapeake Planning Department, 2016)

Chesapeake has 6 Action Strategies seen above in Figure 7. The City will direct growth to areas as designated on the 2035 Land Use Plan [c5]. Orderly expansions of utilities will be encouraged to avoid scattered or "leapfrog" development. Changes to the boundaries of either the Suburban Overlay District or the Public Utilities Franchise Area, approved by City Council, shall be co-terminus; impacts of the extension of both shall be considered in the decision. The City will amend its Zoning Ordinance provisions to reflect necessary changes in the Overlay District standards to be consistent with this Plan. The City will implement a land acquisition and stabilization, purchase, or lease of conservation easements such as OSAP. [c6] Design of development, clustered housing development with residual open space and "conservation design" for rural subdivisions, should be used as a tool to develop a desirable form for the City[38]. [c5]

Provided there is capacity for such development, infill development complementing existing communities will be encouraged in developed areas to maximize the use of existing public facilities, utilities, buildings, and services. Planning for density and intensity of land development to be aligned with areas having existing public water and sewer service, good roads, and transit access – thus the City will use the design and location of its future utility and transport to guide local pattern, character, and timing of growth. Implementation of proper infrastructure and a revitalization of established neighborhoods in conjunction with preservation and creation of open space places a focus on balanced growth[39].

3.3.2 Code of Ordinances

Land disturbance activities provide opportunities for compromised water bodies. The city council has determined natural ground cover, especially woody vegetation, to be most effective in preventing site erosion and holding soil in place. Natural vegetation, with its adaptability to local conditions and without the use of harmful fertilizers or pesticides, serves the important function of filtering stormwater runoff. Additionally, minimizing impervious cover enhances rainwater infiltration and effectively reduces stormwater runoff[40].

The Chesapeake Code of Ordinances has 9 sections relating to creating open space and flood mitigation seen in Table 1[41]. [c6, c9]

Table 1: Code of Ordinances Relating to Flooding

Sec. 19-600	Zoning and landscaping throughout Chesapeake
Sec. 19-701	Properly zoned recreational space in subdivisions
Sec. 19-702	Standard for determining zoning percentages
Sec. 19-704	Characteristics of recreational land apart of subdivision
Sec. 26-513	Creation of the CBPA District
Sec. 26-517	Interpretation of CBPA boundaries

[38] (City of Chesapeake Planning Department, 2016)
[39] (City of Chesapeake Planning Department, 2016)
[40] (Chesapeake, Code of Ordinances IV, VII, IX, X, and XI, 2013)
[41] (Chesapeake, Code of Ordinances IV, VII, IX, X, and XI, 2013)

Sec. 26-519	Permitted development in the RPA
Sec. 26-520	General performance standards for the RPA, RMA, and IDA
Sec. 26-522-2	Relationship of CBPA standards to other ordinances

The Chesapeake Bay Preservation Area District (CBPA) of the city was created and then adopted by city council on January 21, 1992 as part of the city zoning ordinance. Any person contemplating development or land-disturbing activities within the city should consult the CBPA map prior to engaging in the proposed activity. All land disturbance, uses, development and redevelopment in the CBPA District are required to retain an undisturbed vegetated 100-foot buffer area around resource protection area (RPA) features, such as wetlands, shorelines and along waterbodies with perennial flow [c10]. The following figure presents the City CBPA.

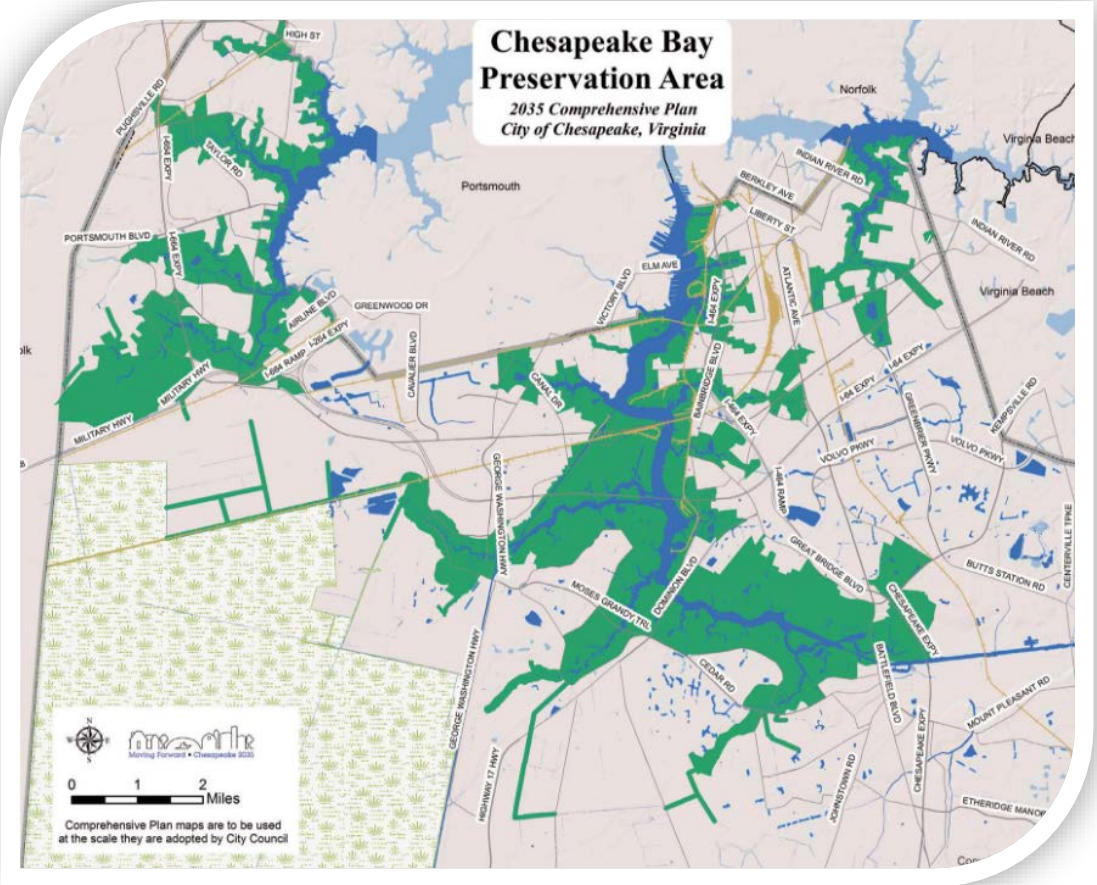


Figure 8: Chesapeake CBPA

The City of Chesapeake also offers owners of non-residential property an opportunity to qualify for a credit on their utility fee by utilizing BMPs. BMPs are practices used for on-site control of stormwater runoff and to provide water quality improvements. These BMPs include, but are not limited to, detention lakes, retention ponds, vegetated buffer strips, and grassed swales. The

City of Chesapeake has established a Stormwater Utility Credit Criteria in accordance with City Code. [c10]

3.3.3 City Public Facilities Manual (PFM)

Chapter 5 in the PFM references stormwater design standards and requirements. Current City standards meet or are more stringent than State requirements or industry standards and require the use of a downstream tailwater elevation that is variable depending on location. The design storm for system capacity also increases with increased contributory drainage area.

The City is able to fund some stormwater infrastructure improvements through the Pro Rata program which is defined in the City PFM as responsibility of cost in development of suitable stormwater infrastructure is shared by the City and developers. The City accepts portions of improvements required by existing developments and areas to remain undisturbed; the developer is required to pay their share of improvements based on rate of runoff generated by given development. The developer has an option to pay into a fund in lieu of making improvements and the City must use that funding to benefit the area local to the development.

3.3.4 City-wide Master Drainage Plans and Other Focused Studies

Much of Chesapeake has been studied as part of a Master Drainage Plan (MDP)or other focused study. The goal of the MDPs is to identify capacity improvements for the City's major drainage facilities. The City started preparing MDPs in the 1980s and subsequent updates, or MDPUs, have been developed in the 2000s and more recently in the past decade. Appendix C contains a map depicting the status of MDP development as of late 2021. The map also shows the progress of implementation of some of the resulting improvement projects. The City considerations of all parts of the locality regardless of socioeconomics or race. [c4]

In addition to the MDPs, the City has also developed dozens of more detailed, localized studies to look at chronic flooding issues that cannot be adequately assessed at the coarser watershed-scale of the MDPs.

The full list of MDPs, MDPUs, and other studies undertaken by the City can be found in the list of documents reviewed prior to developing this Plan, included as Appendix B.

Studies are beneficial in providing the science to back sound programs and projects to combat flooding. Most of the projects listed in Section 4 come from these MDPUs and studies.

3.3.5 Total Maximum Daily Load (TMDL) Action Plans

A TMDL Action Plan is a plan that is developed to identify projects and programs that should be undertaken to reduce the loading of a pollutant of concern into a waterbody. The City of Chesapeake has developed several TMDL Action Plans as follows:

- Chesapeake Bay TMDL Action Plan (2021)
- Southern Rivers TMDL Action Plan (2018)
- Southern Rivers TMDL Action Plan Conceptual Water Quality Projects (2018)
- Elizabeth River Bacterial TMDL Action Plan (2018)

Though all projects identified in TMDL Action Plans address water quality, some may also have a flood reduction benefit. Many are also nature-based. Those multiple benefit, nature-based

projects are more advantageous to move through the CFPF program. Several of the projects presented in Section 4 were recommended in City TMDL Action Plans.

The City also partners with the Elizabeth River Project; an independent non-profit environmental group that is dedicated to improving water quality in the Elizabeth River through public education and outreach. The Elizabeth River Project recruit's residents into a pledge program to encourage environmental stewardship and facilitates implementation of water quality BMPs on individual residential lots. The City's stormwater utility fee helps fund the design and construction of these BMPs recommended in the Chesapeake Bay TMDL Action Plan[42]. [c11]

3.4 Regional Efforts

3.4.1 Joint Land Use Study (JLUS)

The Portsmouth and Chesapeake JLUS focuses on reducing flood impacts to the transportation network, expanding access opportunities for getting to installations, reducing impacts on neighborhoods related to congestion and parking, promoting compatible and managed growth and redevelopment that also benefits the local tax base, and fostering improved coordination among JLUS partners to advance regional priorities..

3.4.2 Hampton Roads Hazard Mitigation Plan

Execution of hazard mitigation activities involves a broad range of professions. Stakeholders may include local planners, public works officials, economic development specialists, and others. Concurrent local planning efforts complement hazard mitigation goals even though they may not be designed as such. Balanced growth is a large component of establishing resilience within the community and providing proper infrastructure is essential for good quality of life. Restricting growth in sensitive regions is ideal while incentivizing growth in non-sensitive regions is ideal from a quality-of-life standpoint and an environmental one[43]. [c5]

The City will continue to devote available and applicable resources to implementing the identified Hazard Mitigation Actions. Chesapeake Mitigation Action Items 2, 3, 13, and 14 involve efforts to mitigate flooding damage, these are elaborated on in the following[44] [c15]:

1. Maintain participation in NFIP and Community Rating System. Continue enforcement of standards in existing ordinance that meet and exceed NFIP minimum requirements.
2. Actions which may include Climate Resilient Mitigation Activities (CRMA) such as Mitigation Reconstruction projects, minor localized flood reduction projects. These may include activities such as relocating, and retrofitting floodproof structures in flood prone areas.
3. Cross referencing of homes and parks correlated with repetitive flood loss areas and new FEMA 100-year floodplains. [c8] This is done by reviewing their vulnerability to flood and wind hazards. Solutions include implementation of measures to retrofit, relocate, or acquire vulnerable properties. [c15] This action may include Mitigation Reconstruction projects. The Emergency Management Department, with support from the Geographic Information System (GIS) and Engineering Division, are responsible for this action.

[42] (AECOM, 2021)
[43] (Hampton Roads Planning District Commission, 2017)
[44] (City of Chesapeake Planning Department, 2016)

4. Replace structures or implement retrofits, which may include but are not limited to: installation of emergency backup power, elevation of structure or components, relocation or retrofit of building components. [c5]
5. Flow test and inspect existing City-owned and grant-funded dry hydrants annually to help maintain operability.
6. Seek and use additional revenue sources and local matching funds for mitigation planning and projects.
7. Develop and implement a Pre-Disaster Homeowner Tree Preventative Maintenance and Hazard Awareness Program.
8. Improving stormwater management infrastructure, preparing, and implementing preventive maintenance schedule, and providing a replacement schedule for stormwater management and inspection equipment and vehicles. It also aims to implement updates on older stormwater infrastructure that was repaired previously and should be examined to ensure it is up to current standards.
9. Part I: Maximize training and educational opportunities for the National Event Management Advisory Committee (NEMAC), City staff, elected officials, Central Emergency Response Team (CERT) members and citizen/neighborhood leaders regarding hazard mitigation, disaster preparedness and the relationship of mitigation to reduced recovery needs. Part II: Accommodate training and related support for at least two staff in the Department of Department and Permits to receive and maintain Certified Floodplain Manager (CFM) certification through the ASFPM.
10. Conduct Hazardous Environmental Action Team (HEAT) program to industrial facilities, particularly hazardous facilities, to discuss hazards and mitigation alternatives.
11. Support and maintain City's new Reverse-911 system. Prepare messages to release to citizens before and after a natural hazard event.
12. Prevent sanitary sewer inflows to the system during flood events. Smoke test public and private sanitary sewer infrastructure to determine priorities.
13. Continuation of the lease and maintenance of facilities along the Dismal Swamp Canal Trail. This is a high priority action. Parks and Recreation is the department responsible.
14. Continue outreach efforts through a strategically developed Plan for Public Information (PPI) using the 7 actions seen below:
    a) Create a PPI Committee
    b) Assess public information needs
    c) Formulate multi-hazard messages
    d) Identify outreach projects
    e) Examine public information initiatives
    f) Prepare PPI document
    g) Implement, monitor, and evaluate program
15. Acquire open space sites capable of providing multi-objective management. Some objectives of this action are flood control, water quality, public access to waterways, preserving or creating tree canopy, and preserving diverse ecological and cultural heritage sites [c10]. CRMA may be included in this action.

16. Identify, create database, and plan uses for data regarding vulnerable populations. Uses may include target outreach, emergency notification and specialized evacuation planning.

Flooding, SLR, coastal storms, and winter storms are some of the hazards addressed by these actions. There are approximately 400 properties and 2,000 structures identified as being within repetitive loss areas[45] [C7].

3.4.3 Other HRPDC Efforts

Resilience related participation from the City on other Hampton Roads Planning District Commission (HRPDC) items include:

- Coastal Resilience Committee and Working Group
- Floodfluent Program
- Hampton Roads All Hazards Advisory Committee (AHAC)
- Regional Environmental Committee
- Stormwater Committee
- Watershed Technical Workgroup
- Coastal Resiliency Committee and Working Group
- Regional Stormwater Management Workgroup

3.5 Preparation for Severe Weather Events

3.5.1 Public Works Emergency Operations Center (PWEOC) Hurricane Preparation

The City has a policy and procedures in place to assure an efficient and coordinated response pre-, during, and post-emergencies. The PWEOC defines tasks and responsibilities of the Department of Public Works (DPW) and designated Mosquito Control, and Parks, Recreation and Tourism crews to assist in restoring essential City services as quickly and safely as possible. DPW maintains traffic flow, streets and drainage clearance, public infrastructure, and debris removal. Staff conduct an annual mock emergency condition drill and maintain a manual. [c15]

3.5.2 Emergency Management Disaster Training

Emergency Management staff both initiate and take part in regular training and exercises on disasters. The City has a robust Training & Exercise Program which is managed through the Office of Emergency Management (OEM). The training is developed to coincide with hazards that are recognized at both the federal and state level. OEM staff routinely attend training on flooding, natural and manmade disasters, hurricanes, and tropical storms, as well as city preparedness activities to ready city response and recovery operations before the start of the season. Staff also take part in webinars, meetings, and training courses geared around flood and mitigation efforts, that tie into the Community Rating System, Sea Level Rise, Resiliency, and City related projects that have a mitigation focus or nexus to them. Training and meetings are attended by all staff within the department. [c11]

[45] (Hampton Roads Planning District Commission, 2017)

3.5.3 Power Franchisees

The City will work with power franchisees to improve the safety, efficiency, dependability, and aesthetic impact of power utilities. The traditional method of providing electrical service has been via a network of poles to support power lines. The conventional method of supplying electrical service has been through a network of poles to support power lines. These are affected by extreme weather, car accidents and interference from growing trees. Minor storms can cause inconvenient power outages while more major storms can cause an extensive amount of damage and loss of power for days at a time. For these reasons, it is preferable to have utilities located underground whenever possible[46]. [c15]

[46] (City of Chesapeake Planning Department, 2016)

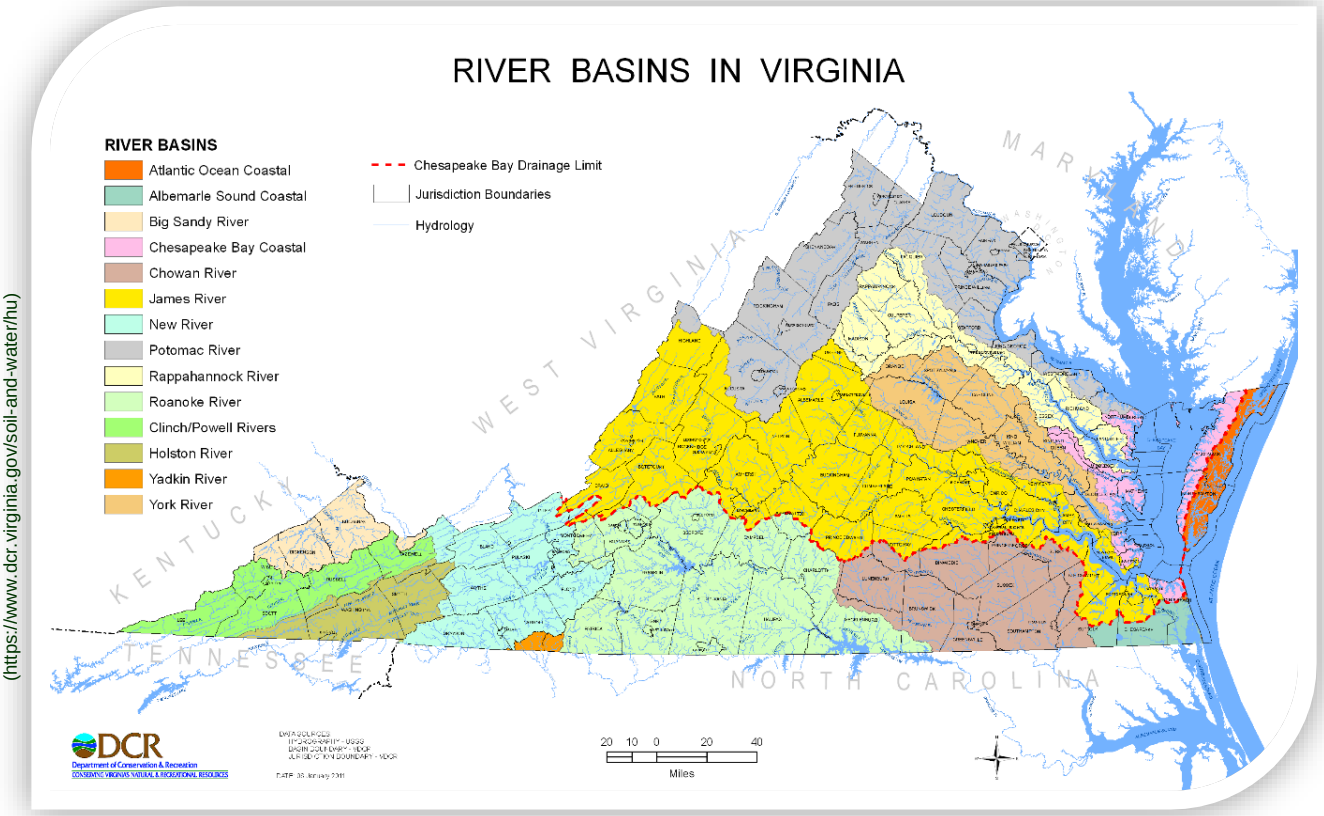
4.0 A Plan for Resilience

The City of Chesapeake is committed to continuing those efforts already underway to improve resilience as descried in the previous section. Additionally, there are programs, studies, and projects that the City is considering to further advance efforts towards developing resilience for the entire locality.

Successful projects grow out of scientifically sound studies derived from firmly rooted programs. The following subsections will discuss Chesapeake's efforts to contribute quality projects, programs, and studies in order to fight flooding and increase the resiliency of the City.

4.1 Continued Coordination with other Entities

Partnership with neighboring localities and other entities is essential for a successful, resilient community. As seen in Figure 9, watersheds cross locality borders. Therefore, it is impossible to address their vulnerabilities without collaboration. To be resilient, we all must work together.



(https://www.dcr.virginia.gov/soil-and-water/hu)

Figure 9: River Basins in Virginia

The City has and will continue to coordinate with adjacent localities when watershed boundaries overlap governmental boundaries.

The City also plans to continue its participation on several regional workgroups and committees hosted by the HRPDC, discussed in Section 3.1.

The City of Chesapeake is committing to building, maintaining, and strengthening its relationships with other entities as it works toward greater community resilience.

4.2 The Science

One of the guiding principles of the CFPF program is to "acknowledge climate change and its consequences, and base decision making on the best available science."[47] To that end, the City will endeavor to use current flood maps and incorporate climate change, SLR, and storm surge, where appropriate, into proposed initiatives.

Projections of SLR are available from various sources, based on varying underlying assumptions and climate models. An October 18, 2018, resolution by the HRPDC localities recommended three different SLR scenario values for planning purpose. Each had an associated future planning horizon, summarized below and shown in Figure 10. The JLUS utilized the near- and mid-term SLR values consistent with the HRPDC guidance[48].

- 1.5-feet of SLR for near-term planning, represented by the timeframe 2018–2050
- 3.0-feet of SLR for medium-term planning, represented by the timeframe 2050–2080
- 4.5-feet of SLR for long-term planning relevant to timeframes beyond year 2080

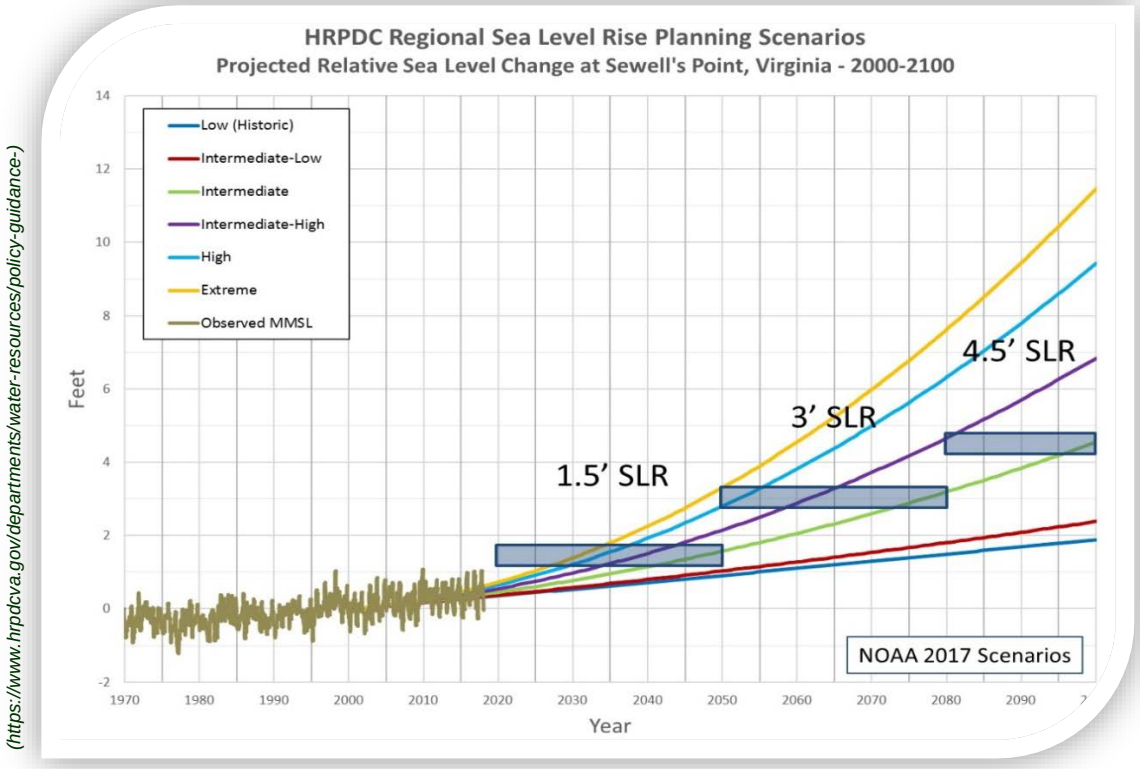


Figure 10: Projected SLR

[47] (Commonweath of Virginia Department of Conservation and Recreation, 2022)
[48] (Hampton Roads Planning District Commission, 2021)

Figure 2: Rationale Behind HRPDC SLR

Rational behind this study can be seen in Figure 11. Recommendations from the HRPDC SLR are as follows:

- Localities should plan for SLR using 1.5-feet of relative SLR above current mean higher high water (MHHW) for near-term planning, 3-feet of relative SLR above current MHHW for medium-term planning, and 4.5-feet of relative SLR above current MHHW for long-term planning
- For engineering and design, localities should calculate project-appropriate SLR scenarios by using a tool such as the U.S. Army Corps of Engineers (USACE) Sea Level Change Calculator and conduct a benefit-cost analysis of various adaptation strategies to determine an appropriate amount of SLR for a specific project
- These scenarios should be reevaluated as appropriate based upon new information developed by the NOAA, USACE, or Virginia Institute of Marine Science (VIMS)

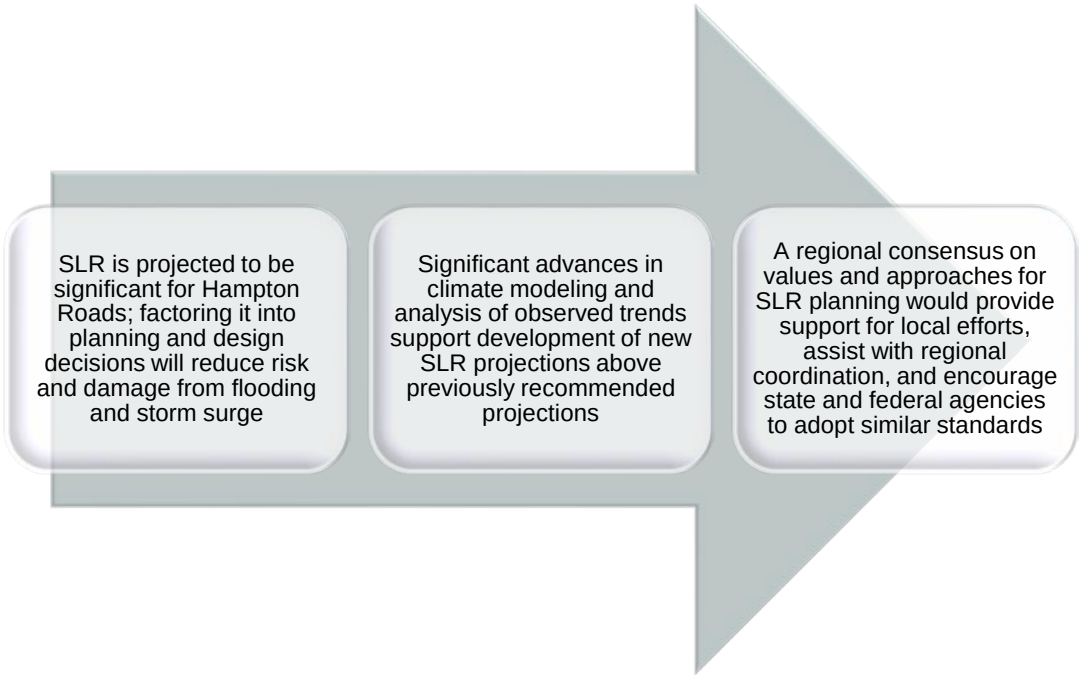


Figure 11: Rationale Behind HRPDC SLR

In January 2017, NOAA partnered with the U.S. Geological Survey, the U.S. Environmental Protection Agency (USEPA), and Rutgers University, and published a report updating regional and global SLR scenarios for the United States. This report takes advantage of additional observations of sea level change and ongoing research into global and regional drivers of SLR including rapid ice melt, ice sheet instability, shifts in ocean circulation patterns, changes in the Earth's gravitational field, and vertical land movement[49].

[49] (City of Chesapeake, 2017)

The overall result is that the upper bound of plausible global SLR is higher than considered in the NOAA's 2012 report. In addition, regional drivers – such as vertical land movement, ocean circulation, and shifts in the gravitational field – account for a significant amount of projected SLR in Hampton Roads. Overall, the report projects between 1.9-feet of SLR in Hampton Roads between 2000 and 2100 at best and 11.5-feet of SLR at worst. According to the report's most statistically probably assessment, the predicted outcome is approximately 4.5-feet of SLR by 2100[50].

Sea level trends are continuously being monitored and updated by both federal (NOAA, USACE) and state (VIMS) entities. In addition, research, and analysis into the dynamics of sea level and how it responds to changing climatic conditions are also ongoing. The HRPDC recommends that the HRPDC staff and localities reevaluate and consider updating these scenarios as appropriate based upon new information developed by NOAA, USACE, or VIMS[51].

4.3 Studies

The CFPF defines a flood prevention or protection study as any hydraulic or hydrologic study of a floodplain with historical and predicted floods, the assessment of flood risk, and the development of strategies to prevent or mitigate damage from coastal or riverine flooding. Utilizing the most recent flood maps, engineering software, and ensuring minimal human error when collecting and recording data are just a few components to producing a scientifically sound study.

Some studies may be the result of a recommendation from large-scale MDPUs. Others include opportunities for coordination with other entities in Hampton Roads or as a result of citizen input.

The City will continue to look for opportunities to identify and conduct additional studies. Future studies may:

- Conducting large-scale master plans of areas of the City that have not been previously covered
- Updating existing studies and large-scale master plans to incorporate additional resilience/equity features
- Look at community scale flooding issues not addressed by large-scale studies

There may be an opportunity to modify the scope of these planned studies to incorporate flooding and resilience:

- Greenbrier Redevelopment Study
- Industrial Waterfront Study
- Western Branch Redevelopment Study
- Joint planning study of St. Juliens Creek corridor and/or Blows Creek corridor to explore options for expanded public recreation access to the water around St. Juliens Creek Annex
- Study options for interconnecting water service to St. Juliens Creek Annex and evaluate alternatives for extending water and sewer service eastward towards the Elizabeth River to support future development

[50] (City of Chesapeake, 2017)
[51] (City of Chesapeake, 2017)

As opportunities are identified and vetted, the City plans to seek grant funding though the CFPF program.

4.4 Programs

The CFPF program defines capacity building programs as "improving the ability of a local government through training of existing staff, hiring personnel, contracting with expert consultants or advisors, and other related actions that allow a local government to identify and mitigate risk and flood impacts[52]." A program could be considered essential to a sustainable community that is economically, socially, and environmentally based.

A possible program is a modification to the OSAP Program. This project would supplement the existing, city-wide competitive, OSAP program. This program allows the City to purchase development rights from willing landowners in exchange for preservation easement on their property. In addition to capacity building, programs can also be considered preparation for the future. The City will review opportunities to be involved in planning programs. For example, the City will look into and identify types of staff support that may be helping in planning future needs such as staff capacity, on-call contracts, and training.

The City will seek to ensure an equitable and proportionate share of public facility and infrastructure improvements attributable, in whole or part, to a proposed development project which will be financed by the owners, developers, users or beneficiaries. Development and redevelopment will be designed in such a way as to mitigate for the potential impacts from flooding and SLR[53]. [c1]

The City continues to explore different strategies of flood mitigation, including tidal flooding, such as removing structures and preserving properties subject to repetitive losses from flooding, in part by exploring funding mechanisms for purchasing such properties. New development, redevelopment, and critical infrastructure will be directed towards higher ground to the greatest extent practicable [c9]. Chesapeake will continue to work with businesses and community organizations, such as civic leagues, potentially affected by SLR to proactively adapt to future conditions [c4, c12].

Natural resource protection activities reduce the impact of natural hazards by preserving or restoring natural areas and their protective functions [c10]. Natural areas could include floodplains, wetlands, streams, steep slopes, barrier islands and sand dunes. Parks, recreation or conservation agencies and organizations often implement these measures, examples include[54]:

- Beach and dune preservation
- Erosion and sediment control
- Floodplain protection
- Forest and vegetation management
    - i.e., fire resistant landscaping, fuel breaks
- Habitat preservation
- Historic properties and archaeological site preservation

[52] (Commonweath of Virginia Department of Conservation and Recreation, 2022)
[53] (City of Chesapeake Planning Department, 2016)
[54] (Hampton Roads Planning District Commission, 2017)

- Land acquisition
- Riparian buffers
- Slope stabilization
- Watershed management
- Wetland preservation and restoration

Chesapeake is also considering establishing forested buffers on conserved properties, providing stormwater filtering to receiving waters. The City currently plants trees as a part of municipal projects and based on Expert Panel recommendations, tree plantings can reduce the total phosphorous load by 24% for tree canopy over lawn and 11% for canopy over impervious surfaces. In 2018, the City planted 2,000 loblolly pine seedlings in the TMDL watersheds[55].

Moving residential living away from sensitive regions does not mean their beauty cannot be appreciated. By creating public access, people can visit and live more well in other regions. Thus, acquisition of new public waterfront access sites, such as those identified in the City's 2026 Comprehensive Plan and the Private and Public Waterfront Access Study, will be pursued including:

- Continue efforts to expand and enhance multi-purpose trail along Dismal Swamp Canal
- Increase shoreline pedestrian and boating access to the Albemarle and Chesapeake Canal by means of a proposed hiking trail on the northeast side of the Canal
- Pocaty Creek and St. Julian Creek
- The abandoned Route-168 bridge over the Northwest River could be used to provide an additional boat ramp, as could a portion of Northwest Preserve No. 1
- The Eastern Branch of the Elizabeth River and the Indian River should also be further explored for future public waterfront access points
- The Western Branch area of the City should be further explored for future access points; possible sites include Western Branch Park and former Lake Ahoy site

Land deemed probable for acquisition include properties which are currently leased for agricultural use; however, City policy allows the City to prioritize these lands for recreational use, BMPs, or debris sites during storm events. Specifically, the City will evaluate converting the following leased properties from agriculture to forest in future permit terms[56] [c6&7]:

- 1564 Mount Pleasant Road, 8-acres, North Landing River (AS12)
- 1653 Mt Pleasant Road, 16-acres, North Landing River (AS12)
- 1736 Mount Pleasant Road, 17-acres, North Landing River (AS12)
- 1102 Centerville Turnpike South, 15-acres, Pocaty River (AS15)
- 2500 Land of Promise Road, 133-acres, Pocaty River (AS15)
- Ballahack Road, 404-acres, Northwest River (AS09)

As opportunities are identified and vetted, the City plans to seek grant funding though the CFPF program.

4.5 Projects

Projects can be defined, for the CFPF program, as activities which include the development of flood protection facilities, acquisition of land, restoration of natural features or other activities

[55] (Southern Rivers TMDL Action Plan, 2018)
[56] (Southern Rivers TMDL Action Plan, 2018)

that involve design, construction, or installation of facilities[57]. As opportunities are identified and vetted, the City plans to seek grant funding though the CFPF program.

The City of Chesapeake is blessed with ample water access, this critical resource needs to be protected from anthropomorphic pollutants. Proper utilization of land, identifying incentives for restoring riparian and wetland vegetation, and incorporation of nature-based infrastructure are some of the key factors in deeming a project as resilient. Forward-looking projects designed for resilience are critical to mitigating impacts of climate change on infrastructure – specifically in coastal regions.

As has been presented in Section 3, the City of Chesapeake has developed Master Drainage Plans and, in some instances, more detailed neighborhood studies for the majority of the locality. Through a review of approximately 40 of these studies and other documents, approximately 200 discrete projects were identified. The City has selected the following 26 projects to include in the Preliminary Resilience Plan, listed in order implementation status and anticipated construction start. Project details can be found in Appendix D.

- Under Design
  1. Oakdale Area BMP and Drainage Improvements
  2. Norfolk Highlands Drainage Improvements
  3. Welch Ln Drainage Improvements – Phase I & II
  4. Cooper's Ditch – Phase II
  5. Washington Manor Outfall Improvements
  6. Hickory Ridge Outfall Improvements
  7. Herring Ditch Outfall Improvements
  8. Royce Dr Drainage Outfall Improvements – Phase II
  9. Lamberts Trail Area Drainage Improvements – Phase II
  10. Pughsville Area Outfall Improvements

- Design Scoping Underway
  11. Elmwood Landing Area Drainage Improvements – Phase I & II
  12. Providence Rd Crossing Replacement
  13. Mount Pleasant Rd Crossing Replacement
  14. Shell Rd Drainage Improvements

- Not Yet Under Design
  15. Greenbrier Outfall Resiliency Improvements – Phase I & II
  16. Greenbrier Outfall Resiliency Improvements – Phase III
  17. Drum Creek Farms Drainage Improvements – Phase II
  18. Poplar Branch Ditch Regrading
  19. Buskey Rd Crossing Replacement
  20. Carawan Ln Drainage Improvements
  21. Weiss Lane Outfall Improvements
  22. Pleasant View Drainage Improvements
  23. Mount Pleasant Rd Outfall Improvements
  24. Homemont Outfall Improvements
  25. Forest Lakes Outfall Improvements – Phase II
  26. Scenic Blvd Drainage Improvements

[57] (Commonweath of Virginia Department of Conservation and Recreation, 2022)

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Appendices

Appendix A: Plan Criteria Matrix

Appendix B: Plan and Program Inventory

Appendix C: Critical Facilities Map

Appendix D: Resilience Plan Project Table

Appendix A
Plan Criteria Matrix

Resilience Plan **Criteria Matrix**								
	Document Name	Hampton Roads Hazard Mitigation Plan	2035 Chesapeake Comprehensive Plan	HRPDC Sea Level Rise Planning Policy and Approach	HRPDC Integrating Coastal Resilience into Local Plans, Policies, and Ordinances	Norfolk Highlands Master Plan (Timmons job)	Chesapeake, Code of Ordinances IV, VII, IX, X, and XI	Portsmouth & Chesapeake Joint Land Use Study
	URL	https://www.hrpdcva.gov/uploads/docs/2017%20Hampton%20Roads%20Hazard%20Mitigation%20Plan%20Update%20FINAL.pdf	https://resources.cityofchesapeake.net/comp-plan-2035/#page=1	https://www.hrpdcva.gov/uploads/docs/05A_Attachment%20-%20HRPDC%20Sea%20Level%20Rise%20Planning%20Policy%20and%20Approach%20-%20Adopted%20101818.pdf	https://www.hrpdcva.gov/uploads/docs/HRPDC%20FY%2015%20Task%2094.01%20Final%20Report%20-%20Coastal%20Resilience.pdf	not available	https://library.municode.com/va/chesapeake/codes/code_of_ordinances	https://www.hrpdcva.gov/uploads/docs/ChsPorJLUS_Report_Draft_June2021.pdf
	Published date	2017	2014	2018	2017	2019	2013	2021
Criterion	Amended/Revised date	2017	2016			2019		
1	Equity based strategic polices for local government wide flood protection and prevention.	Table 7.4 page 243	Pages 11, 56, 206				Code of Ordinances are City policies (Ref Doc)	Section 1.5 Starting on page 28, and 6.3 (page 182), Policies and Practices, page 20, Section 6.0, page
2	Documentation of existing social, economic, natural, and other conditions present in the local government.	page 3:9-10 (29-30)	Chapter 2 (Page 22)		Code of Virginia (page 7)			Economy page 22-23, Section 1.1, page 21-23 Section 1.5, page 28-31
3	Review of the vulnerabilities and stressors, both natural and social in the local government.	Vulnerability Assessment Page 5:1 (Page 153), Overview of Vulnerability (page 5:5, 156)	Pages 68, 113, 170, 178		FMP (page 11)		26-89-b (page 5)	Section 4.6 (page 76), 4.6.2 (page 79), Summary of Challenges, page 15-17
4	- Forward looking goals, actionable strategies, and priorities through as seen through an equity based lens.	Chesapeake Mitigation Actions 1-16 (Page 7:151, 383)	Page 45-58 and Appendix C (good summary, but really most of the document addresses this item)	Yes pages 1-4	page 68-69	Page 23	26-99 (page 11-12), 26-100-3 (Page 13),	3.2.5 (page 50), 5.3.17 (Risk Assessment), JLUS Goals, page 16 Table ES.1, page 17 Priority Actions, page 18-19 Section 1.2, page 23-25 Section 5.0, page 103
5	Strategies that guides growth and development away from high risk locations that may include strategies in comprehensive plans or other land use plans or ordinances or other studies, plans or strategies adopted by a local government.	Mitigation Action 2, 3 and 15			page 68-69		26-519 (page 47-49)	Project specific
6	Proposed acquisition of land or conservation easements or identification of areas suitable for conservation particularly areas identified as having high flood attenuation benefit by Conserve Virginia or similar data driven tools.	Mitigation Action 2, 3, 13, and 15	Pages 34, 58, 73		page 68-69		OSAP (page 62-66, 70)	REPI Page 29, Section 1.3, page 25-26 Section 3.2, page 43-47
7	Identification of areas suitable for property buyouts in frequently flooded areas.	Mitigation Action 2, 3, 13, and 15	pages 67, 68 (no specific mention of property buyouts however, only alluded), New property acquisitions page 73		page 68-69		OSAP (page 66-67, 70)	#2 (page 226)
8	Identification of critical facilities and their vulnerability throughout the local government such as water and sewer or other types identified as "lifelines" by FEMA.	Mitigation Action 16	Pages 122		page 68-69		Defined (page 1-2), 26-100-5 (page14)	4.6.5 (page 95), Table 1 Ches (page 219)
9	Identified ecosystems/wetlands/floodplains suitable for permanent protection.	Page 6:24 (230), #3 page 7:5 (237)	Pages 14, 34, 59, 61, 66, 69-71,				26-513 (page 39-40), 26-520 (page 49)	5.3.29 (Page 164), Section 1.3, page 25-26
10	Identified incentives for restoring riparian and wetland vegetation.	Page 6:10 (216), #3 page 7:5 (237)					26-516 (page 45), 26-522-2 (page 54)	
11	A framework for implementation, capacity building and community engagement.	Page 6:2 (208), 6:5 (211), 6:10 (216), 7:1 (233),	Pages 32, 76,		page 68-69	Page 23	Sec 26-93 (page 6-9), 26-358 & 360 (page 29-30), 26-518 (page 46-47)	7.0 (page (191), Section 1.4.3, page 27
12	Strategies for creating knowledgeable, inclusive community leaders and networks.	Pages 17-18, HMPS Committee members table 2.2 (page 2:4-5, 12-13)	Pages 130 and 170		Page 49, 51		26-86 (page 1)	Sect. 6.1 and 6.2, Section 1.4, page 26
13	A community dam safety inventory and risk assessment posed by the location and condition of dams.	Table 4.2 (Page 4:18, 64)			National Flood Insurance Program (page 8-9)			
14	A characterization of the community including population, economics, cultural and historic resources, dependence on the built environment and infrastructure and the risks posed to such infrastructure and characteristics by flooding from climate change, sea level rise, tidal events or storm surges or other weather.	Population (Page 3:2, 22), Historic (3:9-10, 29-30), Infrastructure (3:15, 35), Sea level rise (4:32, 78)	Pages 68, 125		Chesapeake is CRS Class 8 (Pages 14-15), page 68	Page 6, 43		Intro (page 21), Roadway Flooding, page 15-16, Section 4.6, page 76-101
15	Strategies to address other natural hazards that would cause, affect or result from flooding events including: • Earthquakes. • Storage of hazardous materials • Landslides/mud/debris flow/rock falls. • Prevention of wildfires that would result in denuded lands making flooding, mudslides or similar events more likely. • Preparations for severe weather events including tropical storms or other severe storms, including winter storms.	Pages 90-152, 187-206, Table 7.5 (page 7:13, 245)	Page 127 - prepare power utilities for severe weather	Severe Storms		Page 23	26-606 (page 73)	Section 4.6, page 76-79

Resilience Plan Criteria Matrix								
	Document Name	Public Facilities Manual (Chapt. 5, 15, and 17)	Chesapeake Bay TMDL Action Plan	Southern Rivers TMDL Action Plan	Southern Rivers TMDL Action Plan Conceptual Water Quality Projects	Elizabeth River Bacterial TMDL Action Plan	Community Rating System data	2021 Legislative Priorities
	URL	https://www.cityofchesapeake.net/government/city-departments/departments/Department-of-Development-and-Permits/Development-Engineering-and-Construction/pfm/volume1/chapters.htm	https://www.norfolk.gov/DocumentCenter/View/38025/Final-Report---Chesapeake-Bay-TMDL-Action-Plan---06_28_2018_FINAL?bidId=	https://www.cityofchesapeake.net/Assets/documents/departments/public_works/TMDL/Chesapeake+Southern+Rivers+TMDL+Action+Plan+-+July+24$!2c+2018.pdf	https://www.cityofchesapeake.net/Assets/documents/departments/public_works/TMDL/Draft+Conceptual+Water+Projects.pdf	https://norfolk.gov/DocumentCenter/View/38026/Norfolk-ER-Bacteria-TMDL---Final-Action-Plan---06-28-2018_FINAL?bidId=	not available	https://www.cityofchesapeake.net/Assets/documents/departments/city_manager/2021+Legislative+Program/Proposed+2021+Legislative+Package.pdf
	Published date	2016, 2018, 2010	2018	2018	2018	2018	2021	2021
Criterion	Amended/Revised date					2018		
1	Equity based strategic polices for local government wide flood protection and prevention.		Section 3.2, page 10	Table 1-2, page 13 Section 12, page 71-73 Section 15, page 78		Section 5.0, page 16-17		Page 6 & 7, and Page 12 "Preserve Legal Standards"
2	Documentation of existing social, economic, natural, and other conditions present in the local government.		Section 1.3, page 8	Section 1, page 11-13		Section 1.1, Page 1		Page 22 "Deep Creek AIWW Bridge & North Landing AIWW Bridge Replacements"
3	Review of the vulnerabilities and stressors, both natural and social in the local government.			Section 6, page 41-43		Section 2.0, page 5 Section 3.0, page 6-7		Page 15 "Barriers to Human Service Providers" Page 18 "Uranium Mining"
4	Forward looking goals, actionable strategies, and priorities through as seen through an equity based lens.		Section 1.2 & 1.3, page 7 & 8	Section 3, page 21-22 Section 7, page 44-57 Section 8, page 58-62		Table 1-2, page 4 Section 7.1, page 20 Section 7.3, page 21		Page 8
5	Strategies that guides growth and development away from high risk locations that may include strategies in comprehensive plans or other land use plans or ordinances or other studies, plans or strategies adopted by a local government.		Section 3.3, page 11	Section 7.5, page 54 Section 7.6.1, page 55				
6	Proposed acquisition of land or conservation easements or identification of areas suitable for conservation particularly areas identified as having high flood attenuation benefit by Conserve Virginia or similar data driven tools.			Section 8.3.3, page 61				
7	Identification of areas suitable for property buyouts in frequently flooded areas.		Section 3.3, page 11	Table 2-1, page 17 Section 8.3.4, page 61				
8	Identification of critical facilities and their vulnerability throughout the local government such as water and sewer or other types identified as "lifelines" by FEMA.		Section 3.3, page 11	Section 6, page 41-43		Section 2.0, page 5 Section 3.0, page 6-7	CRS program	Page 10 & 11
9	Identified ecosystems/wetlands/floodplains suitable for permanent protection.		Section 3.3, page 11	Table 2-1, page 17		Section 1.2, page 2 Figure 1-1, page 3		
10	Identified incentives for restoring riparian and wetland vegetation.			Section 8.3.4, page 61				
11	A framework for implementation, capacity building and community engagement.		Section 3.9 & 3.10, page 15	Section 7.2, page 50-51 Section 13, page 74		Section 6, page 18-19 Section 8.0, page 22		
12	Strategies for creating knowledgeable, inclusive community leaders and networks.		Section 3.9, page 15	Section 7.2, page 50-51 Section 13, page 74		Section 6, page 18-19 Section 8.0, page 22		
13	A community dam safety inventory and risk assessment posed by the location and condition of dams.							
14	A characterization of the community including population, economics, cultural and historic resources, dependence on the built environment and infrastructure and the risks posed to such infrastructure and characteristics by flooding from climate change, sea level rise, tidal events or storm surges or other weather.							Page 16 "Virginia Commonwealth Flooding Board" Page 17 "Real Estate Disclosures for Flooding"
15	Strategies to address other natural hazards that would cause, affect or result from flooding events including: • Earthquakes. • Storage of hazardous materials • Landslides/mud/debris flow/rock falls. • Prevention of wildfires that would result in denuded lands making flooding, mudslides or similar events more likely. • Preparations for severe weather events including tropical storms or other severe storms, including winter storms.		Table 3.4-1 (Annual Pollutant Loads)					

Resilience Plan Criteria Matrix								
	Document Name	Capital Improvement Projects Summary – Stormwater Projects	Crestwood 2&3 Calibration	Sterns Creek Watershed Master Drainage Plan	Bedford Study Area	MS4 Program Plan	Greenbrier Resiliency Plan	Chesapeake Citizen Stormwater Committee - Annual Report to Council (2018)
	URL	not available but full CIP can be found at: https://www.cityofchesapeake.net/Assets/documents/departments/budget/CIP+Approved+2020-2024/CIP+Approved+2021-2025/FY21-25+Approved+CIP+Document.pdf	not available	not available	not available	https://resources.cityofchesapeake.net/vsmp/ms4-plan/#page=1	not available	not available
	Published date	2021	2021	2021	1986	2017	2020	2018
Criterion	Amended/Revised date		2022	2022				
1	Equity based strategic polices for local government wide flood protection and prevention.		Section 4, page 4	Section 6, page 6-1 - 6-5		Section 2.4, page 8-9 Section 2.5, page 9-10	Section 2, page 8	
2	Documentation of existing social, economic, natural, and other conditions present in the local government.		Section 2, page 2 Section 3, page 3 Figure 1-15, page 23-37 Figure 18-20, page 41-43	Executive Summary, page ES-1 - ES-3 Section 2.4, page 2-7	Existing Conditions, page 1-2 Table 1, page 4 Figure 1, page 8			
3	Review of the vulnerabilities and stressors, both natural and social in the local government.					Water Quality Impact Assessments, page 222 & 318		
4	Forward looking goals, actionable strategies, and priorities through as seen through an equity based lens.	Page 1-34	Section 1, page 1 Table 5, page 20-22	Executive Summary, page ES-1 - ES-3 Section 1.1, page 1-2 Section 4.3, page 4-5 - 4-6 Section 4.4, page 4-6 - 4-9 Table 5-1, page 5-2	Future Conditions, page 2-3 Table 2, page 5			
5	Strategies that guides growth and development away from high risk locations that may include strategies in comprehensive plans or other land use plans or ordinances or other studies, plans or strategies adopted by a local government.							
6	Proposed acquisition of land or conservation easements or identification of areas suitable for conservation particularly areas identified as having high flood attenuation benefit by Conserve Virginia or similar data driven tools.	Page 1-34		Section 1.3, page 1-5 & 1-6				page 2 of 4
7	Identification of areas suitable for property buyouts in frequently flooded areas.							page 2 of 4
8	Identification of critical facilities and their vulnerability throughout the local government such as water and sewer or other types identified as "lifelines" by FEMA.					Section 4.9, page 36-40		
9	Identified ecosystems/wetlands/floodplains suitable for permanent protection.	Page 1-34		Section 1.3, page 1-5 & 1-6				page 2 of 4
10	Identified incentives for restoring riparian and wetland vegetation.		Table 5, Scenario F, page 21 Figure 17a, page 40					
11	A framework for implementation, capacity building and community engagement.					Section 4.10, page 41-43		All
12	Strategies for creating knowledgeable, inclusive community leaders and networks.					Section 4.10, page 41-43 Section 4.11, page 44-46		All
13	A community dam safety inventory and risk assessment posed by the location and condition of dams.					Dam Safety and Floodplain Management		
14	A characterization of the community including population, economics, cultural and historic resources, dependence on the built environment and infrastructure and the risks posed to such infrastructure and characteristics by flooding from climate change, sea level rise, tidal events or storm surges or other weather.				Introduction, page 1			
15	Strategies to address other natural hazards that would cause, affect or result from flooding events including: • Earthquakes. • Storage of hazardous materials • Landslides/mud/debris flow/rock falls. • Prevention of wildfires that would result in denuded lands making flooding, mudslides or similar events more likely. • Preparations for severe weather events including tropical storms or other severe storms, including winter storms.			50 and 100 year storm	50 year storm			

Resilience Plan Criteria Matrix								
	Document Name	Chesapeake Citizen Stormwater Committee - Annual Report to Council (2020)	Contract for Elizabeth River Project to Provide Environmental Conservation Services for the City of Chesapeake	City of Chesapeake 2022 Mitigation Action Items (internal update)	Essential Facilities	Administrative Regulation 1.29: Facilitating Procurement Opportunities for Small Businesses and Businesses Owned by Women, Minorities, and Service Disabled Veterans	City Directive 2.09: Department of Human Resources Equal Employment Opportunity Policy	Administrative Regulation 1.30: Chesapeake Alert Emergency Notification/Citizen Information/Employee Notification System
	URL	not available	not available	not available	not available	https://www.cityofchesapeake.net/Assets/documents/departments/human_resources/administrative_regulations/AR129.pdf	https://www.cityofchesapeake.net/Assets/documents/departments/human_resources/administrative_regulations/AR209.pdf	https://www.cityofchesapeake.net/Assets/documents/departments/human_resources/administrative_regulations/AR130.pdf
	Published date	2020	2020	2022	2022	2011	2004	2011
Criterion	Amended/Revised date						2021	2014
1	Equity based strategic polices for local government wide flood protection and prevention.			All		Pg. 1 - 3	Equity Statement	
2	Documentation of existing social, economic, natural, and other conditions present in the local government.					Page 3	Page 2-4	
3	Review of the vulnerabilities and stressors, both natural and social in the local government.							
4	- Forward looking goals, actionable strategies, and priorities through as seen through an equity based lens.					Pg. 1 - 3		
5	Strategies that guides growth and development away from high risk locations that may include strategies in comprehensive plans or other land use plans or ordinances or other studies, plans or strategies adopted by a local government.			Mitigation 2 & 3		Pg. 1-3		Page 1, 2-6
6	Proposed acquisition of land or conservation easements or identification of areas suitable for conservation particularly areas identified as having high flood attenuation benefit by Conserve Virginia or similar data driven tools.			Mitigation 2 & 3 & 15				
7	Identification of areas suitable for property buyouts in frequently flooded areas.			Mitigation 2 & 3 & 15				
8	Identification of critical facilities and their vulnerability throughout the local government such as water and sewer or other types identified as "lifelines" by FEMA.			Mitigation 10	All			
9	Identified ecosystems/wetlands/floodplains suitable for permanent protection.	Page 3 of 4	Page 3					
10	Identified incentives for restoring riparian and wetland vegetation.		Page 4					
11	A framework for implementation, capacity building and community engagement.	All	Page 1					Page 1-6
12	Strategies for creating knowledgeable, inclusive community leaders and networks.	All				Pg. 1-3		
13	A community dam safety inventory and risk assessment posed by the location and condition of dams.							
14	A characterization of the community including population, economics, cultural and historic resources, dependence on the built environment and infrastructure and the risks posed to such infrastructure and characteristics by flooding from climate change, sea level rise, tidal events or storm surges or other weather.							
15	Strategies to address other natural hazards that would cause, affect or result from flooding events including: • Earthquakes. • Storage of hazardous materials • Landslides/mud/debris flow/rock falls. • Prevention of wildfires that would result in denuded lands making flooding, mudslides or similar events more likely. • Preparations for severe weather events including tropical storms or other severe storms, including winter storms.							

Resilience Plan Criteria Matrix								
	Document Name	Administrative Regulation 1.33: City Manager's Office Authority to Apply for Grant Policy	City Policies and Processes for Budget	Mobile Home Displacement Policy	Budget Work Session: Policy and Programmatic Levers	Public Facilities Manual Chapter 5 - Stormwater Management and Drainage Design	Program Year 47 2021/2022 Annual Action Plan	City of Chesapeake Strategic Plan
	URL	https://www.cityofchesapeake.net/Assets/documents/departments/human_resources/administrative_regulations/AR133.pdf	https://www.cityofchesapeake.net/Assets/documents/departments/budget/FY2021-22/CIP/Policies+and+Process.pdf	https://www.cityofchesapeake.net/Assets/documents/departments/planning/2035compplan/supporting-docs/mobile-home-displacement-policy.pdf	not available	https://www.cityofchesapeake.net/Assets/documents/departments/development_permits/pfm/volumei/chapters/05-Stormwater-Management-and-Drainage-Design.pdf	https://www.cityofchesapeake.net/Assets/documents/departments/planning/housing/PY+47+2021-2022+Annual+Action+Plan.pdf	not available
	Published date	2015	2022	2011	2021		2021	2021
Criterion	Amended/Revised date					2016		
1	Equity based strategic polices for local government wide flood protection and prevention.	Page 1-3	Pg. 8	Pg. 1-4	Slide 9		2-7, 8-13, 14, 15-16, 27-32, 37-38, 39-43, maps	slide 4-9, 15
2	Documentation of existing social, economic, natural, and other conditions present in the local government.	Page 1-3	Pg. 1-6	Pg. 1-4	Slide 11		2-7, 8-13, 14, 15-16, 27-32, 37-38, 39-43, maps	
3	Review of the vulnerabilities and stressors, both natural and social in the local government.							
4	- Forward looking goals, actionable strategies, and priorities through as seen through an equity based lens.			Pg. 1-4			2-7, 8-13, 14, 15-16, 27-32, 37-38, 39-43, maps	
5	Strategies that guides growth and development away from high risk locations that may include strategies in comprehensive plans or other land use plans or ordinances or other studies, plans or strategies adopted by a local government.		Pg. 19				19-26	
6	Proposed acquisition of land or conservation easements or identification of areas suitable for conservation particularly areas identified as having high flood attenuation benefit by Conserve Virginia or similar data driven tools.		Pg. 59				19-26	
7	Identification of areas suitable for property buyouts in frequently flooded areas.		Pg. 59				19-26	
8	Identification of critical facilities and their vulnerability throughout the local government such as water and sewer or other types identified as "lifelines" by FEMA.		Pg. 59				19-26	
9	Identified ecosystems/wetlands/floodplains suitable for permanent protection.		Pg. 59				19-26	
10	Identified incentives for restoring riparian and wetland vegetation.						19-26	
11	A framework for implementation, capacity building and community engagement.		Pg. 203				19-26	
12	Strategies for creating knowledgeable, inclusive community leaders and networks.		Pg. 19	Pg. 1-4			19-26	
13	A community dam safety inventory and risk assessment posed by the location and condition of dams.						19-26	
14	A characterization of the community including population, economics, cultural and historic resources, dependence on the built environment and infrastructure and the risks posed to such infrastructure and characteristics by flooding from climate change, sea level rise, tidal events or storm surges or other weather.		Pg. 59				19-26	
15	Strategies to address other natural hazards that would cause, affect or result from flooding events including: • Earthquakes. • Storage of hazardous materials • Landslides/mud/debris flow/rock falls. • Prevention of wildfires that would result in denuded lands making flooding, mudslides or similar events more likely. • Preparations for severe weather events including tropical storms or other severe storms, including winter storms.							

Appendix B
Plan and Program Inventory

Documents Reviewed for Plan Requirements

- 2021 Legislative Priorities (2021)
- 2021 Regional Legislative Agenda (2020)
- 2021 Regional Legislative Agenda for the 757 (n.d.)
- 2035 Chesapeake Comprehensive Plan (2016)
- Administrative Regulation 1.30: Chesapeake Alert Emergency Notification/Citizen Information/Employee Notification System (2014)
- Administrative Regulation 1.33: City Manager's Office Authority to Apply for Grant Policy (2015)
- Administrative Regulation 1.29: Facilitating Procurement Opportunities for Small Businesses and Businesses Owned by Women, Minorities, and Service Disabled Veterans (2011)
- Budget Work Session: Policy and Programmatic Levers (2021)
- Chesapeake Citizen Stormwater Committee – Annual Report to Council (2020)
- Chesapeake Citizen Stormwater Committee – Annual Report to Council (2018)
- Chesapeake, Code of Ordinances IV, VII, IX, X, and XI (2013)
- City Directive 2.09: Department of Human Resources Equal Employment Opportunity Policy (2021)
- City of Chesapeake Strategic Plan (2021)
- City Policies and Processes for Budget (2022)
- Essential Facilities (2022)
- HRPDC Integrating Coastal Resilience into Local Plans, Policies, and Ordinances (2017)
- HRPDC Sea Level Rise Planning Policy and Approach (2018)
- Mobile Home Displacement Policy (2011)
- Public Facilities Manual [Chapters 5, 15, and 17] (2016)
- Ranking Scale Description for Stormwater Project Prioritization (2021)
- Stormwater Utility Fee (2013)

Documents Reviewed for Projects and Plan Requirements

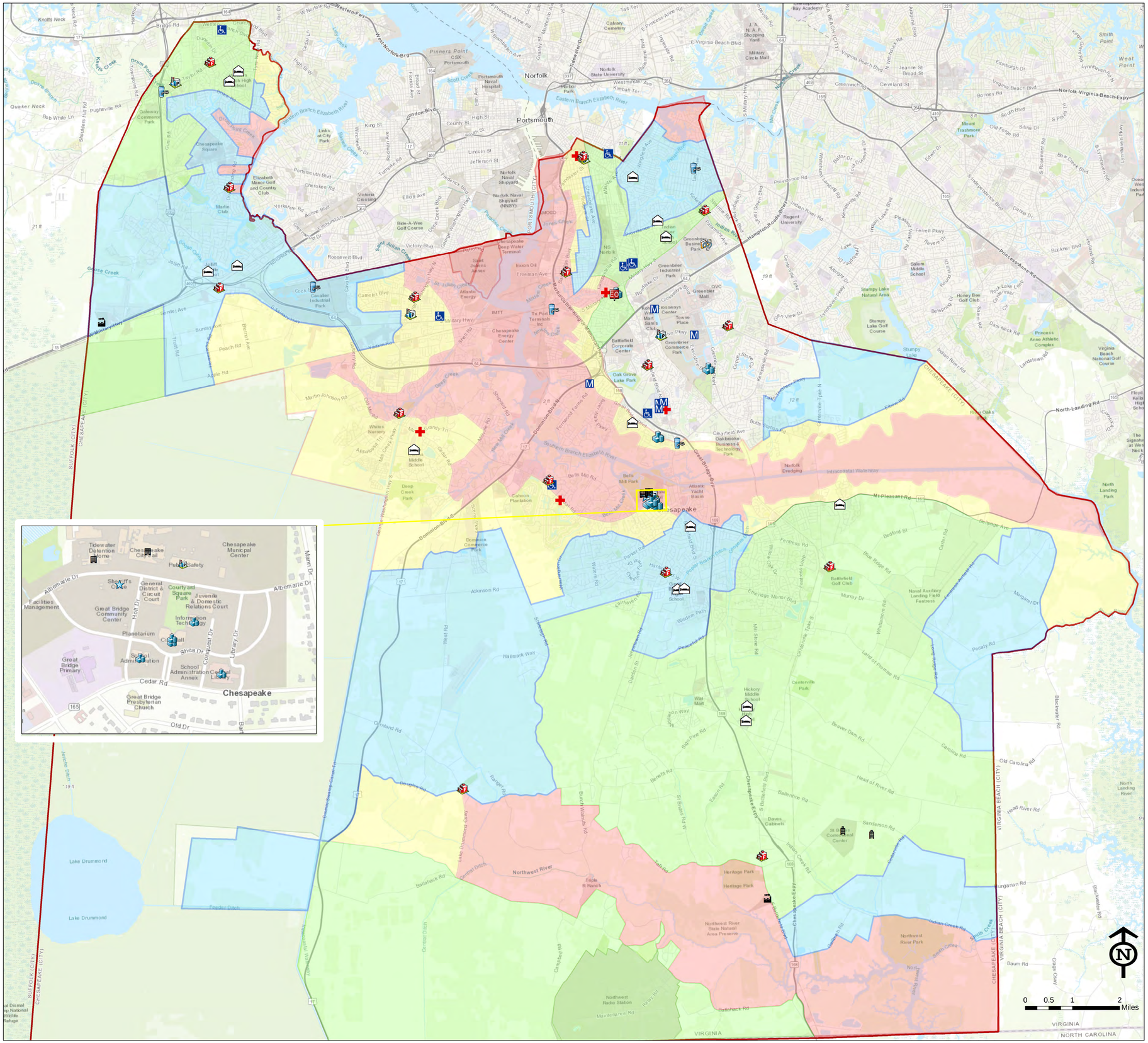
- Bailey Creek Watershed MDPU (2012)
- Bells Mill Creek Watershed MDPU (2009)
- Butts Station Road / Kemp Woods Outfall [NS-2] Watershed MDPU (2005)
- Capital Improvement Program FY 2022-2026 (2021)
- Capital Improvement Projects Summary – Stormwater Projects (2021)
- Capital Improvement Projects Progress Report – Stormwater – FY21-23 (n.d.)
- Chesapeake Avenue Area Drainage and Sanitary Sewer Improvements - SWMM Modeling (2020)
- Chesapeake Bay TMDL Action Plan (2021)
- Chesapeake Citizen Stormwater Committee – Annual Report to Council (2018)

- Chesapeake Citizen Stormwater Committee – Annual Report to Council (2020)
- Chesapeake Essential Facilities (2022)
- City of Chesapeake 2022 Mitigation Action Items (2022)
- Contract for Elizabeth River Project to Provide Environmental Conservation Services for the City of Chesapeake (2020)
- Cooper's Ditch Watershed Technical Memorandum (2012)
- Crestwood 2&3 Calibration (2022)
- Crestwood Drainage Study (2000)
- Crestwood-1 Master Drainage Plan Update (2021)
- Deal Drive Drainage Improvements Drainage Analysis Report (2019)
- Deep Creek Watershed MDPU (2006)
- Deep Creek Watershed Technical Memorandum (2010)
- Drum Point Creek Watershed Master Drainage Plan – Identified Improvements (2018)
- Drum Point Creek Watershed Master Drainage Plan – Link Node Diagram (2018)
- Drum Point Creek Watershed Master Drainage Plan (2018)
- Elizabeth River Bacterial TMDL Action Plan (2018)
- Elmwood Landing Drainage Study (2021)
- Elmwood Landing Offsite Drainage Analysis – SWMM Modeling (2020)
- Existing and Future Hydrology and Hydraulics Albemarle and Chesapeake Canal Drainage Basin Southside Albemarle and Chesapeake Canal Sub-Basin, Bedford Study Area (1986)
- Existing and Future Hydrology and Hydraulics Albemarle and Chesapeake Canal Drainage Basin Southside Albemarle and Chesapeake Canal Sub-Basin (1986)
- Existing and Future Hydrology and Hydraulics Albemarle and Chesapeake Canal Drainage Basin Northside Albemarle and Chesapeake Canal Sub-Basin (1985)
- Existing and Future Hydrology and Hydraulics for Bowers Hill Area of the Goose Creek Drainage Basin (1985)
- Existing and Future Hydrology and Hydraulics Southern Branch of the Elizabeth River Drainage Basin Crestwood Sub-Basin (1985)
- Existing and Future Hydrology and Hydraulics Western Branch Elizabeth River Drainage Basin Goose Creek Sub-Basin (1985)
- Existing and Future Hydrology and Hydraulics Western Branch Elizabeth River Drainage Basin Sterns Creek Sub-Basin (1986)
- Forest Lakes Drainage Study – Pre-Storm Pumping Technical Memorandum (2021)
- Forest Lakes Drainage Study – Recommended Mitigation Measures (2020)
- Greenbrier Resiliency Plan (2020)
- Hampton Roads Hazard Mitigation Plan (2017)
- Hodges Creek Outfall Study Area (1985)
- Horse Run Ditch East Watershed MDPU (2011)

- Indian River Watershed MDPU (2011)
- Master Drainage Reports Identified Projects (2021)
- Milldam Creek Watershed Technical Memorandum (2011)
- MS4 Program Plan (2017)
- New Mill Creek Watershed MDPU (2006)
- New Mill Creek Watershed MDPU [New Mill 3&4] (2011)
- New Mill Creek Watershed SWMM Conversion [New Mill 1 & 2] (2011)
- Newton Creek Outfall Study Area (1985)
- Norfolk Highlands Master Plan (2019)
- Northside Canal-3 Watershed Study (2021)
- Oak Grove Watershed MDPU (2010)
- Pocaty River Watershed MDP (2009)
- Portsmouth & Chesapeake Joint Land Use Study (2021)
- Program Year 47 2021/2022 Annual Action Plan (2021)
- Public Works Capital Projects Summary – Stormwater Projects (2021)
- South Norfolk Master Drainage Study (2009)
- Southern Chesapeake [2&3] Watershed Technical Memorandum (2012)
- Southern Chesapeake 1 Watershed MDP (2008)
- Southern Chesapeake 4 Watershed Study (2010)
- Southern Chesapeake Watershed MDPU [Study Area 2&3] (2007)
- Southern Rivers TMDL Action Plan (2018)
- Southern Rivers TMDL Action Plan Conceptual Water Quality Projects (2018)
- St. Julian Creek Watershed Technical Memorandum (2012)
- Stern Creek Watershed Master Drainage Plan (2021)
- The Virginia Coastal Resilience Master Plan (2020)
- Washington Manor Outfall [GL-1] Watershed Study (2015)

Appendix C
Maps

Chesapeake Essential Facilities



Essential Facilities

- Emergency Operations
- Fire Station
- Medical
- Municipal Bldgs
- Plant
- Police Station
- Senior Disabled
- Shelter
- Sheriff
- Special Needs
- Urgent Care
- Water Storage Tank
- Corrections - Medium
- Corrections - Maximum

Evacuation Zone

- A
- B
- C
- D

2/8/2022

Chesapeake VIRGINIA

Chesapeake River Basins

Eastern Branch Elizabeth River
- Berkley Drainage - BK
- Eastern Branch - EB
- Indian river - IR

Albermarle and Chesapeake Canal
- Coopers Ditch - CD
- Horse Run Ditch - HR
- Northside Canal - NS
- Southside Canal - SS

Western Branch Elizabeth River
- Baily Creek - BC
- Cavalier - CV
- Drum Point Creek - DP
- Goose Creek - GC
- Sterns Creek - ST

Southern Branch Elizabeth River
- Bells Mill Creek - BM
- Camden Mills - CM
- Crestwood - CW
- Deep Creek - DC
- Gilmerton Canal - GL
- Mill Creek - MC
- New Mill Creek - NM
- Oak Grove - OG
- St. Julian Creek - SJ
- South Norfolk - SN
- Southern Chesapeake - SC

North Landing River
- Blackwater Creek - BL
- Gum Swamp - GS
- Pocaty River - PR
- Stumpy Lake - SL

City of Suffolk

City of Portsmouth

City of Norfolk

City of Virginia Beach

City of Virginia Beach

Watershed Study Status
- Complete (2009 - present)
- In Progress
- Complete (1980s)

Master Drainage Improvement Projects
- Complete (2006 - present)
- Complete (1995 - 2005)
- In progress

Master Drainage 2021

Chesapeake VIRGINIA

0 0.5 1 2 Miles

Appendix D
Resilience Plan Project Table

Resilience Plan Project Table				
Parameter — Name of Project:	Oakdale Area BMP and Drainage Improvements	Norfolk Highlands Drainage Improvements (5 Improvement Phases)	Welch Lane Drainage Improvement Phase I & II	Cooper's Ditch Phase II
On Virginia Costal Resilience Web Explorer?	Yes	Yes	Yes	No
Name of the Document the Project is included in:	Approved Capital Improvement Plan; Oakdale Area Drainage Study	Approved Capital Improvement Plan; Norfolk Highlands Area Drainage Study	SW CIP Progress Report	Approved Capital Improvement Plan
Date the Document was published:	March 2021; July 2020	March 2021; ?	March 2022	March 2021
Chesapeake River Basin Watershed is located in (see master drainage map on Chesapeake watershed page):	Eastern Branch Elizabeth River	Eastern Branch Elizabeth River	Southern Branch Elizabeth River	Albemarle and Chesapeake Canal
Name of the Watershed the Project is located in:	Berkley (BK)	Indian River (IR)	Oak Grove (OG)	Coopers Ditch (CD), Coopers Ditch (CD-1)
Rain Fall Events (for 24hr storms) Analyzed:	2-, 5-, 10-, 100-yr	2-, 5-, 10-yr	2-, 5-, 10-yr	50-, 100-yr
Tailwater (or water surface elevation) Analyzed:	Current PFM Std	Current PFM Std	Current PFM Std	Current PFM Std
Short Summary of Project (I.E. Storm System Upgrades, Detention Basin, Channel/Channel widening):	Construct wet pond, dry pond, storm sewer pipe upgrades to reduce flooding in surrounding neighborhood and enhance water quality in Cloverdale area of South Norfolk.	Replace, upsize, and realign pipe and ditch conveyance systems to reduce flooding in surrounding neighborhood.	Construct new drainage conveyance system along Welch Lane including storm structures, storm pipe, curb & gutter, re-sloping of pavement to reduce flooding in surrounding neighborhood.	Restore hydraulic capacity of Cooper's Ditch needed to serve the watershed by removing significant amounts of silt and sediment between Gloria Dr and Forest Rd.
Is the Project Nature-based?	Yes	No	No	No
What issues or problems are being addressed by the project?	Flooding, Pollution	Flooding	Flooding	Flooding
Does the proposed Project enable communities to adapt to and thrive through natural or human hazards?	Yes	Yes	Yes	Yes
Does the Project include forward-looking goals, actionable strategies, and priorities as seen through an equity-based lens?	Yes	Yes	Yes	Yes
Level of Protection / Design Storm	100-yr for ponds	10-yr	10-yr	50-yr
Size of the Drainage Area related to the Project if listed	~ 228 AC	Varies for each phase (< 200 AC)	~ 10 AC	> 200 AC
How many alternatives were developed/analyzed for the issues being solved	3	3	3	None
Does this Project require future maintenance	Yes	Yes	Yes	Yes
Estimated total project cost (includes Engineering, Land Acq, Construction as appropriate)	$7,567,485	$1,200,000	$1,280,000	$1,500,000
Does the Project have funding available at present?	Yes (Partial)	Yes (Partial)	Yes (Partial)	Yes (Partial)
Timing for implementation (contingent on funding availability)	Active (Construction start 2022)	Active (Construction start 2022)	Active (Construction Start 2023)	Active (Construction start 2023)
What other project(s) must be completed prior to installation of this Project?	None	None	None	None
Project Status - Completed, Under Construction, Design Complete (not yet constructed), Under Design, Scoping (design not yet started), On Hold, Future (not yet started & MAY have funding in a future year)	Under Design	Under Design	Under Design	Under Design
	1	2	3	4

Resilience Plan Project Table					
Parameter	Name of Project:	Washington Manor Drainage Improvements	Hickory Ridge Outfall Improvements	Herring Ditch Outfall Improvements	Royce Dr Drainage Outfall Improvements Phase II
On Virginia Costal Resilience Web Explorer?		Yes (previously called Meads Court BMP/Drainage Improvements)	Yes	Yes	Yes
Name of the Document the Project is included in:		Approved Capital Improvement Plan; Washington Manor Outfall (GL-1) Watershed Study	Approved Capital Improvement Plan	Bells Mill Creek Watershed MDPU	SW CIP Progress Report
Date the Document was published:		March 2021; ?	March 2021	January 2010	March 2022
Chesapeake River Basin Watershed is located in (see master drainage map on Chesapeake watershed page):		Southern Branch Elizabeth River	Northwest River	Southern Branch Elizabeth River	Albemarle and Chesapeake Canal
Name of the Watershed the Project is located in:		Gilmerton Canal (GL), Washington Manor (GL-1)	Southern Chesapeake (SC), St. Brides Ditch (SC-3)	Bells Mill Creek (BM), Herring Ditch (BM-1)	Coopers Ditch (CD), Poplars Branch (CD-2)
Rain Fall Events (for 24hr storms) Analyzed:		2-,10-, 50-, 100-year	10-, 50-yr	2-, 10-, 50-, 100-year	2-, 5-, 10-yr
Tailwater (or water surface elevation) Analyzed:		Current PFM Std	Current PFM Std	Current PFM Std	Current PFM Std
Short Summary of Project (I.E. Storm System Upgrades, Detention Basin, Channel/Channel widening):		Replace and upsize pipes along Old George Washington Hwy and re-grade eastern outfall ditch to increase system capacity and reduce area flooding.	Correct erosion, increase outfall ditch capacity, replace pipes with box culvert in the conveyance system between Battlefield Blvd S. and Benefit Rd to reduce area flooding.	Widen outfall ditch and upsize culverts east of Shillelagh Rd to increase system capacity and reduce area flooding.	Regrade roadside ditches and replace driveway culverts to increase capacity and reduce flooding in surrounding neighborhood.
Is the Project Nature-based?		No	Yes	Yes	No
What issues or problems are being addressed by the project?		Flooding	Flooding, Erosion	Flooding	Flooding
Does the proposed Project enable communities to adapt to and thrive through natural or human hazards?		Yes	Yes	Yes	Yes
Does the Project include forward-looking goals, actionable strategies, and priorities as seen through an equity-based lens?		Yes	Yes	Yes	Yes
Level of Protection / Design Storm		50-yr	10-yr	50-yr	5-yr
Size of the Drainage Area related to the Project if listed		~ 560 AC	~140 AC	~ 1,500 AC	~ 20 AC
How many alternatives were developed/analyzed for the issues being solved		3	None	1	1
Does this Project require future maintenance		Yes	Yes	Yes	Yes
Estimated total project cost (includes Engineering, Land Acq, Construction as appropriate)		$1,550,000	$850,000	$2,500,000	$750,000
Does the Project have funding available at present?		Yes (Partial)	Yes (Partial)	No	No
Timing for implementation (contingent on funding availability)		Active (Construction start 2023)	Active (Construction start 2024)	Active	Active
What other project(s) must be completed prior to installation of this Project?		None	None	None	Phase I
Project Status - Completed, Under Construction, Design Complete (not yet constructed), Under Design, Scoping (design not yet started), On Hold, Future (not yet started & MAY have funding in a future year)		Under Design	Under Design	Under Design	Under Design
		5	6	7	8

Resilience Plan Project Table					
Parameter	Name of Project:	Lamberts Trail Area Drainage Improvements Phase II	Pughsville Area Outfall Improvements	Elmwood Landing Area Drainage Improvements Phases I & II	Providence Rd Crossing Replacement
On Virginia Costal Resilience Web Explorer?		Yes	No	Yes	No
Name of the Document the Project is included in:		SW CIP Progress Report	PW SW Eng Unfunded Project List	SW CIP Progress Report; Elmwood Landing Drainage Study Elmwood Landing Offsite Drainage Analysis	PW SW Eng Unfunded Project List; PW Ops Condition Report
Date the Document was published:		December 2021	March 2022	March 2022; December 2021; January 2020	March 2022
Chesapeake River Basin Watershed is located in (see master drainage map on Chesapeake watershed page):		Southern Branch Elizabeth River	Western Branch Elizabeth River	Southern Branch Elizabeth River	Eastern Branch Elizabeth River
Name of the Watershed the Project is located in:		St. Julian Creek (SJ), Camelot (SJ-1)	Drum Point Creek (DP), Pughsville (DP-1)	Deep Creek (DC), Deep Creek (DC-2)	Indian River (IR), Georgetown (IR-1)
Rain Fall Events (for 24hr storms) Analyzed:		2-, 5-, 10-yr	50-yr, 100-yr	2-1000-yr	10-, 50-yr
Tailwater (or water surface elevation) Analyzed:		Current PFM Std	Current PFM Std	Current PFM Std / road elevation	Current PFM Std
Short Summary of Project (I.E. Storm System Upgrades, Detention Basin, Channel/Channel widening):		Replace aging storm pipes and improve ditches to increase system capacity and provide a higher level of protection	Regrade major outfall channel and remove beaver dams to restore hydraulic capacity.	A new neighborhood outfall pipe. Also, replace existing poor-condition cross pipes under both Martin Johnson Rd and Cookes Mill Rd to provide a higher level of protection.	Replace existing poor-condition cross pipes under Providence Rd near Georgetown Blvd with a new box culvert to provide a higher level of protection, for both flood events and transportation network.
Is the Project Nature-based?		Hybrid	Yes	No	No
What issues or problems are being addressed by the project?		Flooding	Flooding	Flooding, Erosion	Flooding, Erosion, Road Stability, Cave-Ins
Does the proposed Project enable communities to adapt to and thrive through natural or human hazards?		Yes	Yes	Yes	Yes
Does the Project include forward-looking goals, actionable strategies, and priorities as seen through an equity-based lens?		Yes	Yes	Yes	Yes
Level of Protection / Design Storm		10-yr	100-yr	50-yr for neighborhood, 1000-yr for culvert crossings	50-yr
Size of the Drainage Area related to the Project if listed		~ 100 AC	> 200 AC	94 AC fo neighborhood, 92,000 AC for culvert crossings	~200 AC
How many alternatives were developed/analyzed for the issues being solved		1	None	Multiple	None
Does this Project require future maintenance		Yes	Yes	Yes	Yes
Estimated total project cost (includes Engineering, Land Acq, Construction as appropriate)		$1,250,000	$1,544,055	$3,000,000	$1,400,000
Does the Project have funding available at present?		No	Yes (partial)	Yes (partial)	No
Timing for implementation (contingent on funding availability)		Active	Active	2023	Active
What other project(s) must be completed prior to installation of this Project?		Phase I	None	None	None
Project Status - Completed, Under Construction, Design Complete (not yet constructed), Under Design, Scoping (design not yet started), On Hold, Future (not yet started & MAY have funding in a future year)		Under Design	Under Design	Scoping	Scoping
		9	10	11	12

Resilience Plan Project Table				
Parameter — Name of Project:	Mount Pleasant Rd Crossing Replacement	Shell Rd Drainage Improvements	Greenbrier Outfall Resiliency Improvements Phase I & II (Weir Lowering at IR HS Lake & S. Military Hwy Culvert Upsize)	Greenbrier Outfall Resiliency Improvements Phase III (I-64 Additional Culvert)
On Virginia Costal Resilience Web Explorer?	No	Yes	No	No
Name of the Document the Project is included in:	PW SW Eng Unfunded Project List; PW Ops Condition Report	SW CIP Progress Report	Greenbrier Resiliency Plan	Greenbrier Resiliency Plan
Date the Document was published:	March 2022	March 2022	November 2020	November 2020
Chesapeake River Basin Watershed is located in (see master drainage map on Chesapeake watershed page):	Albemarle and Chesapeake Canal	Southern Branch Elizabeth River	Eastern Branch Elizabeth River	Eastern Branch Elizabeth River
Name of the Watershed the Project is located in:	Coopers Ditch (CD), Fentress (CD-3)	Gilmerton Canal (GL)	Indian River (IR)	Indian River (IR)
Rain Fall Events (for 24hr storms) Analyzed:	10-, 50-yr	2-, 5-, 10-yr	100-, 500-, 1,000-year	100-, 500-, 1,000-year
Tailwater (or water surface elevation) Analyzed:	Current PFM Std	Current PFM Std	Current PFM Std + SLR	Current PFM Std + SLR
Short Summary of Project (I.E. Storm System Upgrades, Detention Basin, Channel/Channel widening):	Replace existing poor-condition cross pipe and box culvert under Mount Pleasant Rd near railroad tracks/Butts Road Pimary School with a new box culvert to provide a higher level of protection, for both flood events and transportation network.	Replace aging storm pipes and improve ditches to increase system capacity and provide a higher level of protection	Lower Indian River HS lake weir crest and upsize existing poor-condition box culvert under S. Military Hwy to lower upstream hydraulic grade line and provide additional flood storage in Greenbrier business corridor.	Construct new pipe crossing under I-64 (microtunneling) near Greenbrier Pkwy to lower permanent pool elevations of upstream impounds and provide additional flood storage in Greenbrier business corridor.
Is the Project Nature-based?	No	Hybrid	Hybrid	Hybrid
What issues or problems are being addressed by the project?	Flooding, Erosion, Road Stability	Flooding	Flooding	Flooding
Does the proposed Project enable communities to adapt to and thrive through natural or human hazards?	Yes	Yes	Yes	Yes
Does the Project include forward-looking goals, actionable strategies, and priorities as seen through an equity-based lens?	Yes	Yes	Yes	Yes
Level of Protection / Design Storm	50-yr	10-yr	1,000-yr	1,000-yr
Size of the Drainage Area related to the Project if listed	~ 450 AC	~ 10 AC	~ 3,800 AC	~ 3,000 AC
How many alternatives were developed/analyzed for the issues being solved	None	1	Multiple	2
Does this Project require future maintenance	Yes	Yes	Yes	Yes
Estimated total project cost (includes Engineering, Land Acq, Construction as appropriate)	$500,000	$900,000	$1,975,398	$3,200,000
Does the Project have funding available at present?	No	No	Yes (Partial)	No
Timing for implementation (contingent on funding availability)	Active	TBD	2022	TBD
What other project(s) must be completed prior to installation of this Project?	None	None	None	Phase I and Phase II
Project Status - Completed, Under Construction, Design Complete (not yet constructed), Under Design, Scoping (design not yet started), On Hold, Future (not yet started & MAY have funding in a future year)	Scoping	Scoping	Future	Future
	13	14	15	16

Resilience Plan Project Table					
Parameter	Name of Project:	Drum Creek Farms Drainage Imporvements Phase II	Poplar Branch Ditch Regrading	Buskey Rd Crossing Replacement	Carawan Lane Drainage Improvements
On Virginia Costal Resilience Web Explorer?		No	No	No	No
Name of the Document the Project is included in:		Approved Capital Improvement Plan	PW SW Eng Unfunded Project List	PW SW Eng Unfunded Project List; PW Ops Condition Report	PW SW Eng Unfunded Project List
Date the Document was published:		March 2021	March 2022	March 2022	March 2022
Chesapeake River Basin Watershed is located in (see master drainage map on Chesapeake watershed page):		Western Branch Elizabeth River	Albemarle and Chesapeake Canal	Northwest River	Albemarle and Chesapeake Canal
Name of the Watershed the Project is located in:		Drum Point Creek (DP)	Coopers Ditch (CD), Poplars Branch (CD-2)	Southern Chesapeake (SC), Homestead Outfall (SC-2)	Horse Run Ditch East (HR)
Rain Fall Events (for 24hr storms) Analyzed:		10-, 50-yr	50-, 100-yr	10-, 50-yr	2-, 5-, 10-yr
Tailwater (or water surface elevation) Analyzed:		Current PFM Std	Current PFM Std	Current PFM Std	Current PFM Std
Short Summary of Project (I.E. Storm System Upgrades, Detention Basin, Channel/Channel widening):		Correct major erosion, increase outfall ditch capacity and enhance water quality in the conveyance system along Drum Creek Rd to reduce flooding in surrounding neighborhood.	Restore hydraulic capacity of Poplar Branch Ditch needed to serve the watershed by removing significant amounts of silt and sediment between Hanbury Rd and Battlefield Blvd.	Replace existing poor-condition cross pipes under Buskey Rd near Bunch Walnuts Rd with a new box culvert to provide a higher level of protection, for both flood events and transportation network.	Regrade roadside/outfall ditches and replace driveway culverts to increase capacity and reduce flooding in surrounding neighborhood.
Is the Project Nature-based?		Yes	Yes	No	No
What issues or problems are being addressed by the project?		Flooding, Erosion, Pollution	Flooding	Flooding, Road Stability, Cave-Ins	Flooding
Does the proposed Project enable communities to adapt to and thrive through natural or human hazards?		Yes	Yes	Yes	Yes
Does the Project include forward-looking goals, actionable strategies, and priorities as seen through an equity-based lens?		Yes	Yes	Yes	Yes
Level of Protection / Design Storm		10-yr	50-yr	50-yr	10-yr
Size of the Drainage Area related to the Project if listed		~ 100 AC	> 200 AC	~ 1,300 AC	~ 40 AC
How many alternatives were developed/analyzed for the issues being solved		None	None	1	1
Does this Project require future maintenance		Yes	Yes	Yes	Yes
Estimated total project cost (includes Engineering, Land Acq, Construction as appropriate)		$1,400,000	$1,000,000	$600,000	$1,350,000
Does the Project have funding available at present?		No	No	No	No
Timing for implementation (contingent on funding availability)		2024	2024	UNK	TBD
What other project(s) must be completed prior to installation of this Project?		None	None	None	None
Project Status - Completed, Under Construction, Design Complete (not yet constructed), Under Design, Scoping (design not yet started), On Hold, Future (not yet started & MAY have funding in a future year)		Future	Future	Future	Future
		17	18	19	20

Resilience Plan Project Table				
Parameter — Name of Project:	Weiss Lane Outfall Improvements	Pleasant View Drainage Improvemt	Mount Pleasant Rd Outfall Improvement	Homemont Outfall Improvements
On Virginia Costal Resilience Web Explorer?	No	No	No	No
Name of the Document the Project is included in:	Deep Creek Watershed MDPU	PW SW Eng Unfunded Project List	PW SW Eng Unfunded Project List	PW SW Eng Unfunded Project List
Date the Document was published:	July 2010	March 2022	March 2022	March 2022
Chesapeake River Basin Watershed is located in (see master drainage map on Chesapeake watershed page):	Southern Branch Elizabeth River	Southern Branch Elizabeth River	Albemarle and Chesapeake Canal	Southern Branch Elizabeth River
Name of the Watershed the Project is located in:	Deep Creek (DC), Deep Creek (DC-2)	Deep Creek (DC), Deep Creek Locks (DC-3)	Horse Run Ditch East (HR)	Bells Mill Creek (BM), Herring Ditch (BM-1)
Rain Fall Events (for 24hr storms) Analyzed:	2-, 5-, 10-, 25-, 50-, 100-year	2-, 5-, 10-yr	50-, 100-yr	2-, 5-, 10-yr
Tailwater (or water surface elevation) Analyzed:	Current PFM Std	Current PFM Std	Current PFM Std	Current PFM Std
Short Summary of Project (I.E. Storm System Upgrades, Detention Basin, Channel/Channel widening):	Widen outfall ditch, upsize culverts under Weiss Lane, lower inverts to increase system capacity and reduce area flooding.	Regrade roadside/outfall ditches and replace driveway culverts to increase capacity and reduce flooding in surrounding neighborhood.	Regrade and improve major lead outfall ditch between Mount Pleasant Rd and rear of Ravenna subdivision to provide a higher level of protection.	Regrade roadside/outfall ditches and replace driveway culverts to increase capacity and reduce flooding in surrounding neighborhood.
Is the Project Nature-based?	Hybid	No	Yes	No
What issues or problems are being addressed by the project?	Flooding	Flooding	Flooding	Flooding
Does the proposed Project enable communities to adapt to and thrive through natural or human hazards?	Yes	Yes	Yes	Yes
Does the Project include forward-looking goals, actionable strategies, and priorities as seen through an equity-based lens?	Yes	Yes	Yes	Yes
Level of Protection / Design Storm	50-yr	10-yr	50-yr	10-yr
Size of the Drainage Area related to the Project if listed	~ 80 AC	~ 30 AC	~ 300 AC	~ 50 AC
How many alternatives were developed/analyzed for the issues being solved	3	1	None	None
Does this Project require future maintenance	Yes	Yes	Yes	Yes
Estimated total project cost (includes Engineering, Land Acq, Construction as appropriate)	$1,300,000	$1,300,000	$600,000	$1,100,000
Does the Project have funding available at present?	No	No	No	No
Timing for implementation (contingent on funding availability)	TBD	TBD	TBD	TBD
What other project(s) must be completed prior to installation of this Project?	None	None	None	None
Project Status - Completed, Under Construction, Design Complete (not yet constructed), Under Design, Scoping (design not yet started), On Hold, Future (not yet started & MAY have funding in a future year)	Future	Future	Future	Future
	21	22	23	24

Resilience Plan Project Table		
Parameter — Name of Project:	Forest Lakes Outfall Improvements Phase II	Scenic Blvd Drainage Improvements
On Virginia Costal Resilience Web Explorer?	No	No
Name of the Document the Project is included in:	PW SW Eng Unfunded Project List	PW SW Eng Unfunded Project List
Date the Document was published:	March 2022	March 2022
Chesapeake River Basin Watershed is located in (see master drainage map on Chesapeake watershed page):	Southern Branch Elizabeth River	Southern Branch Elizabeth River
Name of the Watershed the Project is located in:	Bells Mill Creek (BM), Herring Ditch (BM-1)	Bells Mill Creek (BM), Herring Ditch (BM-1)
Rain Fall Events (for 24hr storms) Analyzed:	50-yr, 100-yr	2-, 5-, 10-yr
Tailwater (or water surface elevation) Analyzed:	Current PFM Std	Current PFM Std
Short Summary of Project (I.E. Storm System Upgrades, Detention Basin, Channel/Channel widening):	Pre-storm pumping of the front lake in the Forest Lakes neighborhood as an alternative to replace or supplement capacity improvements	Regrade roadside/outfall ditches and replace driveway culverts to increase capacity and reduce flooding in surrounding neighborhood.
Is the Project Nature-based?	Hybrid	No
What issues or problems are being addressed by the project?	Flooding	Flooding
Does the proposed Project enable communities to adapt to and thrive through natural or human hazards?	Yes	Yes
Does the Project include forward-looking goals, actionable strategies, and priorities as seen through an equity-based lens?	Yes	Yes
Level of Protection / Design Storm	50-yr	10-yr
Size of the Drainage Area related to the Project if listed	~ 50 AC	~ 30 AC
How many alternatives were developed/analyzed for the issues being solved	10	1
Does this Project require future maintenance	Yes	Yes
Estimated total project cost (includes Engineering, Land Acq, Construction as appropriate)	$4,000,000	$1,000,000
Does the Project have funding available at present?	No	No
Timing for implementation (contingent on funding availability)	TBD	TBD
What other project(s) must be completed prior to installation of this Project?	None	None
Project Status - Completed, Under Construction, Design Complete (not yet constructed), Under Design, Scoping (design not yet started), On Hold, Future (not yet started & MAY have funding in a future year)	Future	Future
	25	26

VDEM - City of Chesapeake- N Battlefield Blvd

BENEFIT COST ANALYSIS REPORT

BRIC 2022

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BCA SUMMARY

SUB APPLICANT
City of Chesapeake

LAT/LON
36.724502, -76.241135

PROPERTY TYPE
Roads & Bridges

HAZARD TYPE
Severe Storm

MITIGATION TYPE
Road elevation

DAMAGE AND FREQUENCY
Historical Damages

N. Battlefield Boulevard is an important arterial road in Chesapeake, Virginia that crosses the headwaters of the Elizabeth River and the intercoastal waterway (a human-made canal). A cluster of small businesses and a 237-unit residential development located north of the Elizabeth River rely on the road for day-to-day access to the surrounding community and as a lifeline for evacuation and access to medical facilities aduring emergencies. Unfortunately, the road lies within the FEMA 100-year floodplain and is anticipated to be regularly impacted by sea level rise by 2030.

Additionally, this section of roadway is listed as an evacuation route and has been identified as flood prone since 2002 (2002 City of Chesapeake Vulnerability Assessment).

The proposed hazard mitigation project would raise the roadway of N. Battlefield Boulevard above the 100-year floodplain along a 1,800 foot segment of the road stretching north from where it crosses the Elizabeth River. The road, which is currently four (4) feet above sea level at its lowest point, would be raised up to three (3) feet to a new elevation of seven (7) feet above sea level. Project construction would involve removing the existing road surface, adding, and compacting fill material to increase the elevation, and constructing a new roadway and adjacent sidewalk. On the east side of the road, a low retaining wall would reduce the project's footprint to avoid impacting the wetlands to the east.

Existing utilities would be relocated or raised along with the road and the project would be phased to maximize accessibility for residents, employees, and customers during construction. In addition to the lifting of the roadway, the project would include the reconstruction of several hundred feet of intersecting local roads and approximately six private driveways to meet the new raised elevation of the Battlefield Boulevard.

Construction of the project may require the reconfiguration of commercial parking lots, which would be accomplished in collaboration with the relevant parcel landowners. The project would not impact the existing bridge over the Elizabeth River. Future stages of project scoping and design may identify opportunities for the installation of culverts along the roadway as it is raised, potentially relieving floodwaters and restoring a more natural flow regime for the city-owned wetland areas to the east of the road.

Optional components of the project could provide additional benefits such as:

- Increasing pedestrian safety and by reconfiguring the existing sidewalk on the west side of the road and improving walking between surrounding community (including the nearby Great Bridge Battlefield Historic Park) and supporting planned aspects of the 2050 Trails Plan (including separate bike lanes).
- Adding informational signage about nearby wetland habitat, the project's location within the larger watershed of the Elizabeth River and the Chesapeake Bay watershed, and design to protect against flooding.
- Conducting outreach to local community and businesses about managing flood risk and participating in the existing Bay Star Homes Program, which encourages Hampton Roads region residents to make property improvements that help restore local waterways.

For in depth review of BCA methodology, please refer to the Historical Damages Before Mitigation comments section within the BCA. In general, data from previous storms that have affected the area were used to determine recurrence according to NOAA Atlas 14, Volume 2, Version 3 WALLACETON LK DRUMMOND Station ID: 44-8837.

After project mitigation actions are complete, we estimate the 100-year storm will cause one day of impact. An H & H study will be completed as part of project deliverables to corroborate the damages projected by this analysis.

Estimated Benefits (B) = $16,273,381

Estimated Costs (C) = $ 6,654,722

BCR (B/C) = 2.45

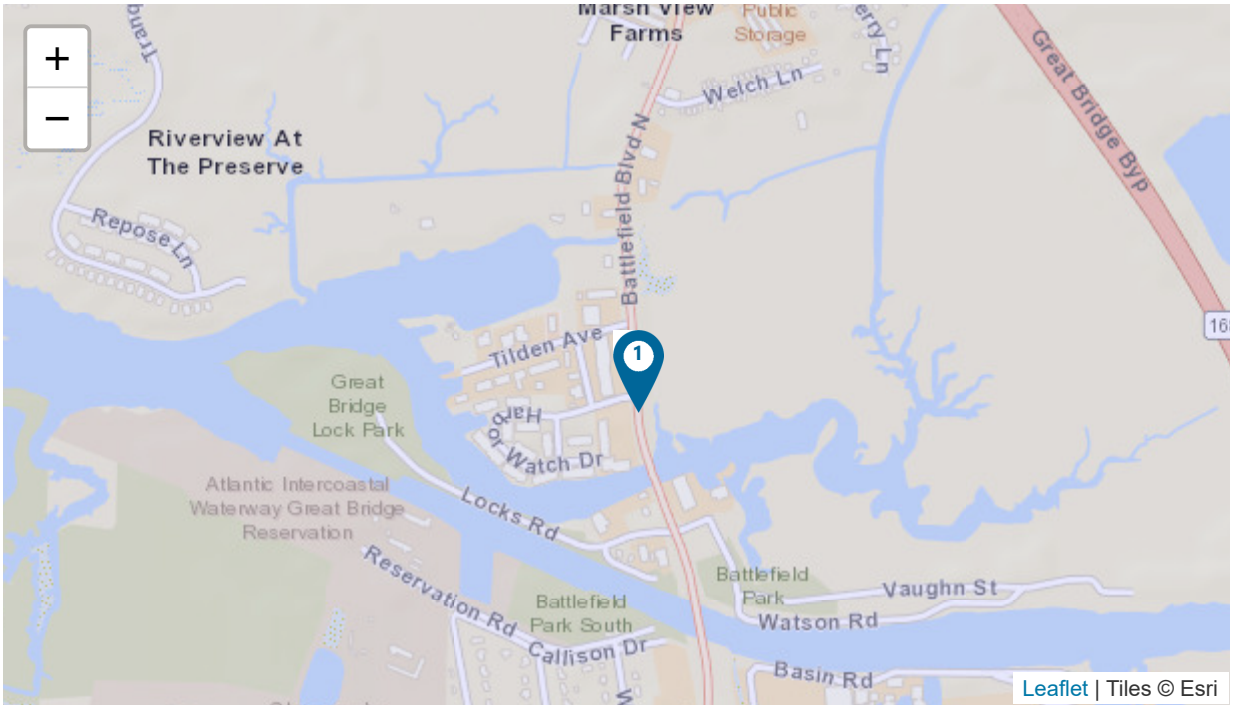
Benefit-Cost Analysis

Benefit-Cost Calculator

V.6.0 (Build 20221028.1600 | Release Notes)

Benefit-Cost Analysis

Project Name: VDEM-City of Chesapeake-N Battlefield Blvd



				Using 7% Discount Rate			Using 3% Discount Rate (For FY22 BRIC and FMA only)			
Map Marker ▲	Mitigation Title	Property Type	Hazard	Benefits (B)	Costs (C)	BCR (B/C)	Benefits (B)	Costs (C)	BCR (B/C)	
1	Other @ 36.7245020; -76.2411350		DFA - Severe Storm	$ 8,728,599	$ 6,023,334	1.45	$ 16,273,381	$ 6,654,722	2.45	
TOTAL (SELECTED)				**$ 8,728,599**	**$ 6,023,334**	**1.45**	**$ 16,273,381**	**$ 6,654,722**	**2.45**	
TOTAL				**$ 8,728,599**	**$ 6,023,334**	**1.45**	**$ 16,273,381**	**$ 6,654,722**	**2.45**	

Property Configuration

Property Title:	Other @ 36.7245020; -76.2411350
Property Location:	23320, Chesapeake, Virginia
Property Coordinates:	36.724502, -76.241135
Hazard Type:	Severe Storm
Mitigation Action Type:	Other
Property Type:	Roads & Bridges
Analysis Method Type:	Historical Damages

Cost Estimation
Other @ 36.7245020; -76.2411350

Project Useful Life (years):	50
Project Cost:	$5,292,877
Number of Maintenance Years:	50 Use Default:Yes
Annual Maintenance Cost:	$52,929

Comments

-

Project Useful Life:

The project useful life (PUL) used in the BCA is 50 years, which is the standard useful life value predetermined in the FEMA Toolkit 6.0 for Concrete infrastructure, flood walls, roads, bridges, and major drainage systems.

-

Mitigation Project Cost:

For more detailed budget information see Appendix A.

-

Annual Maintenance Cost:

The City of Chesapeake is responsible for the annual maintenance necessary for the upkeep or repair of mitigation project components so that the project maintains its originally designed and approved level of effectiveness. Maintenance cost was determined using 1% of the total project cost estimate.

Damage Analysis Parameters - Damage Frequency Assessment
Other @ 36.7245020; -76.2411350

Year of Analysis was Conducted:	2022
Year Property was Built:	1980
Analysis Duration:	43 Use Default:Yes

Comments

•

Analysis Year:

The year analysis performed.

Roads and Bridges Properties
Other @ 36.7245020; -76.2411350

Estimated Number of One-Way Traffic Detour Trips per Day:	41,000
Additional Time per One-Way Detour Trip (minutes):	31.8
Number of Additional Miles:	3.99
Federal Rate ($):	0.625 Use Default:Yes
Economic Loss Per Day of Loss of Function ($):	875,831.75

Comments

•

Number of Trips:

Based on memo from City Traffic Engineer ADT for N Battlefield Blvd. is 41000vpd (see Appendix B: Average daily trips).

•

Time per Trip:

During a weather event, the detour would be 31.8 minutes because of inclement conditions damaging the original route and disorienting drivers and drivers not knowing the detour. This information is based on Memo signed by City Traffic Engineer (see Appendix B: Average daily trips and Appendix E: Detour).

•

Number of Miles:

See Appendix E: Detour.

Historical Damages Before Mitigation
Other @ 36.7245020; -76.2411350

		ROADS AND BRIDGES	OPTIONAL DAMAGES			VOLUNTEER COSTS		TOTAL		
Damage Year	Recurrence Interval (years)	Impact (days)	Category 1 ($)	Category 2 ($)	Category 3 ($)	Number of Volunteers	Number of Days	Damages ($)	Current Dollars?	Inflated Damages ($)
2009	10	1.44	0	0	0	0	0	1,261,198	No	1,261,198
2012	2	0.53	0	0	0	0	0	464,191	No	464,191
2015	1	0.43	0	0	0	0	0	376,608	No	376,608

Comments

-

Damages Before Mitigation:
N. Battlefield Boulevard is an important arterial road in Chesapeake, Virginia that crosses the headwaters of the Elizabeth River and the intercoastal waterway (a human-made canal). A cluster of small businesses and a 237-unit residential development located north of the Elizabeth River rely on the road for day-to-day access to the surrounding community and as a lifeline for evacuation and access to medical facilities and care in emergencies. Unfortunately, the road lies within the FEMA 100-year floodplain and is anticipated to be regularly impacted by sea level rise by 2030 (see Appendix C FIRM and FIRMette).

Additionally, this section of roadway is listed as an evacuation route and has been identified as flood prone since 2002 (2002 City of Chesapeake Vulnerability Assessment). The proposed hazard mitigation project would raise traveled roadway of N. Battlefield Boulevard above the 100-year floodplain along a 1,800 foot segment of the road stretching north from where it crosses the Elizabeth River. The road, which is currently four (4) feet above sea level at its lowest point, would be raised up to three (3) feet to a new elevation of seven (7) feet above sea level. Project construction would involve removing the existing road surface, adding, and compacting fill material to increase the elevation, and constructing a new roadway and adjacent sidewalk. On the east side of the road, a low retaining wall would reduce the project's footprint to avoid impacting the wetlands to the east.

Alternatively, the project could enhance the wetlands by including a Living Shoreline on the east side, creating a vegetated slope down to the existing marshland that would protect against erosion and treat roadway runoff. Implementation of this nature-based solution would benefit from the lessons learned from the Living Shoreline project constructed at the nearby Great Bridge Battlefield Historic Park in 2015. On the west side, a gentle berm would return to existing grade, providing an opportunity for native plantings.

Existing utilities would be relocated or raised along with the road and the project would be phased to maximize accessibility for residents, employees, and customers during construction. In addition to the lifting of the roadway, the project would include the reconstruction of several hundred feet of intersecting local roads and approximately six private driveways to meet the new raised elevation of the Battlefield Boulevard.

Historical flood events that have affected the area are:

11/12/2009 Nor'easter (Nor'Ida), dropped 7.2 inches in 48 hours, based on Record of Climatological Observations from NOAA WALLACETON LAKE DRUMMOND, VA US USC00448837 station. This event corresponds to 10-year recurrence for 48 hours according to NOAA Atlas 14, Volume 2, Version 3 WALLACETON LK DRUMMOND Station ID: 44-8837. Road was blocked for 34.5 hours (see Appendix D Flood events information).

10/28/2012 Hurricane Sandy, dropped 4.51 inches in 72 hours, based on Record of Climatological Observations from NOAA WALLACETON LAKE DRUMMOND, VA US USC00448837 station. This event corresponds to 2-year recurrence for 72 hours according to NOAA Atlas 14, Volume 2, Version 3 WALLACETON LK DRUMMOND Station ID: 44-8837. Road was blocked for 12.6 hours (see Appendix D Flood events information).

10/02/2015 Hurricane Joaquin, dropped 4.11 inches in 72 hours, based on Record of Climatological Observations from NOAA WALLACETON LAKE DRUMMOND, VA US USC00448837 station. This event corresponds to 1-year recurrence for 72 hours according to NOAA Atlas 14, Volume 2, Version 3 WALLACETON LK DRUMMOND Station ID: 44-8837. Road was blocked for 10.4 hours (see Appendix D Flood events information).

01/03/2022 Winter Storm, dropped 1.75 inches in 24 hours, based on Record of Climatological Observations from NOAA WALLACETON LAKE DRUMMOND, VA US USC00448837 station. This event corresponds to less than 1-year recurrence for 24 hours according to NOAA Atlas 14, Volume 2, Version 3 WALLACETON LK DRUMMOND Station ID: 44-8837. Road was blocked for 3.8 hours (see Appendix D Flood events information). This event was not included as part of the analysis because has estimated recurrence interval lower than 1 year.

This analysis does not capture losses avoided in the form of emergency response measures, debris clean up, employment loss, business interruption, and other related losses.

Annualized Damages Before Mitigation
Other @ 36.7245020; -76.2411350

Annualized Recurrence Interval (years)	Damages and Losses ($)	Annualized Damages and Losses ($)
1	376,608	209,056
2	464,191	306,055
10	1,261,198	126,120
	Sum Damages and Losses ($)	Sum Annualized Damages and Losses ($)
	2,101,996	641,231

Expected Damages After Mitigation
Other @ 36.7245020; -76.2411350

	ROADS AND BRIDGES	OPTIONAL DAMAGES			VOLUNTEER COSTS		TOTAL
Recurrence Interval (years)	Impact (days)	Category 1 ($)	Category 2 ($)	Category 3 ($)	Number of Volunteers	Number of Days	Damages ($)
100	1	0	0	0	0	0	875,832

Comments

-

Damages After Mitigation:

Since the road will be elevated to 7 feet, which matches the 100 year flood elevation, we estimate for the 100-year storm will cause one day of impact. An H & H study will be completed as part of project deliverables to corroborate the damages projected by this analysis.

Annualized Damages After Mitigation
Other @ 36.7245020; -76.2411350

Annualized Recurrence Interval (years)	Damages and Losses ($)	Annualized Damages and Losses ($)
100	875,832	8,758
	Sum Damages and Losses ($)	Sum Annualized Damages and Losses ($)
	875,832	8,758

Benefits-Costs Summary
Other @ 36.7245020; -76.2411350

Total Standard Mitigation Benefits:	$8,728,599
Total Social Benefits:	$0
Total Mitigation Project Benefits:	$8,728,599
Total Mitigation Project Cost:	$6,023,334
Benefit Cost Ratio - Standard:	1.45
Benefit Cost Ratio - Standard + Social:	1.45

Appendix A – Cost Estimate

OMB Number: 4040-0008
Expiration Date: 02/28/2025

BUDGET INFORMATION - Construction Programs

NOTE: Certain Federal assistance programs require additional computations to arrive at the Federal share of project costs eligible for participation. If such is the case, you will be notified.

COST CLASSIFICATION	a. Total Cost	b. Costs Not Allowable for Participation	c. Total Allowable Costs (Columns a-b)
1. Administrative and legal expenses	$ 650,610.00	$	$ 650,610.00
2. Land, structures, rights-of-way, appraisals, etc.	$ 1,096,320.00	$	$ 1,096,320.00
3. Relocation expenses and payments	$	$	$
4. Architectural and engineering fees	$ 430,454.00	$	$ 430,454.00
5. Other architectural and engineering fees	$	$	$
6. Project inspection fees	$	$	$
7. Site work	$ 154,800.00	$	$ 154,800.00
8. Demolition and removal	$	$	$
9. Construction	$ 2,960,693.00	$	$ 2,482,410.00
10. Equipment	$	$	$
11. Miscellaneous	$	$	$
12. SUBTOTAL *(sum of lines 1-11)*	$ 5,292,877.00	$	$ 4,814,594.00
13. Contingencies	$	$	$ 478,283.00
14. SUBTOTAL	$ 5,292,877.00	$	$ 5,292,877.00
15. Project (program) income	$	$	$
16. TOTAL PROJECT COSTS *(subtract #15 from #14)*	$ 5,292,877.00	$	$ 5,292,877.00

FEDERAL FUNDING

17. Federal assistance requested, calculate as follows: (Consult Federal agency for Federal percentage share.) Enter the resulting Federal share.	Enter eligible costs from line 16c Multiply X 100 %	$ 5,292,877.00

Appendix B – Average Daily Trips and Location Maps

MEMORANDUM

TO: Crystal Bloom, P.E., Engineering Manager

FROM: Troy Eisenberger, P.E., City Traffic Engineer

DATE: December 20, 2022

SUBJECT: **DOCUMENTATION FOR BRIC GRANT INCLUDING SUPPORT OF DETOUR TIME FOR N BATTLEFIELD BLVD AND ADT FOR BOTH DEEPWATER DR AND N BATTLEFIELD BLVD**

Please use the following average daily traffic (ADT) volumes for the 2022 BRIC grant applications:

- ADT for Deepwater Drive can stay at 800 vpd.
- ADT for N Battlefield Blvd is 41,000 vpd.

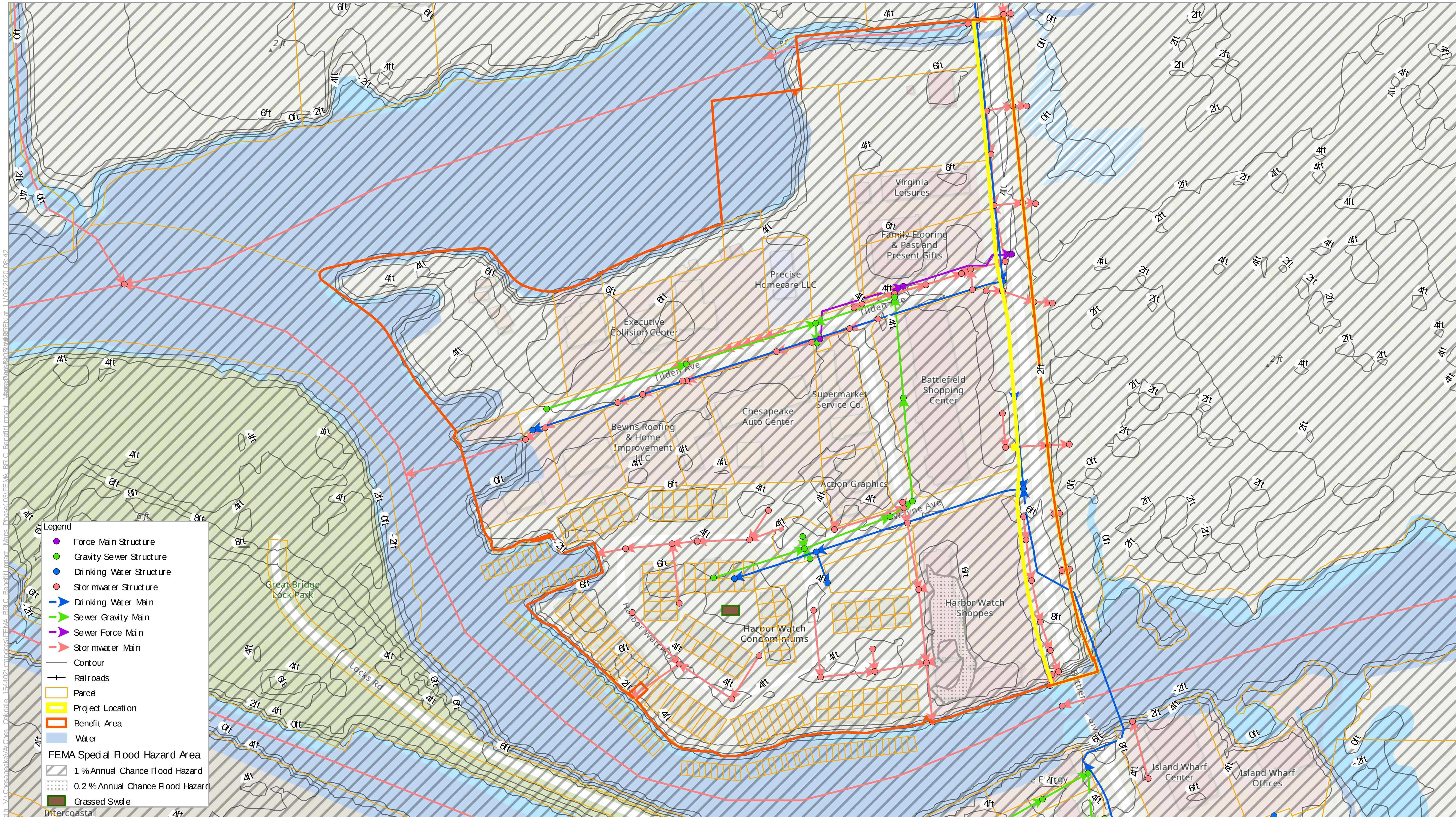
Concerning the detour time for the N Battlefield Blvd project, since the time of the detour is driven by the weather event, the time of day the detour is needed would be unknown. Based on that information and using a worst case travel time as a result, I can support the 31.8 min detour time as shown in the attached output.

Should you have any questions or need additional information, please contact me at 382-6002.

_____ _____12-20-22_____
Troy Eisenberger, P.E., City Traffic Engineer Date

TE ls

Attachments



Brown AND Caldwell

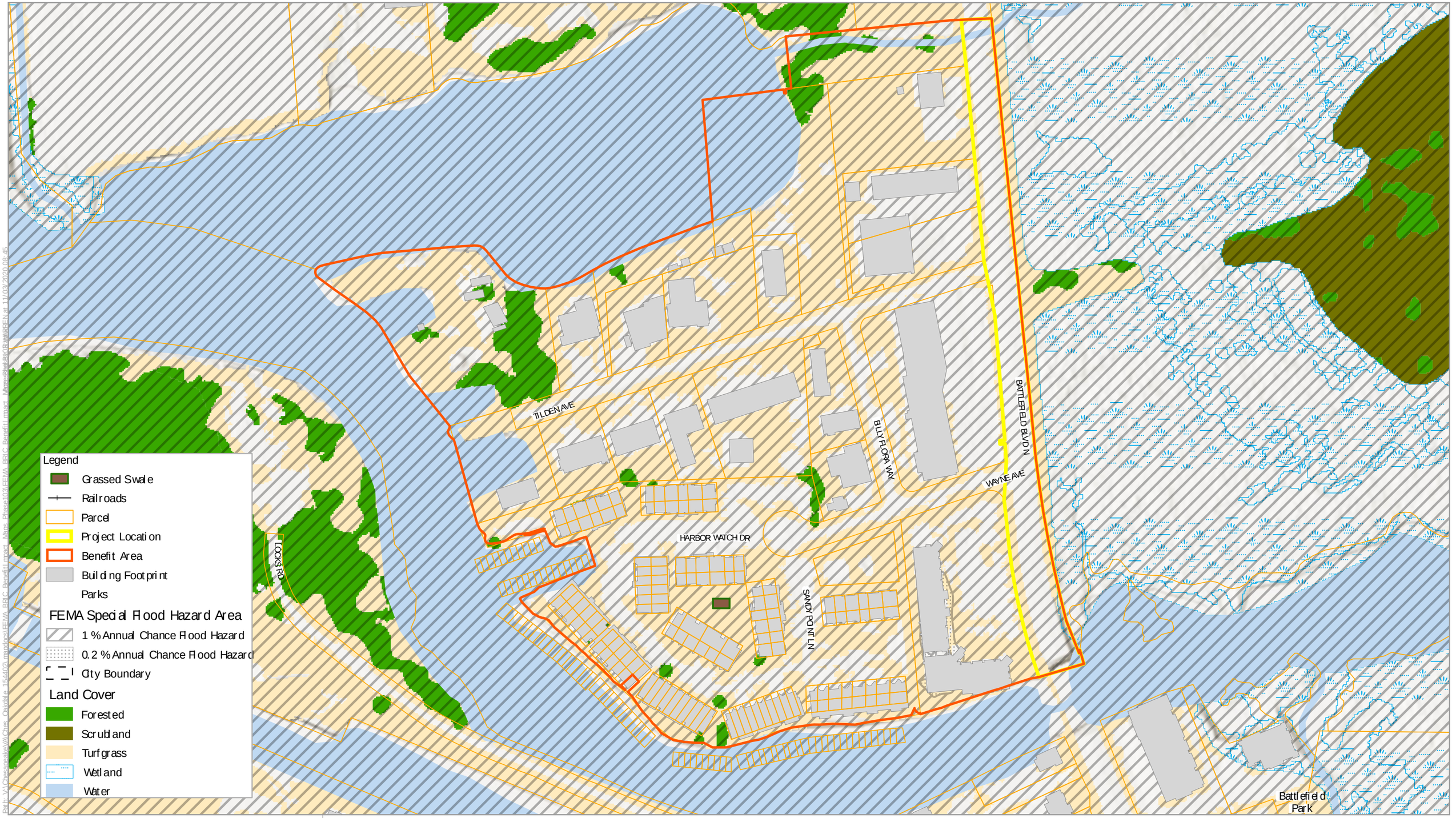
City of Chesapeake, VA
154402
Oakdale
FEMA BRIC Grant

Date: 11/3/2020 8:40 AM

Spatial Reference:
Name: NAD 1983 HARN StatePlane Virginia South FIPS 4502 Feet

0 0.01 0.02 0.04 0.06 Miles

Benefit Area Map
North Battlefield Blvd
Latitude: 36.724664
Longitude: -76.241099



Brown AND Caldwell

City of Chesapeake, VA
154402
Oakdale
FEMA BRIC Grant

Date: 11/3/2020 8:40 AM

Spatial Reference:
Name: NAD 1983 HARN StatePlane Virginia South FIPS 4502 Feet

0 0.01 0.02 0.04 0.06
Miles

Benefit Area Map
North Battlefield Blvd
Latitude: 36.724664
Longitude: -76.241099

Path: V:\Chesapeake\VA\Ches_Oakdale_154402\mapdocs\FEMA_BRIC_Benefit.mxd Mans_Phase1\06\FEMA_BRIC_Benefit.mxd 11/03/2020 08:45

Appendix C – FIRM and FIRMette

NOTES TO USERS

p is for use in administering the National Flood Insurance Program. It t necessarily identify all areas subject to flooding, particularly from local sources of small size. The **community map repository** should be d for possible updated or additional flood hazard information.

in more detailed information in areas where **Base Flood Elevations** and/or **floodways** have been determined, users are encouraged to consult d Profiles and Floodway Data and/or Summary of Stillwater Elevations ontained within the Flood Insurance Study (FIS) report that accompanies M. Users should be aware that BFEs shown on the FIRM represent l whole-foot elevations. These BFEs are intended for flood insurance urposes only and should not be used as the sole source of flood n information. Accordingly, flood elevation data presented in the FIS should be utilized in conjunction with the FIRM for purposes of tion and/or floodplain management.

l Base Flood Elevations shown on this map apply only landward of h American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should e that coastal flood elevations are also provided in the Summary of r Elevations tables in the Flood Insurance Study report for this jurisdiction. ns shown in the Summary of Stillwater Elevations table should be used for tion and/or floodplain management purposes when they are higher than tions shown on this FIRM.

ies of the **floodways** were computed at cross sections and interpolated cross sections. The floodways were based on hydraulic considerations ard to requirements of the National Flood Insurance Program. Floodway and other pertinent floodway data are provided in the Flood Insurance port for this jurisdiction.

areas not in Special Flood Hazard Areas may be protected by **flood structures**. Refer to Section 2.4 "Flood Protection Measures" of the surance Study report for information on flood control structures for this on.

jection used in the preparation of this map was Virginia State Plane South he **horizontal datum** was NAD 83, HARN. Differences in datum, projection or State Plane zones used in the production of FIRMs for jurisdictions may result in slight positional differences in map features risdiction boundaries. These differences do not affect the accuracy of this

evations on this map are referred to the North American Vertical Datum These flood elevations must be compared to structure and ground s referenced to the same **vertical datum**. For information regarding ion between the National Geodetic Vertical Datum of 1929 and the rth American Vertical Datum of 1988, visit the National Geodetic Survey at http://www.ngs.noaa.gov or contact the National Geodetic Survey at ving address:

ormation Services
-NGS12
Geodetic Survey
, #9202
st-West Highway
ring, Maryland 20910-3282
3-3242

n current elevation, description, and/or location information for **bench** shown on this map, please contact the Information Services Branch National Geodetic Survey at **(301) 713-3242**, or visit its website at w.ngs.noaa.gov.

p information shown on this FIRM was provided by the Commonwealth of through the Virginia Base Mapping Program (VBMP). The orthophotos wn in 2009 at scales of 1:100 and 1:200.

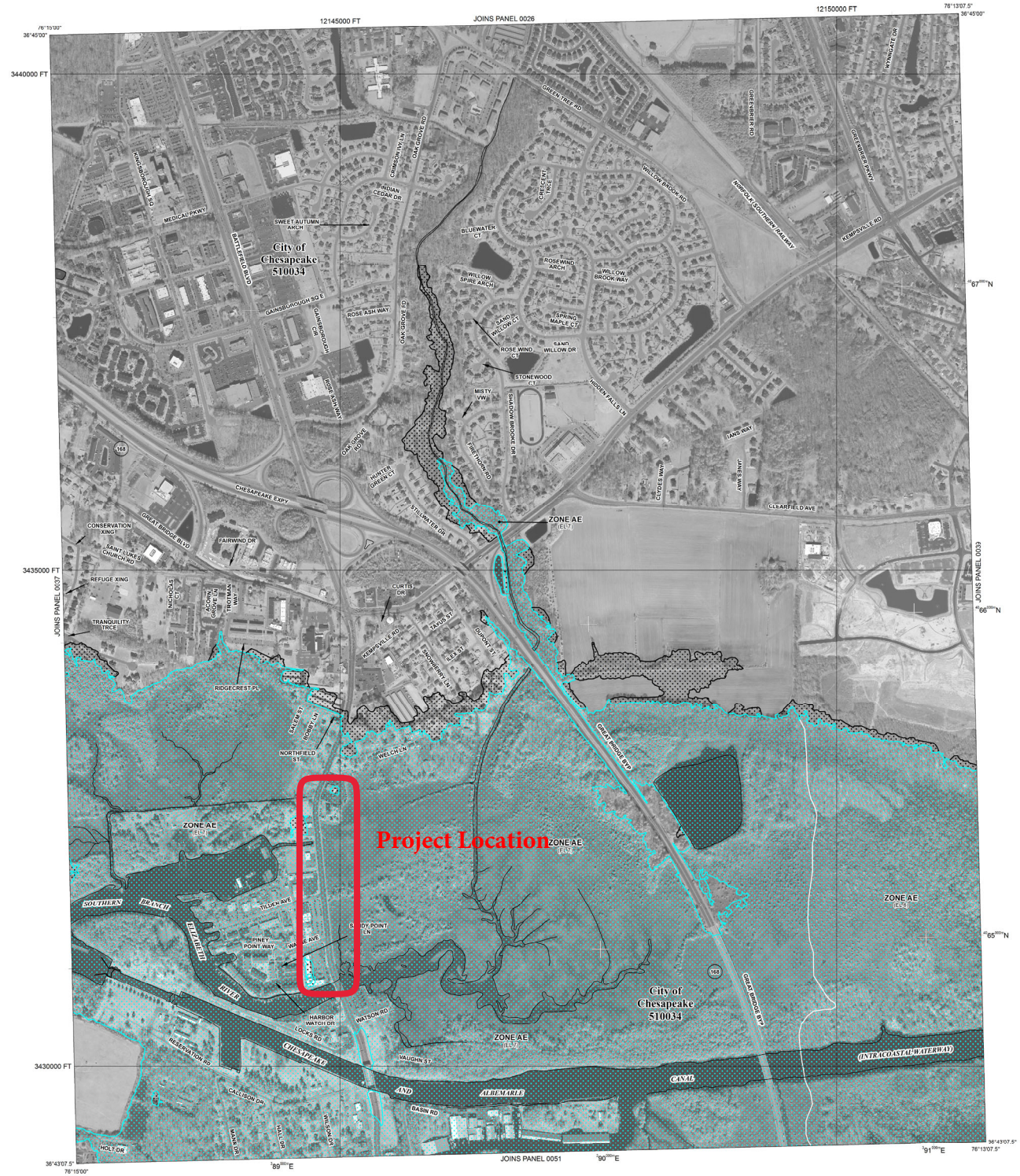
n updated topographic information, this map reflects more detailed and te **stream channel configurations and floodplain delineations** than own on the previous FIRM for this jurisdiction. As a result, the Flood and Floodway Data tables in the Flood Insurance Study Report (which authoritative hydraulic data) may reflect stream channel distances that m what is shown on this map. Also, the road to floodplain relationships for d streams may differ from what is shown on previous maps.

te limits shown on this map are based on the best data available at the ublication. Because changes due to annexations or de-annexations may curred after this map was published, map users should contact appropriate ity officials to verify current corporate limit locations.

efer to the separately printed **Map Index** for an overview map showing t of map panels for this jurisdiction.

mation on available products associated with this FIRM visit the **Map Center (MSC)** website at http://msc.fema.gov. Available products may previously issued Letters of Map Change, a Flood Insurance Study Report, igital versions of this map. Many of these products can be ordered or directly from the MSC website.

ave **questions about this map**, how to order products or the National surance Program in general, please call the FEMA Map Information e (FMIX) at **1-877-FEMA-MAP** (1-877-336-2627) or visit the FEMA at http://www.fema.gov/business/nfip.



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNI BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that chance of being equaled or exceeded in any given year. The Special Flood Hazard A area subject to flooding by the 1% annual chance flood. Areas of Special Flood Haza Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); B Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain depths determined. For areas of alluvial fan flooding, velo determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% ann flood by a flood control system that was subsequently decertifi AR indicates that the former flood control system is being re provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a fed protection system under construction; no Base Flood determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no B Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Ba Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be of encroachment so that the 1% annual chance flood can be carried without substantial in flood heights.

OTHER FLOOD AREAS

ZONE X — Areas of 0.2% annual chance flood; areas of 1% annual chance f average depths of less than 1 foot or with drainage areas less than mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X — Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D — Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREA

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Are

	1% annual chance floodplain boundary
	0.2% annual chance floodplain boundary
	Floodway boundary
	Zone D boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Area Z boundary dividing Special Flood Hazard Areas of diffe Flood Elevations, flood depths or flood velocities.
	Limit of Moderate Wave Action
513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; in feet*

* Referenced to the North American Vertical Datum of 1988

A A	Cross section line
23 23	Transect line
	Culvert, Flume, Penstock or Aqueduct
	Road or Railroad Bridge
	Footbridge
87°07'45", 32°22'30"	Geographic coordinates referred to the North Am Datum of 1983 (NAD 83), Western Hemisphere
4376000mN	1000-meter Universal Transverse Mercator grid values,
600000 FT	5000-foot grid values: Virginia State Plane coordinate system, South zone (FIPSZONE 4502), Lambert Conform projection
DX5510 ×	Bench mark (see explanation in Notes to Users sectio FIRM panel)
M1.5	River Mile

MAP REPOSITORY
Planning Department, 306 Cedar Road, 2nd Floor, Chesapeake, Virginia 23322 (Maps for reference only, not for distribution.)

INITIAL NFIP MAP DATE
June 18, 1970

FLOOD HAZARD BOUNDARY MAP REVISIONS
None

FLOOD INSURANCE RATE MAP EFFECTIVE
July 17, 1970

FLOOD INSURANCE RATE MAP REVISIONS
January 23, 1976
February 2, 1977
May 2, 1989 - to change Special Flood Hazard Areas, to add roads and road names reflect updated topographic information, to incorporate previously issued Letters of Map Revision, and to update corporate limits and map format
December 16, 2014 - to incorporate new detailed Coastal Flood Hazard Analyses a update map format.

To determine if flood insurance is available in this community, contact your In agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'
250 0 500 1000 FEET
150 0 150 300 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0038D

FIRM

FLOOD INSURANCE RATE

CITY OF
CHESAPEAKE,
VIRGINIA
INDEPENDENT CITY

PANEL 38 OF 122

(SEE MAP INDEX FOR FIRM PANEL LA

CONTAINS:

COMMUNITY	NUMBER	PANEL
CHESAPEAKE, CITY OF	510034	0038

Notice to User: The **Map Number** shown belo used when placing map orders; the **Communi** shown above should be used on insurance applica subject community.

MAP NU
510034

MAP RE
DECEMBER 1

Federal Emergency Management

National Flood Hazard Layer FIRMette

FEMA

76°14'47"W 36°43'43"N

76°14'9"W 36°43'14"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 12/28/2022 at 12:47 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Appendix D – Flood events information

N Battlefield Blvd Road flooding

Date of Event	Flooding Duration (deeper than 0.5' above roadway)		Flood dates/times	Hrs.	Flood dates/times	Hrs.	Flood dates/times	Hrs.
	Hrs.	Days						
11/12/2009	**34.5**	**1.44**	11/12 08:30 - 11/13 15:06	30.6	11/13 21:54 - 11/14 01:48	3.9		
10/28/2012	**12.6**	**0.53**	10/28 12:24 - 14:54	2.5	10/28 23:30 - 10/29 03:54	4.4	10/29 10:42 - 16:24	5.7
10/1/2015	**10.4**	**0.43**	10/2 16:18 - 19:42	3.4	10/4 06:24 - 08:12	1.8	10/4 17:18 - 22:30	5.2
10/12/2018	**0**	**0**	No flood record registered					
11/12/2020	**0**	**0**	No flood record registered					
1/3/2022	**3.8**	**0.16**	1/3 13:54 - 17:36	3.8				

U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data, and Information Service

Current Location: Elev: 21 ft. Lat: 36.5950° N Lon: -76.4390° W
Station: **WALLACETON LAKE DRUMMOND, VA US USC00448837**

Record of Climatological Observations

These data are quality controlled and may not be identical to the original observations.

Generated on 12/06/2022

National Centers for Environmental Information
151 Patton Avenue
Asheville, North Carolina 28801

Observation Time Temperature: 0800 Observation Time Precipitation: 0800

Year	Month	Day	Temperature (F)			Precipitation					Evaporation		Soil Temperature (F)					
			24 Hrs. Ending at Observation Time		At Obs.	24 Hour Amounts Ending at Observation Time				At Obs. Time	24 Hour Wind Movement (mi)	Amount of Evap. (in)	4 in. Depth			8 in. Depth		
			Max.	Min.		Rain, Melted Snow, Etc. (in)	Flag	Snow, Ice Pellets, Hail (in)	Flag	Snow, Ice Pellets, Hail, Ice on Ground (in)			Ground Cover (see *)	Max.	Min.	Ground Cover (see *)	Max.	Min.
2009	11	01	80	52	57	0.10		0.0		0.0								
2009	11	02	60	40	55	0.35		0.0		0.0								
2009	11	03	59	42	52	0.03		0.0		0.0								
2009	11	04	69	35	48	0.00		0.0		0.0								
2009	11	05	60	38	50	0.05		0.0		0.0								
2009	11	06	67	33	44	0.00		0.0		0.0								
2009	11	07	60	30	37	0.00		0.0		0.0								
2009	11	08	62	42	50	0.00		0.0		0.0								
2009	11	09	78	36	48	0.00		0.0		0.0								
2009	11	10	80	44	55	0.00		0.0		0.0								
2009	11	11	73	53	57	0.80		0.0		0.0								
2009	11	12	58	52	55	4.20		0.0		0.0	Between 11/11/2009 and 11/12/2009, 7.2 in.							
2009	11	13	56	50	53	3.00		0.0		0.0	rain fell which has a recurrence 1 in 10-years.							
2009	11	14	56	50	56	0.38		0.0		0.0								
2009	11	15	59	52	58	0.03		0.0		0.0								
2009	11	16	72	47	55	0.00		0.0		0.0								
2009	11	17	74	47	54	0.00		0.0		0.0								
2009	11	18	65	50	59	0.00		0.0		0.0								
2009	11	19	68	55	64	0.00		0.0		0.0								
2009	11	20	74	55	60	0.00		0.0		0.0								
2009	11	21	57	41	50	0.00		0.0		0.0								
2009	11	22	60	39	50	0.00		0.0		0.0								
2009	11	23	57	46	52	0.15		0.0		0.0								
2009	11	24	62	42	52	0.10		0.0		0.0								
2009	11	25	55	46	55	0.15		0.0		0.0								
2009	11	26	60	38	43	0.09		0.0		0.0								
2009	11	27	66	38	43	0.00		0.0		0.0								
2009	11	28	57	33	40	0.00		0.0		0.0								
2009	11	29	58	31	46	0.00		0.0		0.0								
2009	11	30	72	42	56	0.00		0.0		0.0								
Summary			64	43		9.43		0.0										

Empty, or blank, cells indicate that a data observation was not reported.

*Ground Cover: 1=Grass; 2=Fallow; 3=Bare Ground; 4=Brome grass; 5=Sod; 6=Straw mulch; 7=Grass muck; 8=Bare muck; 0=Unknown

"s" This data value failed one of NCDC's quality control tests. "At Obs." = Temperature at time of observation

"T" values in the Precipitation or Snow category above indicate a "trace" value was recorded.

"A" values in the Precipitation Flag or the Snow Flag column indicate a multiday total, accumulated since last measurement, is being used.

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U.S. Department of Commerce
National Oceanic & Atmospheric Administration
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Current Location: Elev: 21 ft. Lat: 36.5950° N Lon: -76.4390° W
Station: **WALLACETON LAKE DRUMMOND, VA US USC00448837**

Record of Climatological Observations

These data are quality controlled and may not be identical to the original observations.

Generated on 12/06/2022

National Centers for Environmental Information
151 Patton Avenue
Asheville, North Carolina 28801

Observation Time Temperature: 0800 Observation Time Precipitation: 0800

Year	Month	Day	Temperature (F)			Precipitation					Evaporation		Soil Temperature (F)					
			24 Hrs. Ending at Observation Time		At Obs.	24 Hour Amounts Ending at Observation Time				At Obs. Time	24 Hour Wind Movement (mi)	Amount of Evap. (in)	4 in. Depth			8 in. Depth		
			Max.	Min.		Rain, Melted Snow, Etc. (in)	Flag	Snow, Ice Pellets, Hail (in)	Flag	Snow, Ice Pellets, Hail, Ice on Ground (in)			Ground Cover (see *)	Max.	Min.	Ground Cover (see *)	Max.	Min.
2012	10	01	62	54	62	0.00												
2012	10	02	69	52	62	0.01												
2012	10	03	86	60	75	0.30												
2012	10	04	87	63	73	0.15												
2012	10	05	85	55	66	0.00												
2012	10	06	80	51	64	0.00												
2012	10	07	85	51	60	0.00												
2012	10	08	63	45	55	0.35												
2012	10	09	60	45	55	3.10												
2012	10	10	61	50	58	0.08												
2012	10	11	72	39	48	0.00												
2012	10	12	70	35	50	0.00												
2012	10	13	72	35	50	0.00												
2012	10	14	70	36	47	0.00												
2012	10	15	80	40	63	0.00												
2012	10	16	77	42	51	1.30												
2012	10	17	70	38	50	0.00												
2012	10	18	72	37	50	0.00												
2012	10	19	80	43	64	0.02												
2012	10	20	80	41	51	0.00												
2012	10	21	76	40	51	0.00												
2012	10	22	71	35	45	0.00												
2012	10	23	74	36	47	0.00												
2012	10	24	79	38	53	0.00												
2012	10	25	84	44	54	0.00												
2012	10	26	82	46	65	0.00												
2012	10	27	75	56	64	0.00												
2012	10	28	69	54	60	1.44												
2012	10	29	60	47	53	1.67												
2012	10	30	54	36	43	1.40												
2012	10	31	47	34	42	0.07												
Summary			73	44		9.89		0.0										

Between 10/28/2012 and 10/30/2012, 4.51 in. rain fell which has a recurrence 1 in 2-years.

Empty, or blank, cells indicate that a data observation was not reported.

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Current Location: Elev: 21 ft. Lat: 36.5950° N Lon: -76.4390° W
Station: **WALLACETON LAKE DRUMMOND, VA US USC00448837**

Record of Climatological Observations

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Generated on 12/06/2022

National Centers for Environmental Information
151 Patton Avenue
Asheville, North Carolina 28801

Observation Time Temperature: 0800 Observation Time Precipitation: 0800

Year	Month	Day	Temperature (F)			Precipitation					Evaporation		Soil Temperature (F)					
			24 Hrs. Ending at Observation Time		At Obs.	24 Hour Amounts Ending at Observation Time				At Obs. Time	24 Hour Wind Movement (mi)	Amount of Evap. (in)	4 in. Depth			8 in. Depth		
			Max.	Min.		Rain, Melted Snow, Etc. (in)	Flag	Snow, Ice Pellets, Hail (in)	Flag	Snow, Ice Pellets, Hail, Ice on Ground (in)			Ground Cover (see *)	Max.	Min.	Ground Cover (see *)	Max.	Min.
2015	10	01	81	58	70	1.80												
2015	10	02	70	53	65	1.26												
2015	10	03	73	53	72	1.05												
2015	10	04	82	58	70	0.10												
2015	10	05	71	52	61	0.34												
2015	10	06	68	48	65	0.00												
2015	10	07	75	42	70	0.00												
2015	10	08	79	44	60	0.00												
2015	10	09	85	49	68	0.00												
2015	10	10	85	47	65	0.00												
2015	10	11	67	44	61	0.00												
2015	10	12	70	42	60	0.00												
2015	10	13	82	45	63	0.00												
2015	10	14	72	47	60	0.00												
2015	10	15	80	40	53	0.00												
2015	10	16	76	38	60	0.00												
2015	10	17	64	36	54	0.05												
2015	10	18	72	30	50	0.00												
2015	10	19	60	30	46	0.00												
2015	10	20	62	25	40	0.00												
2015	10	21	72	28	46	0.00												
2015	10	22	80	35	48	0.00												
2015	10	23	81	37	52	0.00												
2015	10	24	74	34	53	0.00												
2015	10	25	67	42	60	0.00												
2015	10	26	73	40	57	0.00												
2015	10	27	63	40	60	0.00												
2015	10	28	70	45	70	0.15												
2015	10	29	77	55	68	0.35												
2015	10	30	78	44	55	0.00												
2015	10	31	72	30	45	0.00												
Summary			74	42		5.10		0.0										

Between 10/01/2015 and 10/01/2015, 4.11 in. rain fell which has a recurrence 1 in 1-year.

Empty, or blank, cells indicate that a data observation was not reported.

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"s" This data value failed one of NCDC's quality control tests. "At Obs." = Temperature at time of observation

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Current Location: Elev: 21 ft. Lat: 36.5950° N Lon: -76.4390° W
Station: **WALLACETON LAKE DRUMMOND, VA US USC00448837**

Record of Climatological Observations

These data are quality controlled and may not be identical to the original observations.

Generated on 12/06/2022

National Centers for Environmental Information
151 Patton Avenue
Asheville, North Carolina 28801

Observation Time Temperature: 0800 Observation Time Precipitation: 0800

Year	Month	Day	Temperature (F)			Precipitation					Evaporation		Soil Temperature (F)					
			24 Hrs. Ending at Observation Time		At Obs.	24 Hour Amounts Ending at Observation Time				At Obs. Time	24 Hour Wind Movement (mi)	Amount of Evap. (in)	4 in. Depth			8 in. Depth		
			Max.	Min.		Rain, Melted Snow, Etc. (in)	Flag	Snow, Ice Pellets, Hail (in)	Flag	Snow, Ice Pellets, Hail, Ice on Ground (in)			Ground Cover (see *)	Max.	Min.	Ground Cover (see *)	Max.	Min.
2022	01	01	78	52	66	0.50		0.0		0.0								
2022	01	02	77	60	63	0.05		0.0		0.0								
2022	01	03	70	47		1.75		0.0		0.0								
2022	01	04	49	25	31	0.90		0.0		0.0								
2022	01	05	45	26	38	0.00		0.0		0.0								
2022	01	06	43	22	37	0.60		0.0		0.0								
2022	01	07	48	24	37	0.00		0.0		0.0								
2022	01	08	40	20	30	0.00		0.0		0.0								
2022	01	09	38	20	34	0.00		0.0		0.0								
2022	01	10	53	30	38	0.30		0.0		0.0								
2022	01	11	50	15	35	0.00		0.0		0.0								
2022	01	12	35	15		0.00		0.0		0.0								
2022	01	13	49	30	40	0.00		0.0		0.0								
2022	01	14	52	24	42	0.00		0.0		0.0								
2022	01	15	53	22	35	0.00		0.0		0.0								
2022	01	16	41	20	36	0.00		0.0		0.0								
2022	01	17	42	20	38	1.85		0.0		0.0								
2022	01	18	45	22	35	0.00		0.0		0.0								
2022	01	19	44	20	34	0.00		0.0		0.0								
2022	01	20	53	22	39	0.00		0.0		0.0								
2022	01	21	45	20	29	0.10		0.0		0.0								
2022	01	22	29	18		0.60		5.0		5.0								
2022	01	23	35	28		0.00		0.0		4.0								
2022	01	24	46	21	32	0.00		0.0		2.0								
2022	01	25	43	19	36	0.00		0.0		T								
2022	01	26	54	24	29	0.00		0.0		0.0								
2022	01	27	34	20	31	0.00		0.0		0.0								
2022	01	28	36	24	34	0.00		0.0		0.0								
2022	01	29	42	20	31	0.20		2.8		2.0								
2022	01	30	35	17		0.00		0.0		1.0								
2022	01	31	33	20	29	0.00		0.0		T								
Summary			46	25		6.85		7.8										

On 01/03/2022 0.60 in. rain fell which has a recurrence 1 in <1-year.

Empty, or blank, cells indicate that a data observation was not reported.

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NOAA Atlas 14, Volume 2, Version 3
WALLACETON LK DRUMMOND
Station ID: 44-8837
Location name: Chesapeake, Virginia, USA*
Latitude: 36.5942°, Longitude: -76.4386°
Elevation:
Elevation (station metadata): 20 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.460** (0.419-0.507)	**0.542** (0.493-0.597)	**0.613** (0.557-0.676)	**0.699** (0.633-0.771)	**0.787** (0.710-0.866)	**0.865** (0.777-0.953)	**0.937** (0.838-1.03)	**1.01** (0.896-1.11)	**1.10** (0.965-1.21)	**1.18** (1.03-1.31)
10-min	**0.735** (0.669-0.811)	**0.866** (0.788-0.955)	**0.982** (0.893-1.08)	**1.12** (1.01-1.23)	**1.25** (1.13-1.38)	**1.38** (1.24-1.52)	**1.49** (1.33-1.64)	**1.60** (1.42-1.76)	**1.73** (1.53-1.92)	**1.86** (1.62-2.06)
15-min	**0.919** (0.837-1.01)	**1.09** (0.991-1.20)	**1.24** (1.13-1.37)	**1.41** (1.28-1.56)	**1.59** (1.43-1.75)	**1.74** (1.57-1.92)	**1.88** (1.68-2.07)	**2.02** (1.79-2.23)	**2.18** (1.92-2.41)	**2.34** (2.04-2.59)
30-min	**1.26** (1.15-1.39)	**1.50** (1.37-1.66)	**1.76** (1.60-1.95)	**2.05** (1.86-2.26)	**2.35** (2.12-2.59)	**2.63** (2.36-2.89)	**2.88** (2.58-3.18)	**3.14** (2.79-3.46)	**3.47** (3.06-3.84)	**3.78** (3.30-4.19)
60-min	**1.57** (1.43-1.73)	**1.89** (1.72-2.08)	**2.26** (2.06-2.50)	**2.67** (2.42-2.94)	**3.14** (2.83-3.45)	**3.56** (3.20-3.92)	**3.97** (3.55-4.38)	**4.40** (3.91-4.86)	**4.98** (4.39-5.51)	**5.52** (4.82-6.12)
2-hr	**1.82** (1.65-2.03)	**2.19** (1.98-2.43)	**2.68** (2.42-2.97)	**3.21** (2.89-3.56)	**3.85** (3.45-4.25)	**4.44** (3.96-4.91)	**5.04** (4.46-5.56)	**5.67** (4.99-6.27)	**6.54** (5.71-7.24)	**7.37** (6.37-8.16)
3-hr	**1.96** (1.77-2.20)	**2.36** (2.12-2.64)	**2.89** (2.60-3.23)	**3.49** (3.13-3.90)	**4.23** (3.77-4.71)	**4.94** (4.37-5.48)	**5.65** (4.97-6.27)	**6.44** (5.61-7.14)	**7.54** (6.50-8.37)	**8.59** (7.34-9.54)
6-hr	**2.36** (2.12-2.64)	**2.82** (2.54-3.16)	**3.47** (3.11-3.89)	**4.20** (3.75-4.69)	**5.11** (4.54-5.70)	**5.98** (5.28-6.65)	**6.88** (6.02-7.64)	**7.86** (6.83-8.72)	**9.26** (7.93-10.3)	**10.6** (8.98-11.8)
12-hr	**2.77** (2.48-3.12)	**3.32** (2.96-3.73)	**4.10** (3.65-4.61)	**4.98** (4.42-5.60)	**6.11** (5.38-6.84)	**7.20** (6.30-8.06)	**8.34** (7.23-9.31)	**9.61** (8.24-10.7)	**11.4** (9.65-12.7)	**13.2** (11.0-14.7)
24-hr	**3.07** (2.83-3.35)	**3.74** (3.45-4.08)	**4.82** (4.43-5.27)	**5.74** (5.26-6.25)	**7.09** (6.46-7.71)	**8.26** (7.46-8.97)	**9.54** (8.52-10.4)	**11.0** (9.69-11.9)	**13.1** (11.3-14.2)	**14.9** (12.7-16.3)
2-day	**3.60** (3.34-3.91)	**4.35** (4.04-4.73)	**5.59** (5.18-6.07)	**6.65** (6.13-7.21)	**8.25** (7.54-8.91)	**9.63** (8.72-10.4)	**11.2** (10.0-12.1)	**12.9** (11.4-14.0)	**15.5** (13.4-16.9)	**17.7** (15.1-19.4)
3-day	**3.84** (3.58-4.15)	**4.65** (4.33-5.03)	**5.94** (5.52-6.42)	**7.04** (6.51-7.58)	**8.65** (7.95-9.31)	**10.0** (9.13-10.8)	**11.5** (10.4-12.4)	**13.2** (11.8-14.3)	**15.7** (13.7-17.1)	**18.0** (15.5-19.7)
4-day	**4.09** (3.82-4.40)	**4.95** (4.62-5.33)	**6.30** (5.87-6.77)	**7.42** (6.89-7.96)	**9.05** (8.35-9.72)	**10.4** (9.54-11.2)	**11.9** (10.8-12.8)	**13.5** (12.1-14.6)	**15.9** (14.0-17.3)	**18.2** (15.8-19.9)
7-day	**4.82** (4.52-5.16)	**5.81** (5.45-6.23)	**7.31** (6.84-7.82)	**8.55** (7.97-9.12)	**10.3** (9.57-11.0)	**11.8** (10.9-12.6)	**13.4** (12.2-14.3)	**15.1** (13.7-16.2)	**17.6** (15.6-19.0)	**19.7** (17.2-21.4)
10-day	**5.48** (5.16-5.84)	**6.57** (6.19-7.00)	**8.14** (7.65-8.66)	**9.44** (8.85-10.0)	**11.3** (10.5-12.0)	**12.9** (11.9-13.7)	**14.5** (13.3-15.5)	**16.3** (14.8-17.4)	**18.8** (16.9-20.3)	**20.9** (18.5-22.7)
20-day	**7.47** (7.04-7.95)	**8.90** (8.40-9.48)	**10.8** (10.2-11.5)	**12.4** (11.7-13.2)	**14.6** (13.7-15.6)	**16.5** (15.3-17.5)	**18.4** (16.9-19.6)	**20.4** (18.6-21.8)	**23.3** (20.9-25.0)	**25.6** (22.7-27.7)
30-day	**9.20** (8.70-9.75)	**10.9** (10.3-11.6)	**13.2** (12.4-13.9)	**14.9** (14.1-15.8)	**17.4** (16.3-18.4)	**19.3** (18.1-20.5)	**21.3** (19.8-22.7)	**23.4** (21.6-24.9)	**26.2** (23.9-28.1)	**28.4** (25.7-30.7)
45-day	**11.5** (10.9-12.2)	**13.6** (12.9-14.5)	**16.3** (15.4-17.3)	**18.5** (17.4-19.6)	**21.5** (20.2-22.9)	**24.0** (22.5-25.6)	**26.6** (24.7-28.4)	**29.3** (27.0-31.3)	**33.1** (30.2-35.5)	**36.1** (32.6-39.0)
60-day	**13.8** (13.1-14.6)	**16.3** (15.5-17.3)	**19.3** (18.3-20.4)	**21.6** (20.5-22.9)	**24.9** (23.4-26.3)	**27.4** (25.7-29.0)	**30.0** (28.0-31.8)	**32.6** (30.3-34.6)	**36.2** (33.2-38.6)	**38.9** (35.5-41.8)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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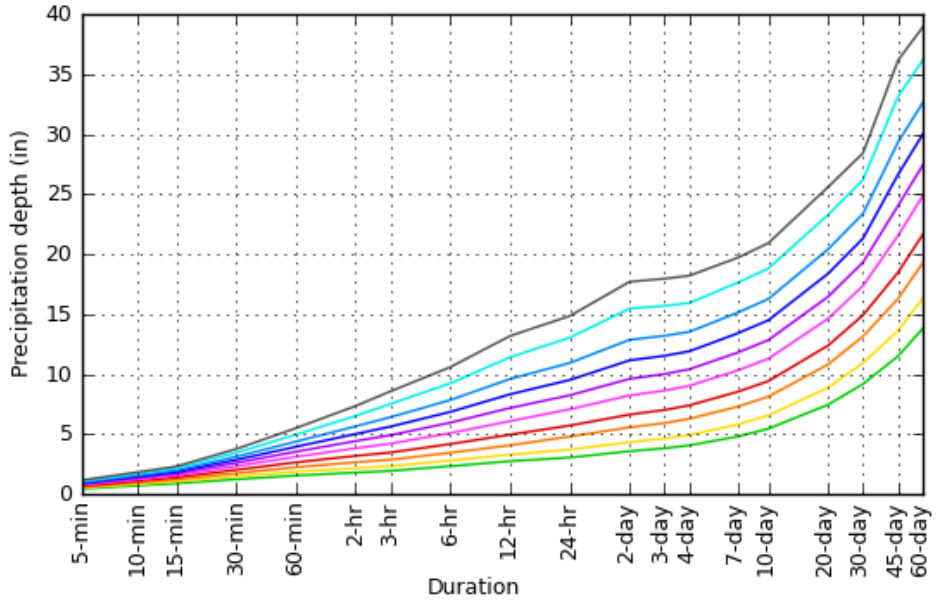
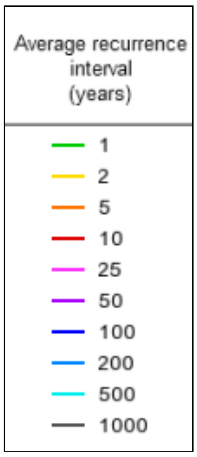
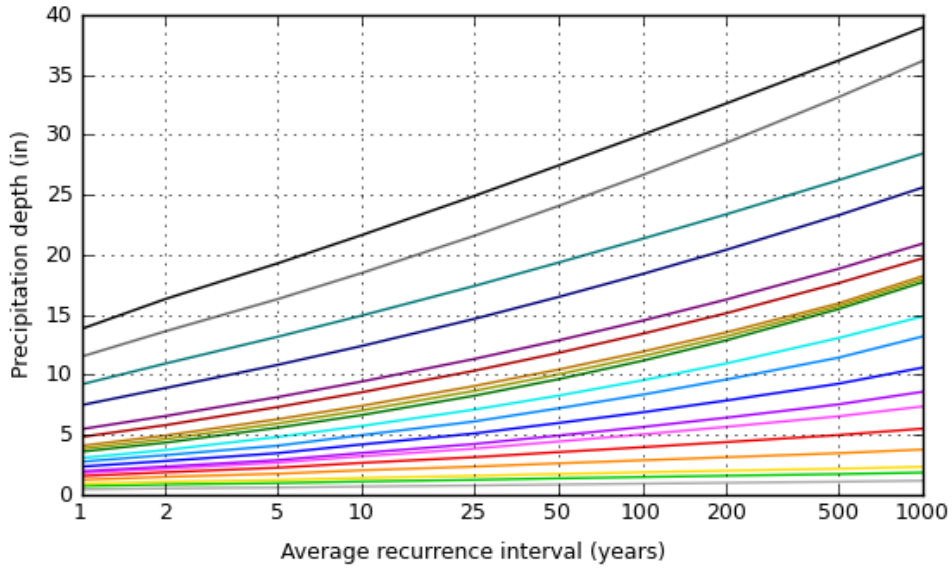
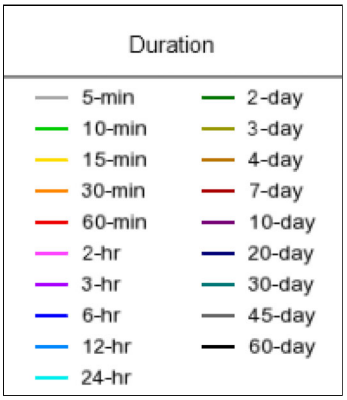
PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 36.5942°, Longitude: -76.4386°









NOAA Atlas 14, Volume 2, Version 3

Created (GMT): Wed Dec 14 19:59:21 2022

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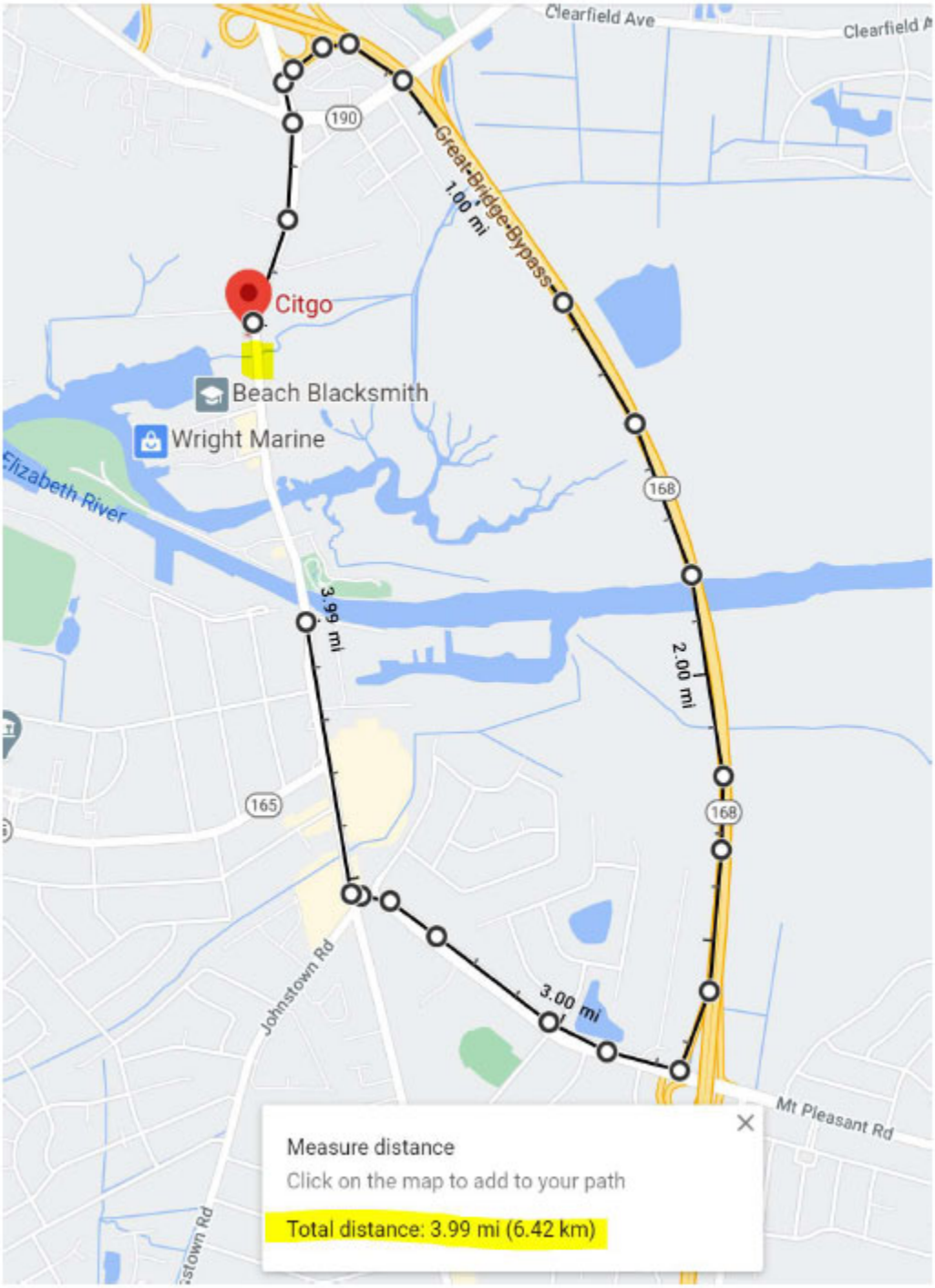
Maps & aerials

Small scale terrain

N Battlefield Blvd. January 3, 2022. Flood observed on all lanes.

Appendix E – Detour

Battlefield N Blvd. Detour



Date	Duration (days)	Loss	Description
Nov 12, 2009	2	$ 141,520.00	Direct cost - Damages to structures - The November 2009 Mid-Atlantic nor'easter (also referred to as "Nor'Ida") was a powerful autumn nor'easter that caused flooding along Battlefield Boulevard.
Feb 16, 2010	2	$ 0.00	Low presssure storm that moved southeastward from Canada into eastern Virginia.
Mar 23, 2010	1	$ 0.00	Surface winds shifted from the west and southwest to northwest, with gusts reaching 25 knots and causing wind driven flooding.
Aug 28, 2011	2	$ 98,169.00	Direct cost - Damages to structures - Heavy rains associated with Hurricane Irene produced widespread lowland flooding across much of Chesapeake and Great Bridge reported 10.75 inches of rain.
Oct 29, 2012	2	$ 5,288.00	Direct cost - Damages to structures - Hurricane Sandy was a late-season hurricane that created a large storm surge in Hampton Roads including a surge of 4.79 ft that was also recorded at Money Point.
Oct 10, 2013	2	$ 0.00	A main area of low pressure remained a few hundred miles offshore created water levels in Virginia that were the highest observed in several years (in many cases, top 5 all-time).
Oct 5, 2015	3	$ 0.00	The combination of Hurricane Joaquin and strong surface high pressure over eastern Canada and New England produced an extended period of strong onshore flow
Sep 10, 2018	2	$ 1,548,430.00	Indirect Costs - Transportation Delays - Tropical Storm Michael
Oct 12, 2018	2	$ 2,322,650.00	Indirect Costs - Transportation Delays - Hurricane Florence

Additional Comments:

Both the September 10, 2018 and October 12, 2018 indirect losses were calculated using the FEMA BCR 6.0 Calculator.

Direct costs listed include claim information for structures within 1000 ft of the project site.

Included a history of all past storms regardless of recorded losses over past ten years.

Provide any additional details regarding past events.

VDEM - City of Chesapeake- N Battlefield Blvd

BENEFIT COST ANALYSIS REPORT

BRIC 2022

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Appendix D – Flood events information 21

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BCA SUMMARY

SUB APPLICANT
City of Chesapeake

LAT/LON
36.724502, -76.241135

PROPERTY TYPE
Roads & Bridges

HAZARD TYPE
Severe Storm

MITIGATION TYPE
Road elevation

DAMAGE AND FREQUENCY
Historical Damages

N. Battlefield Boulevard is an important arterial road in Chesapeake, Virginia that crosses the headwaters of the Elizabeth River and the intercoastal waterway (a human-made canal). A cluster of small businesses and a 237-unit residential development located north of the Elizabeth River rely on the road for day-to-day access to the surrounding community and as a lifeline for evacuation and access to medical facilities aduring emergencies. Unfortunately, the road lies within the FEMA 100-year floodplain and is anticipated to be regularly impacted by sea level rise by 2030.

Additionally, this section of roadway is listed as an evacuation route and has been identified as flood prone since 2002 (2002 City of Chesapeake Vulnerability Assessment).

The proposed hazard mitigation project would raise the roadway of N. Battlefield Boulevard above the 100-year floodplain along a 1,800 foot segment of the road stretching north from where it crosses the Elizabeth River. The road, which is currently four (4) feet above sea level at its lowest point, would be raised up to three (3) feet to a new elevation of seven (7) feet above sea level. Project construction would involve removing the existing road surface, adding, and compacting fill material to increase the elevation, and constructing a new roadway and adjacent sidewalk. On the east side of the road, a low retaining wall would reduce the project's footprint to avoid impacting the wetlands to the east.

Existing utilities would be relocated or raised along with the road and the project would be phased to maximize accessibility for residents, employees, and customers during construction. In addition to the lifting of the roadway, the project would include the reconstruction of several hundred feet of intersecting local roads and approximately six private driveways to meet the new raised elevation of the Battlefield Boulevard.

Construction of the project may require the reconfiguration of commercial parking lots, which would be accomplished in collaboration with the relevant parcel landowners. The project would not impact the existing bridge over the Elizabeth River. Future stages of project scoping and design may identify opportunities for the installation of culverts along the roadway as it is raised, potentially relieving floodwaters and restoring a more natural flow regime for the city-owned wetland areas to the east of the road.

Optional components of the project could provide additional benefits such as:

- Increasing pedestrian safety and by reconfiguring the existing sidewalk on the west side of the road and improving walking between surrounding community (including the nearby Great Bridge Battlefield Historic Park) and supporting planned aspects of the 2050 Trails Plan (including separate bike lanes).
- Adding informational signage about nearby wetland habitat, the project's location within the larger watershed of the Elizabeth River and the Chesapeake Bay watershed, and design to protect against flooding.
- Conducting outreach to local community and businesses about managing flood risk and participating in the existing Bay Star Homes Program, which encourages Hampton Roads region residents to make property improvements that help restore local waterways.

For in depth review of BCA methodology, please refer to the Historical Damages Before Mitigation comments section within the BCA. In general, data from previous storms that have affected the area were used to determine recurrence according to NOAA Atlas 14, Volume 2, Version 3 WALLACETON LK DRUMMOND Station ID: 44-8837.

After project mitigation actions are complete, we estimate the 100-year storm will cause one day of impact. An H & H study will be completed as part of project deliverables to corroborate the damages projected by this analysis.

Estimated Benefits (B) = $16,273,381

Estimated Costs (C) = $ 6,654,722

BCR (B/C) = 2.45

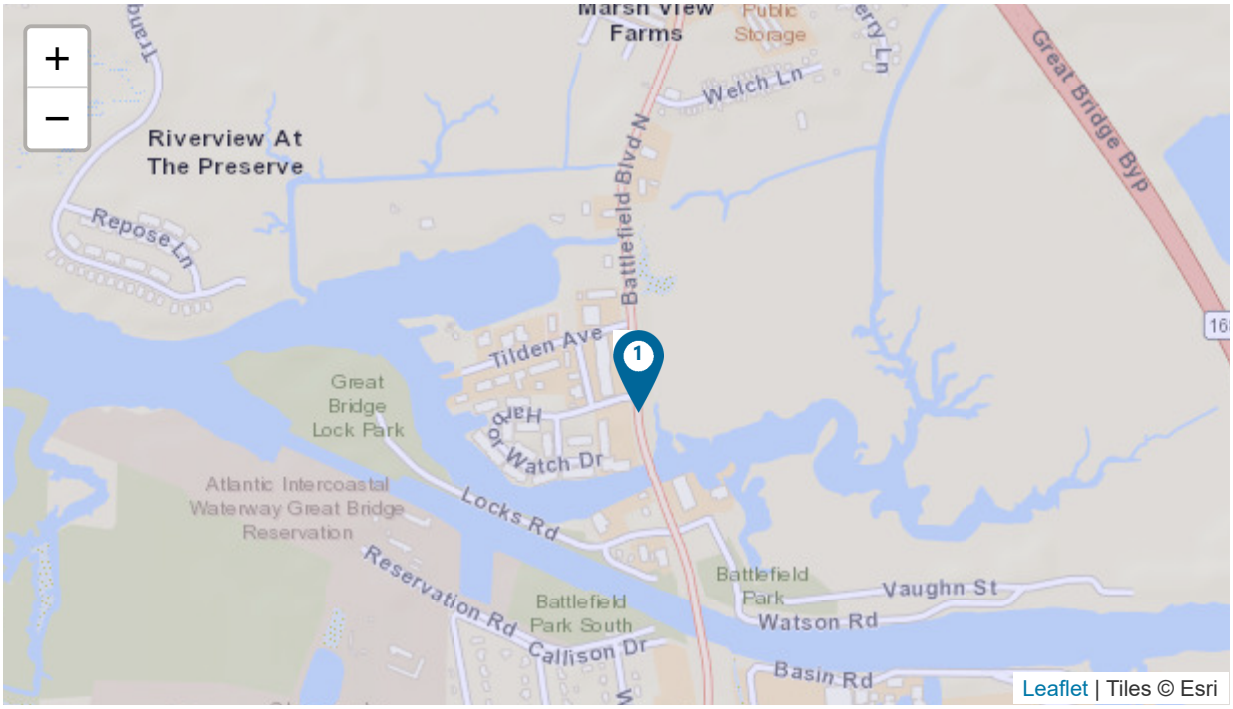
Benefit-Cost Analysis

Benefit-Cost Calculator

V.6.0 (Build 20221028.1600 | Release Notes)

Benefit-Cost Analysis

Project Name: VDEM-City of Chesapeake-N Battlefield Blvd



				Using 7% Discount Rate			Using 3% Discount Rate (For FY22 BRIC and FMA only)			
Map Marker ▲	Mitigation Title	Property Type	Hazard	Benefits (B)	Costs (C)	BCR (B/C)	Benefits (B)	Costs (C)	BCR (B/C)	
1	Other @ 36.7245020; -76.2411350		DFA - Severe Storm	$ 8,728,599	$ 6,023,334	1.45	$ 16,273,381	$ 6,654,722	2.45	
TOTAL (SELECTED)				**$ 8,728,599**	**$ 6,023,334**	**1.45**	**$ 16,273,381**	**$ 6,654,722**	**2.45**	
TOTAL				**$ 8,728,599**	**$ 6,023,334**	**1.45**	**$ 16,273,381**	**$ 6,654,722**	**2.45**	

Property Configuration

Property Title:	Other @ 36.7245020; -76.2411350
Property Location:	23320, Chesapeake, Virginia
Property Coordinates:	36.724502, -76.241135
Hazard Type:	Severe Storm
Mitigation Action Type:	Other
Property Type:	Roads & Bridges
Analysis Method Type:	Historical Damages

Cost Estimation
Other @ 36.7245020; -76.2411350

Project Useful Life (years):	50
Project Cost:	$5,292,877
Number of Maintenance Years:	50 Use Default:Yes
Annual Maintenance Cost:	$52,929

Comments

-

Project Useful Life:

The project useful life (PUL) used in the BCA is 50 years, which is the standard useful life value predetermined in the FEMA Toolkit 6.0 for Concrete infrastructure, flood walls, roads, bridges, and major drainage systems.

-

Mitigation Project Cost:

For more detailed budget information see Appendix A.

-

Annual Maintenance Cost:

The City of Chesapeake is responsible for the annual maintenance necessary for the upkeep or repair of mitigation project components so that the project maintains its originally designed and approved level of effectiveness. Maintenance cost was determined using 1% of the total project cost estimate.

Damage Analysis Parameters - Damage Frequency Assessment
Other @ 36.7245020; -76.2411350

Year of Analysis was Conducted:	2022
Year Property was Built:	1980
Analysis Duration:	43 Use Default:Yes

Comments

•

Analysis Year:

The year analysis performed.

Roads and Bridges Properties
Other @ 36.7245020; -76.2411350

Estimated Number of One-Way Traffic Detour Trips per Day:	41,000
Additional Time per One-Way Detour Trip (minutes):	31.8
Number of Additional Miles:	3.99
Federal Rate ($):	0.625 Use Default:Yes
Economic Loss Per Day of Loss of Function ($):	875,831.75

Comments

•

Number of Trips:

Based on memo from City Traffic Engineer ADT for N Battlefield Blvd. is 41000vpd (see Appendix B: Average daily trips).

•

Time per Trip:

During a weather event, the detour would be 31.8 minutes because of inclement conditions damaging the original route and disorienting drivers and drivers not knowing the detour. This information is based on Memo signed by City Traffic Engineer (see Appendix B: Average daily trips and Appendix E: Detour).

•

Number of Miles:

See Appendix E: Detour.

Historical Damages Before Mitigation
Other @ 36.7245020; -76.2411350

		ROADS AND BRIDGES	OPTIONAL DAMAGES			VOLUNTEER COSTS		TOTAL		
Damage Year	Recurrence Interval (years)	Impact (days)	Category 1 ($)	Category 2 ($)	Category 3 ($)	Number of Volunteers	Number of Days	Damages ($)	Current Dollars?	Inflated Damages ($)
2009	10	1.44	0	0	0	0	0	1,261,198	No	1,261,198
2012	2	0.53	0	0	0	0	0	464,191	No	464,191
2015	1	0.43	0	0	0	0	0	376,608	No	376,608

Comments

-

Damages Before Mitigation:
N. Battlefield Boulevard is an important arterial road in Chesapeake, Virginia that crosses the headwaters of the Elizabeth River and the intercoastal waterway (a human-made canal). A cluster of small businesses and a 237-unit residential development located north of the Elizabeth River rely on the road for day-to-day access to the surrounding community and as a lifeline for evacuation and access to medical facilities and care in emergencies. Unfortunately, the road lies within the FEMA 100-year floodplain and is anticipated to be regularly impacted by sea level rise by 2030 (see Appendix C FIRM and FIRMette).

Additionally, this section of roadway is listed as an evacuation route and has been identified as flood prone since 2002 (2002 City of Chesapeake Vulnerability Assessment). The proposed hazard mitigation project would raise traveled roadway of N. Battlefield Boulevard above the 100-year floodplain along a 1,800 foot segment of the road stretching north from where it crosses the Elizabeth River. The road, which is currently four (4) feet above sea level at its lowest point, would be raised up to three (3) feet to a new elevation of seven (7) feet above sea level. Project construction would involve removing the existing road surface, adding, and compacting fill material to increase the elevation, and constructing a new roadway and adjacent sidewalk. On the east side of the road, a low retaining wall would reduce the project's footprint to avoid impacting the wetlands to the east.

Alternatively, the project could enhance the wetlands by including a Living Shoreline on the east side, creating a vegetated slope down to the existing marshland that would protect against erosion and treat roadway runoff. Implementation of this nature-based solution would benefit from the lessons learned from the Living Shoreline project constructed at the nearby Great Bridge Battlefield Historic Park in 2015. On the west side, a gentle berm would return to existing grade, providing an opportunity for native plantings.

Existing utilities would be relocated or raised along with the road and the project would be phased to maximize accessibility for residents, employees, and customers during construction. In addition to the lifting of the roadway, the project would include the reconstruction of several hundred feet of intersecting local roads and approximately six private driveways to meet the new raised elevation of the Battlefield Boulevard.

Historical flood events that have affected the area are:

11/12/2009 Nor'easter (Nor'Ida), dropped 7.2 inches in 48 hours, based on Record of Climatological Observations from NOAA WALLACETON LAKE DRUMMOND, VA US USC00448837 station. This event corresponds to 10-year recurrence for 48 hours according to NOAA Atlas 14, Volume 2, Version 3 WALLACETON LK DRUMMOND Station ID: 44-8837. Road was blocked for 34.5 hours (see Appendix D Flood events information).

10/28/2012 Hurricane Sandy, dropped 4.51 inches in 72 hours, based on Record of Climatological Observations from NOAA WALLACETON LAKE DRUMMOND, VA US USC00448837 station. This event corresponds to 2-year recurrence for 72 hours according to NOAA Atlas 14, Volume 2, Version 3 WALLACETON LK DRUMMOND Station ID: 44-8837. Road was blocked for 12.6 hours (see Appendix D Flood events information).

10/02/2015 Hurricane Joaquin, dropped 4.11 inches in 72 hours, based on Record of Climatological Observations from NOAA WALLACETON LAKE DRUMMOND, VA US USC00448837 station. This event corresponds to 1-year recurrence for 72 hours according to NOAA Atlas 14, Volume 2, Version 3 WALLACETON LK DRUMMOND Station ID: 44-8837. Road was blocked for 10.4 hours (see Appendix D Flood events information).

01/03/2022 Winter Storm, dropped 1.75 inches in 24 hours, based on Record of Climatological Observations from NOAA WALLACETON LAKE DRUMMOND, VA US USC00448837 station. This event corresponds to less than 1-year recurrence for 24 hours according to NOAA Atlas 14, Volume 2, Version 3 WALLACETON LK DRUMMOND Station ID: 44-8837. Road was blocked for 3.8 hours (see Appendix D Flood events information). This event was not included as part of the analysis because has estimated recurrence interval lower than 1 year.

This analysis does not capture losses avoided in the form of emergency response measures, debris clean up, employment loss, business interruption, and other related losses.

Annualized Damages Before Mitigation
Other @ 36.7245020; -76.2411350

Annualized Recurrence Interval (years)	Damages and Losses ($)	Annualized Damages and Losses ($)
1	376,608	209,056
2	464,191	306,055
10	1,261,198	126,120
	Sum Damages and Losses ($)	Sum Annualized Damages and Losses ($)
	2,101,996	641,231

Expected Damages After Mitigation
Other @ 36.7245020; -76.2411350

	ROADS AND BRIDGES	OPTIONAL DAMAGES			VOLUNTEER COSTS		TOTAL
Recurrence Interval (years)	Impact (days)	Category 1 ($)	Category 2 ($)	Category 3 ($)	Number of Volunteers	Number of Days	Damages ($)
100	1	0	0	0	0	0	875,832

Comments

-

Damages After Mitigation:

Since the road will be elevated to 7 feet, which matches the 100 year flood elevation, we estimate for the 100-year storm will cause one day of impact. An H & H study will be completed as part of project deliverables to corroborate the damages projected by this analysis.

Annualized Damages After Mitigation
Other @ 36.7245020; -76.2411350

Annualized Recurrence Interval (years)	Damages and Losses ($)	Annualized Damages and Losses ($)
100	875,832	8,758
	Sum Damages and Losses ($)	Sum Annualized Damages and Losses ($)
	875,832	8,758

Benefits-Costs Summary
Other @ 36.7245020; -76.2411350

Total Standard Mitigation Benefits:	$8,728,599
Total Social Benefits:	$0
Total Mitigation Project Benefits:	$8,728,599
Total Mitigation Project Cost:	$6,023,334
Benefit Cost Ratio - Standard:	1.45
Benefit Cost Ratio - Standard + Social:	1.45

Appendix A – Cost Estimate

OMB Number: 4040-0008
Expiration Date: 02/28/2025

BUDGET INFORMATION - Construction Programs

NOTE: Certain Federal assistance programs require additional computations to arrive at the Federal share of project costs eligible for participation. If such is the case, you will be notified.

COST CLASSIFICATION	a. Total Cost	b. Costs Not Allowable for Participation	c. Total Allowable Costs (Columns a-b)
1. Administrative and legal expenses	$ 650,610.00	$	$ 650,610.00
2. Land, structures, rights-of-way, appraisals, etc.	$ 1,096,320.00	$	$ 1,096,320.00
3. Relocation expenses and payments	$	$	$
4. Architectural and engineering fees	$ 430,454.00	$	$ 430,454.00
5. Other architectural and engineering fees	$	$	$
6. Project inspection fees	$	$	$
7. Site work	$ 154,800.00	$	$ 154,800.00
8. Demolition and removal	$	$	$
9. Construction	$ 2,960,693.00	$	$ 2,482,410.00
10. Equipment	$	$	$
11. Miscellaneous	$	$	$
12. SUBTOTAL *(sum of lines 1-11)*	$ 5,292,877.00	$	$ 4,814,594.00
13. Contingencies	$	$	$ 478,283.00
14. SUBTOTAL	$ 5,292,877.00	$	$ 5,292,877.00
15. Project (program) income	$	$	$
16. TOTAL PROJECT COSTS *(subtract #15 from #14)*	$ 5,292,877.00	$	$ 5,292,877.00

FEDERAL FUNDING

17. Federal assistance requested, calculate as follows: (Consult Federal agency for Federal percentage share.) Enter the resulting Federal share.	Enter eligible costs from line 16c Multiply X 100 %	$ 5,292,877.00

Appendix B – Average Daily Trips and Location Maps

MEMORANDUM

TO: Crystal Bloom, P.E., Engineering Manager

FROM: Troy Eisenberger, P.E., City Traffic Engineer

DATE: December 20, 2022

SUBJECT: **DOCUMENTATION FOR BRIC GRANT INCLUDING SUPPORT OF DETOUR TIME FOR N BATTLEFIELD BLVD AND ADT FOR BOTH DEEPWATER DR AND N BATTLEFIELD BLVD**

Please use the following average daily traffic (ADT) volumes for the 2022 BRIC grant applications:

- ADT for Deepwater Drive can stay at 800 vpd.
- ADT for N Battlefield Blvd is 41,000 vpd.

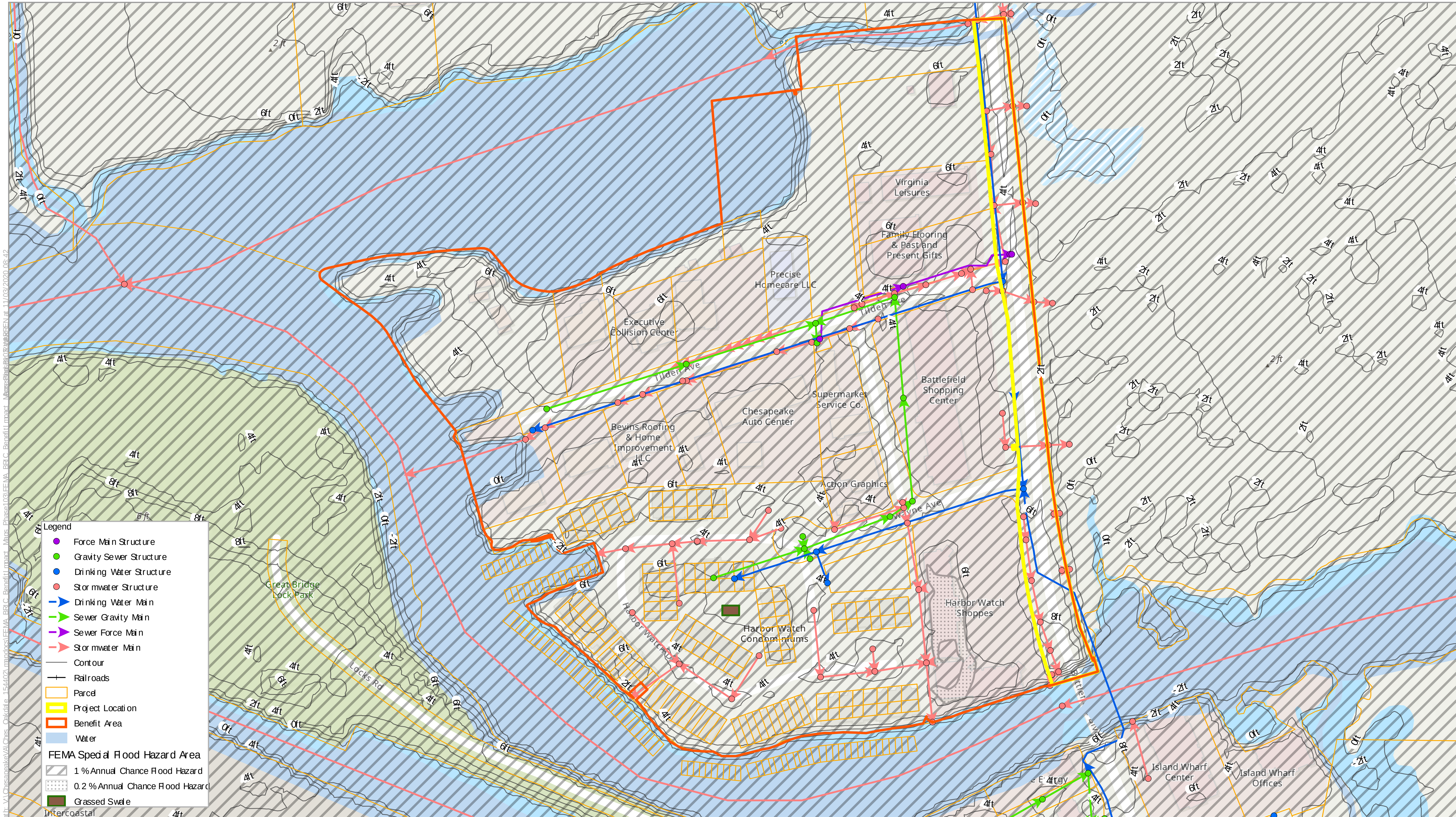
Concerning the detour time for the N Battlefield Blvd project, since the time of the detour is driven by the weather event, the time of day the detour is needed would be unknown. Based on that information and using a worst case travel time as a result, I can support the 31.8 min detour time as shown in the attached output.

Should you have any questions or need additional information, please contact me at 382-6002.

_____ _____12-20-22_____
Troy Eisenberger, P.E., City Traffic Engineer Date

TE ls

Attachments



Brown AND Caldwell

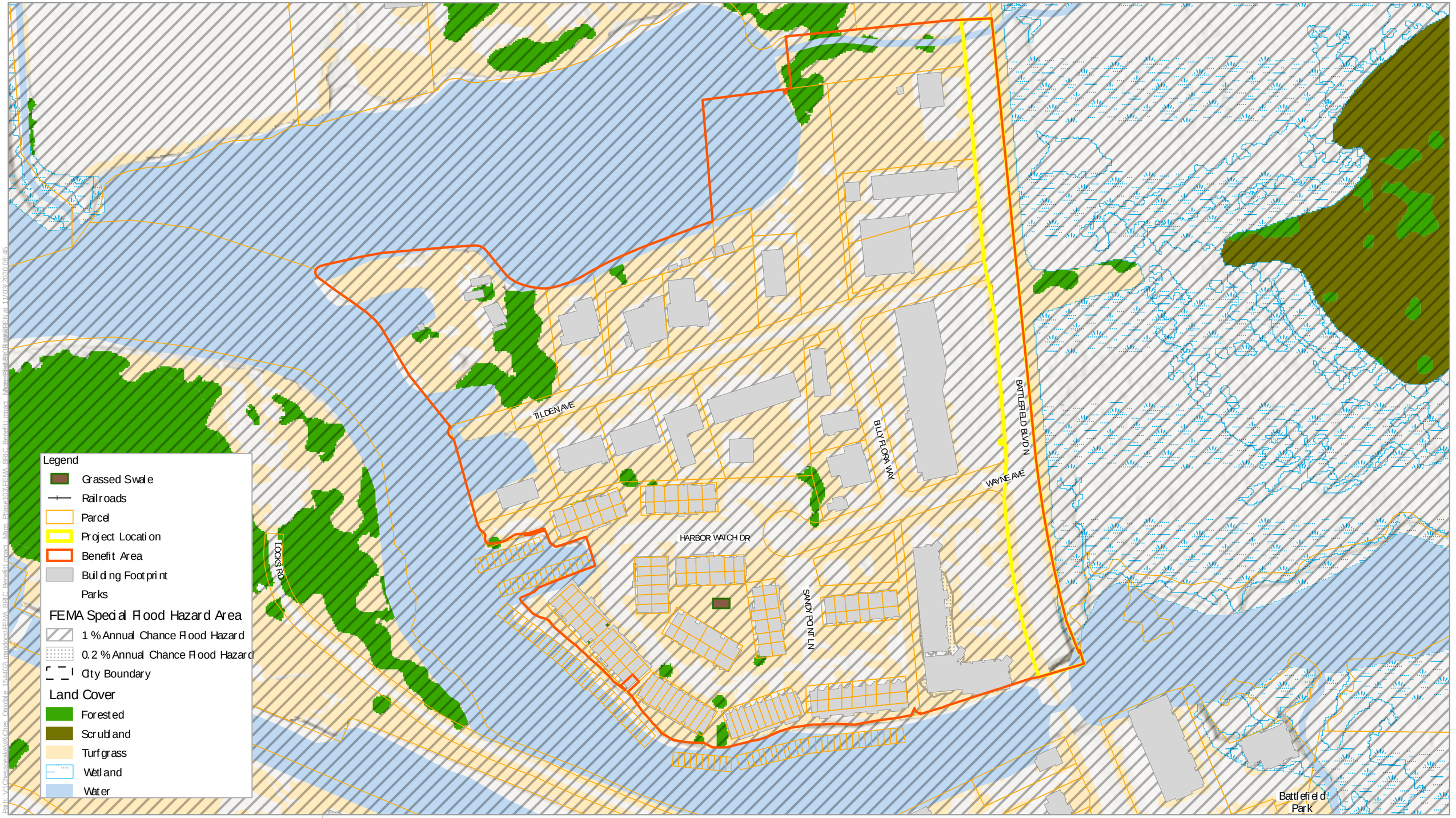
City of Chesapeake, VA
154402
Oakdale
FEMA BRIC Grant

Date: 11/3/2020 8:40 AM

Spatial Reference:
Name: NAD 1983 HARN StatePlane Virginia South FIPS 4502 Feet

0 0.01 0.02 0.04 0.06
Miles

Benefit Area Map
North Battlefield Blvd
Latitude: 36.724664
Longitude: -76.241099



Brown AND Caldwell

City of Chesapeake, VA
154402
Oakdale
FEMA BRIC Grant

Date: 11/3/2020 8:40 AM

Spatial Reference:
Name: NAD 1983 HARN StatePlane Virginia South FIPS 4502 Feet

0 0.01 0.02 0.04 0.06
Miles

Benefit Area Map
North Battlefield Blvd
Latitude: 36.724664
Longitude: -76.241099

Path: V:\Chesapeake\VA\Ches_Oakdale_154402\mapdocs\FEMA_BRIC_Benefit.mxd Mans_Phase1\06\FEMA_BRIC_Benefit.mxd 11/03/2020 08:45

Appendix C – FIRM and FIRMette

NOTES TO USERS

p is for use in administering the National Flood Insurance Program. It t necessarily identify all areas subject to flooding, particularly from local sources of small size. The **community map repository** should be d for possible updated or additional flood hazard information.

in more detailed information in areas where **Base Flood Elevations** and/or **floodways** have been determined, users are encouraged to consult d Profiles and Floodway Data and/or Summary of Stillwater Elevations ontained within the Flood Insurance Study (FIS) report that accompanies M. Users should be aware that BFEs shown on the FIRM represent l whole-foot elevations. These BFEs are intended for flood insurance urposes only and should not be used as the sole source of flood n information. Accordingly, flood elevation data presented in the FIS should be utilized in conjunction with the FIRM for purposes of tion and/or floodplain management.

l Base Flood Elevations shown on this map apply only landward of h American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should e that coastal flood elevations are also provided in the Summary of r Elevations tables in the Flood Insurance Study report for this jurisdiction. ns shown in the Summary of Stillwater Elevations table should be used for tion and/or floodplain management purposes when they are higher than tions shown on this FIRM.

ies of the **floodways** were computed at cross sections and interpolated cross sections. The floodways were based on hydraulic considerations ard to requirements of the National Flood Insurance Program. Floodway and other pertinent floodway data are provided in the Flood Insurance port for this jurisdiction.

areas not in Special Flood Hazard Areas may be protected by **flood structures**. Refer to Section 2.4 "Flood Protection Measures" of the surance Study report for information on flood control structures for this on.

jection used in the preparation of this map was Virginia State Plane South he **horizontal datum** was NAD 83, HARN. Differences in datum, projection or State Plane zones used in the production of FIRMs for jurisdictions may result in slight positional differences in map features risdiction boundaries. These differences do not affect the accuracy of this

evations on this map are referred to the North American Vertical Datum These flood elevations must be compared to structure and ground s referenced to the same **vertical datum**. For information regarding ion between the National Geodetic Vertical Datum of 1929 and the rth American Vertical Datum of 1988, visit the National Geodetic Survey at http://www.ngs.noaa.gov or contact the National Geodetic Survey at ving address:

ormation Services
-NGS12
Geodetic Survey
, #9202
st-West Highway
ring, Maryland 20910-3282
3-3242

n current elevation, description, and/or location information for **bench** shown on this map, please contact the Information Services Branch National Geodetic Survey at **(301) 713-3242**, or visit its website at w.ngs.noaa.gov.

p information shown on this FIRM was provided by the Commonwealth of through the Virginia Base Mapping Program (VBMP). The orthophotos wn in 2009 at scales of 1:100 and 1:200.

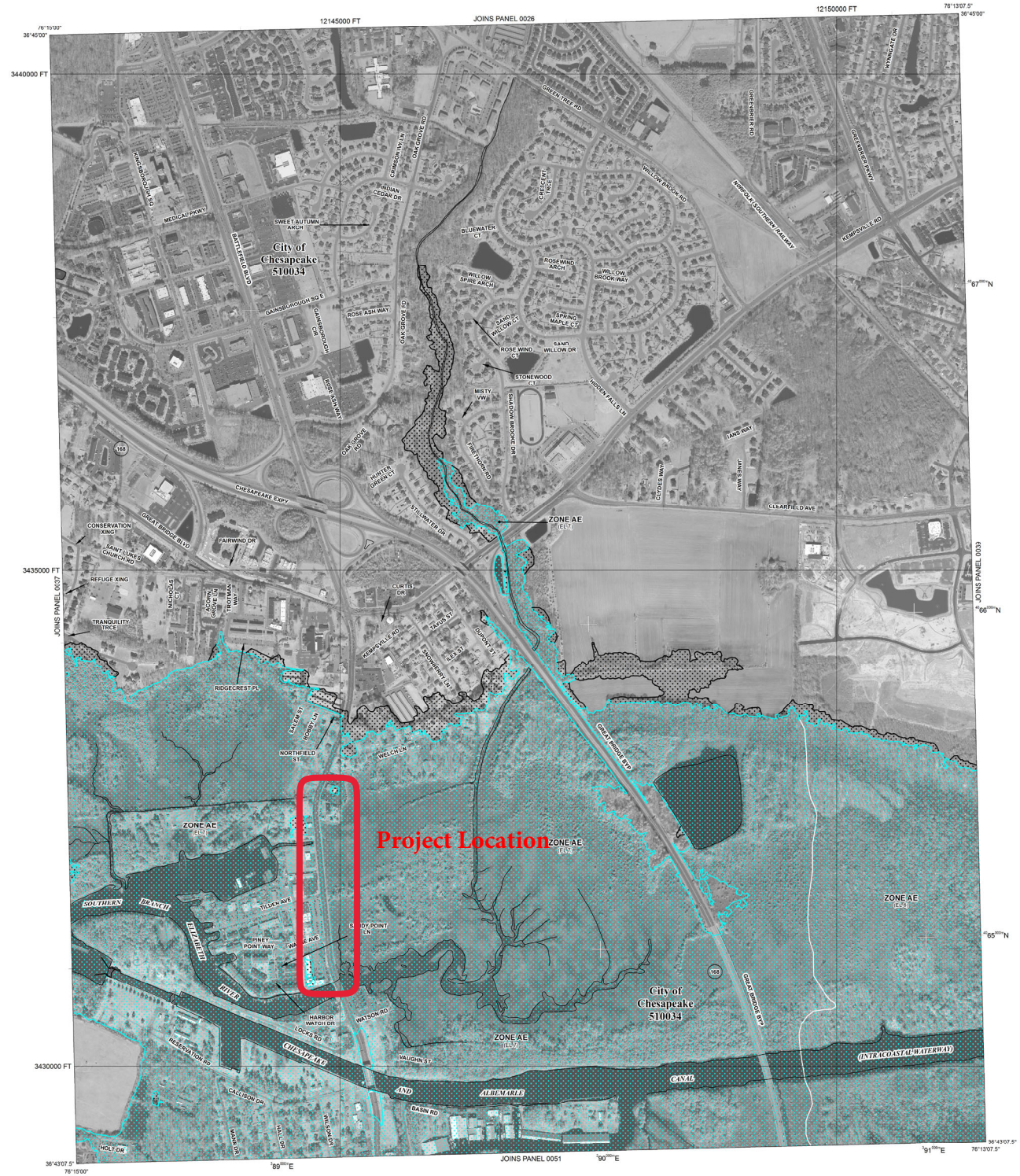
n updated topographic information, this map reflects more detailed and te **stream channel configurations and floodplain delineations** than own on the previous FIRM for this jurisdiction. As a result, the Flood and Floodway Data tables in the Flood Insurance Study Report (which authoritative hydraulic data) may reflect stream channel distances that m what is shown on this map. Also, the road to floodplain relationships for d streams may differ from what is shown on previous maps.

te limits shown on this map are based on the best data available at the ublication. Because changes due to annexations or de-annexations may curred after this map was published, map users should contact appropriate ity officials to verify current corporate limit locations.

efer to the separately printed **Map Index** for an overview map showing t of map panels for this jurisdiction.

mation on available products associated with this FIRM visit the **Map Center (MSC)** website at http://msc.fema.gov. Available products may previously issued Letters of Map Change, a Flood Insurance Study Report, igital versions of this map. Many of these products can be ordered or directly from the MSC website.

ave **questions about this map**, how to order products or the National surance Program in general, please call the FEMA Map Information e (FMIX) at **1-877-FEMA-MAP** (1-877-336-2627) or visit the FEMA at http://www.fema.gov/business/nfip.



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNI BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that chance of being equaled or exceeded in any given year. The Special Flood Hazard A area subject to flooding by the 1% annual chance flood. Areas of Special Flood Haza Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); B Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain depths determined. For areas of alluvial fan flooding, velo determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% ann flood by a flood control system that was subsequently decertifi AR indicates that the former flood control system is being re provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a fed protection system under construction; no Base Flood determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no B Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Ba Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be of encroachment so that the 1% annual chance flood can be carried without substantial in flood heights.

OTHER FLOOD AREAS

ZONE X — Areas of 0.2% annual chance flood; areas of 1% annual chance f average depths of less than 1 foot or with drainage areas less than mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X — Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D — Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREA

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Are

	1% annual chance floodplain boundary
	0.2% annual chance floodplain boundary
	Floodway boundary
	Zone D boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Area Z boundary dividing Special Flood Hazard Areas of diffe Flood Elevations, flood depths or flood velocities.
	Limit of Moderate Wave Action
513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; in feet*

* Referenced to the North American Vertical Datum of 1988

A A	Cross section line
23 23	Transect line
	Culvert, Flume, Penstock or Aqueduct
	Road or Railroad Bridge
	Footbridge
87°07'45", 32°22'30"	Geographic coordinates referred to the North Am Datum of 1983 (NAD 83), Western Hemisphere
4376000mN	1000-meter Universal Transverse Mercator grid values,
600000 FT	5000-foot grid values: Virginia State Plane coordinate system, South zone (FIPSZONE 4502), Lambert Conform projection
DX5510 ×	Bench mark (see explanation in Notes to Users sectio FIRM panel)
M1.5	River Mile

MAP REPOSITORY
Planning Department, 306 Cedar Road, 2nd Floor, Chesapeake, Virginia 23322 (Maps for reference only, not for distribution.)

INITIAL NFIP MAP DATE
June 18, 1970

FLOOD HAZARD BOUNDARY MAP REVISIONS
None

FLOOD INSURANCE RATE MAP EFFECTIVE
July 17, 1970

FLOOD INSURANCE RATE MAP REVISIONS
January 23, 1976
February 2, 1977
May 2, 1989 - to change Special Flood Hazard Areas, to add roads and road names reflect updated topographic information, to incorporate previously issued Letters of Map Revision, and to update corporate limits and map format
December 16, 2014 - to incorporate new detailed Coastal Flood Hazard Analyses a update map format.

To determine if flood insurance is available in this community, contact your In agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'
250 0 500 1000 FEET
150 0 150 300 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0038D

FIRM

FLOOD INSURANCE RATE

CITY OF
CHESAPEAKE,
VIRGINIA
INDEPENDENT CITY

PANEL 38 OF 122

(SEE MAP INDEX FOR FIRM PANEL LA

CONTAINS:

COMMUNITY	NUMBER	PANEL
CHESAPEAKE, CITY OF	510034	0038

Notice to User: The **Map Number** shown belo used when placing map orders; the **Communi** shown above should be used on insurance applica subject community.

MAP NU
510034

MAP RE
DECEMBER 1

Federal Emergency Management

National Flood Hazard Layer FIRMette

FEMA

76°14'47"W 36°43'43"N

76°14'9"W 36°43'14"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 12/28/2022 at 12:47 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Appendix D – Flood events information

N Battlefield Blvd Road flooding

Date of Event	Flooding Duration (deeper than 0.5' above roadway)		Flood dates/times	Hrs.	Flood dates/times	Hrs.	Flood dates/times	Hrs.
	Hrs.	Days						
11/12/2009	**34.5**	**1.44**	11/12 08:30 - 11/13 15:06	30.6	11/13 21:54 - 11/14 01:48	3.9		
10/28/2012	**12.6**	**0.53**	10/28 12:24 - 14:54	2.5	10/28 23:30 - 10/29 03:54	4.4	10/29 10:42 - 16:24	5.7
10/1/2015	**10.4**	**0.43**	10/2 16:18 - 19:42	3.4	10/4 06:24 - 08:12	1.8	10/4 17:18 - 22:30	5.2
10/12/2018	**0**	**0**	No flood record registered					
11/12/2020	**0**	**0**	No flood record registered					
1/3/2022	**3.8**	**0.16**	1/3 13:54 - 17:36	3.8				

U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data, and Information Service

Current Location: Elev: 21 ft. Lat: 36.5950° N Lon: -76.4390° W
Station: **WALLACETON LAKE DRUMMOND, VA US USC00448837**

Record of Climatological Observations

These data are quality controlled and may not be identical to the original observations.

Generated on 12/06/2022

National Centers for Environmental Information
151 Patton Avenue
Asheville, North Carolina 28801

Observation Time Temperature: 0800 Observation Time Precipitation: 0800

Year	Month	Day	Temperature (F)			Precipitation					Evaporation		Soil Temperature (F)					
			24 Hrs. Ending at Observation Time		At Obs.	24 Hour Amounts Ending at Observation Time				At Obs. Time	24 Hour Wind Movement (mi)	Amount of Evap. (in)	4 in. Depth			8 in. Depth		
			Max.	Min.		Rain, Melted Snow, Etc. (in)	Flag	Snow, Ice Pellets, Hail (in)	Flag	Snow, Ice Pellets, Hail, Ice on Ground (in)			Ground Cover (see *)	Max.	Min.	Ground Cover (see *)	Max.	Min.
2009	11	01	80	52	57	0.10		0.0		0.0								
2009	11	02	60	40	55	0.35		0.0		0.0								
2009	11	03	59	42	52	0.03		0.0		0.0								
2009	11	04	69	35	48	0.00		0.0		0.0								
2009	11	05	60	38	50	0.05		0.0		0.0								
2009	11	06	67	33	44	0.00		0.0		0.0								
2009	11	07	60	30	37	0.00		0.0		0.0								
2009	11	08	62	42	50	0.00		0.0		0.0								
2009	11	09	78	36	48	0.00		0.0		0.0								
2009	11	10	80	44	55	0.00		0.0		0.0								
2009	11	11	73	53	57	0.80		0.0		0.0								
2009	11	12	58	52	55	4.20		0.0		0.0	Between 11/11/2009 and 11/12/2009, 7.2 in.							
2009	11	13	56	50	53	3.00		0.0		0.0	rain fell which has a recurrence 1 in 10-years.							
2009	11	14	56	50	56	0.38		0.0		0.0								
2009	11	15	59	52	58	0.03		0.0		0.0								
2009	11	16	72	47	55	0.00		0.0		0.0								
2009	11	17	74	47	54	0.00		0.0		0.0								
2009	11	18	65	50	59	0.00		0.0		0.0								
2009	11	19	68	55	64	0.00		0.0		0.0								
2009	11	20	74	55	60	0.00		0.0		0.0								
2009	11	21	57	41	50	0.00		0.0		0.0								
2009	11	22	60	39	50	0.00		0.0		0.0								
2009	11	23	57	46	52	0.15		0.0		0.0								
2009	11	24	62	42	52	0.10		0.0		0.0								
2009	11	25	55	46	55	0.15		0.0		0.0								
2009	11	26	60	38	43	0.09		0.0		0.0								
2009	11	27	66	38	43	0.00		0.0		0.0								
2009	11	28	57	33	40	0.00		0.0		0.0								
2009	11	29	58	31	46	0.00		0.0		0.0								
2009	11	30	72	42	56	0.00		0.0		0.0								
Summary			64	43		9.43		0.0										

Empty, or blank, cells indicate that a data observation was not reported.

*Ground Cover: 1=Grass; 2=Fallow; 3=Bare Ground; 4=Brome grass; 5=Sod; 6=Straw mulch; 7=Grass muck; 8=Bare muck; 0=Unknown

"s" This data value failed one of NCDC's quality control tests. "At Obs." = Temperature at time of observation

"T" values in the Precipitation or Snow category above indicate a "trace" value was recorded.

"A" values in the Precipitation Flag or the Snow Flag column indicate a multiday total, accumulated since last measurement, is being used.

Data value inconsistency may be present due to rounding calculations during the conversion process from SI metric units to standard imperial units.

U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data, and Information Service

Current Location: Elev: 21 ft. Lat: 36.5950° N Lon: -76.4390° W
Station: **WALLACETON LAKE DRUMMOND, VA US USC00448837**

Record of Climatological Observations

These data are quality controlled and may not be identical to the original observations.

Generated on 12/06/2022

National Centers for Environmental Information
151 Patton Avenue
Asheville, North Carolina 28801

Observation Time Temperature: 0800 Observation Time Precipitation: 0800

Year	Month	Day	Temperature (F)			Precipitation					Evaporation		Soil Temperature (F)					
			24 Hrs. Ending at Observation Time		At Obs.	24 Hour Amounts Ending at Observation Time				At Obs. Time	24 Hour Wind Movement (mi)	Amount of Evap. (in)	4 in. Depth			8 in. Depth		
			Max.	Min.		Rain, Melted Snow, Etc. (in)	Flag	Snow, Ice Pellets, Hail (in)	Flag	Snow, Ice Pellets, Hail, Ice on Ground (in)			Ground Cover (see *)	Max.	Min.	Ground Cover (see *)	Max.	Min.
2012	10	01	62	54	62	0.00												
2012	10	02	69	52	62	0.01												
2012	10	03	86	60	75	0.30												
2012	10	04	87	63	73	0.15												
2012	10	05	85	55	66	0.00												
2012	10	06	80	51	64	0.00												
2012	10	07	85	51	60	0.00												
2012	10	08	63	45	55	0.35												
2012	10	09	60	45	55	3.10												
2012	10	10	61	50	58	0.08												
2012	10	11	72	39	48	0.00												
2012	10	12	70	35	50	0.00												
2012	10	13	72	35	50	0.00												
2012	10	14	70	36	47	0.00												
2012	10	15	80	40	63	0.00												
2012	10	16	77	42	51	1.30												
2012	10	17	70	38	50	0.00												
2012	10	18	72	37	50	0.00												
2012	10	19	80	43	64	0.02												
2012	10	20	80	41	51	0.00												
2012	10	21	76	40	51	0.00												
2012	10	22	71	35	45	0.00												
2012	10	23	74	36	47	0.00												
2012	10	24	79	38	53	0.00												
2012	10	25	84	44	54	0.00												
2012	10	26	82	46	65	0.00												
2012	10	27	75	56	64	0.00												
2012	10	28	69	54	60	1.44												
2012	10	29	60	47	53	1.67												
2012	10	30	54	36	43	1.40												
2012	10	31	47	34	42	0.07												
Summary			73	44		9.89		0.0										

Between 10/28/2012 and 10/30/2012, 4.51 in. rain fell which has a recurrence 1 in 2-years.

Empty, or blank, cells indicate that a data observation was not reported.

*Ground Cover: 1=Grass; 2=Fallow; 3=Bare Ground; 4=Brome grass; 5=Sod; 6=Straw mulch; 7=Grass muck; 8=Bare muck; 0=Unknown

"s" This data value failed one of NCDC's quality control tests. "At Obs." = Temperature at time of observation

"T" values in the Precipitation or Snow category above indicate a "trace" value was recorded.

"A" values in the Precipitation Flag or the Snow Flag column indicate a multiday total, accumulated since last measurement, is being used.

Data value inconsistency may be present due to rounding calculations during the conversion process from SI metric units to standard imperial units.

U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data, and Information Service

Current Location: Elev: 21 ft. Lat: 36.5950° N Lon: -76.4390° W
Station: **WALLACETON LAKE DRUMMOND, VA US USC00448837**

Record of Climatological Observations

These data are quality controlled and may not be identical to the original observations.

Generated on 12/06/2022

National Centers for Environmental Information
151 Patton Avenue
Asheville, North Carolina 28801

Observation Time Temperature: 0800 Observation Time Precipitation: 0800

Year	Month	Day	Temperature (F)			Precipitation					Evaporation		Soil Temperature (F)					
			24 Hrs. Ending at Observation Time		At Obs.	24 Hour Amounts Ending at Observation Time				At Obs. Time	24 Hour Wind Movement (mi)	Amount of Evap. (in)	4 in. Depth			8 in. Depth		
			Max.	Min.		Rain, Melted Snow, Etc. (in)	Flag	Snow, Ice Pellets, Hail (in)	Flag	Snow, Ice Pellets, Hail, Ice on Ground (in)			Ground Cover (see *)	Max.	Min.	Ground Cover (see *)	Max.	Min.
2015	10	01	81	58	70	1.80												
2015	10	02	70	53	65	1.26												
2015	10	03	73	53	72	1.05												
2015	10	04	82	58	70	0.10												
2015	10	05	71	52	61	0.34												
2015	10	06	68	48	65	0.00												
2015	10	07	75	42	70	0.00												
2015	10	08	79	44	60	0.00												
2015	10	09	85	49	68	0.00												
2015	10	10	85	47	65	0.00												
2015	10	11	67	44	61	0.00												
2015	10	12	70	42	60	0.00												
2015	10	13	82	45	63	0.00												
2015	10	14	72	47	60	0.00												
2015	10	15	80	40	53	0.00												
2015	10	16	76	38	60	0.00												
2015	10	17	64	36	54	0.05												
2015	10	18	72	30	50	0.00												
2015	10	19	60	30	46	0.00												
2015	10	20	62	25	40	0.00												
2015	10	21	72	28	46	0.00												
2015	10	22	80	35	48	0.00												
2015	10	23	81	37	52	0.00												
2015	10	24	74	34	53	0.00												
2015	10	25	67	42	60	0.00												
2015	10	26	73	40	57	0.00												
2015	10	27	63	40	60	0.00												
2015	10	28	70	45	70	0.15												
2015	10	29	77	55	68	0.35												
2015	10	30	78	44	55	0.00												
2015	10	31	72	30	45	0.00												
Summary			74	42		5.10		0.0										

Between 10/01/2015 and 10/01/2015, 4.11 in. rain fell which has a recurrence 1 in 1-year.

Empty, or blank, cells indicate that a data observation was not reported.

*Ground Cover: 1=Grass; 2=Fallow; 3=Bare Ground; 4=Brome grass; 5=Sod; 6=Straw mulch; 7=Grass muck; 8=Bare muck; 0=Unknown

"s" This data value failed one of NCDC's quality control tests. "At Obs." = Temperature at time of observation

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U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data, and Information Service

Current Location: Elev: 21 ft. Lat: 36.5950° N Lon: -76.4390° W
Station: **WALLACETON LAKE DRUMMOND, VA US USC00448837**

Record of Climatological Observations

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Generated on 12/06/2022

National Centers for Environmental Information
151 Patton Avenue
Asheville, North Carolina 28801

Observation Time Temperature: 0800 Observation Time Precipitation: 0800

Year	Month	Day	Temperature (F)			Precipitation					Evaporation		Soil Temperature (F)					
			24 Hrs. Ending at Observation Time		At Obs.	24 Hour Amounts Ending at Observation Time				At Obs. Time	24 Hour Wind Movement (mi)	Amount of Evap. (in)	4 in. Depth			8 in. Depth		
			Max.	Min.		Rain, Melted Snow, Etc. (in)	Flag	Snow, Ice Pellets, Hail (in)	Flag	Snow, Ice Pellets, Hail, Ice on Ground (in)			Ground Cover (see *)	Max.	Min.	Ground Cover (see *)	Max.	Min.
2022	01	01	78	52	66	0.50		0.0		0.0								
2022	01	02	77	60	63	0.05		0.0		0.0								
2022	01	03	70	47		1.75		0.0		0.0								
2022	01	04	49	25	31	0.90		0.0		0.0								
2022	01	05	45	26	38	0.00		0.0		0.0								
2022	01	06	43	22	37	0.60		0.0		0.0								
2022	01	07	48	24	37	0.00		0.0		0.0								
2022	01	08	40	20	30	0.00		0.0		0.0								
2022	01	09	38	20	34	0.00		0.0		0.0								
2022	01	10	53	30	38	0.30		0.0		0.0								
2022	01	11	50	15	35	0.00		0.0		0.0								
2022	01	12	35	15		0.00		0.0		0.0								
2022	01	13	49	30	40	0.00		0.0		0.0								
2022	01	14	52	24	42	0.00		0.0		0.0								
2022	01	15	53	22	35	0.00		0.0		0.0								
2022	01	16	41	20	36	0.00		0.0		0.0								
2022	01	17	42	20	38	1.85		0.0		0.0								
2022	01	18	45	22	35	0.00		0.0		0.0								
2022	01	19	44	20	34	0.00		0.0		0.0								
2022	01	20	53	22	39	0.00		0.0		0.0								
2022	01	21	45	20	29	0.10		0.0		0.0								
2022	01	22	29	18		0.60		5.0		5.0								
2022	01	23	35	28		0.00		0.0		4.0								
2022	01	24	46	21	32	0.00		0.0		2.0								
2022	01	25	43	19	36	0.00		0.0		T								
2022	01	26	54	24	29	0.00		0.0		0.0								
2022	01	27	34	20	31	0.00		0.0		0.0								
2022	01	28	36	24	34	0.00		0.0		0.0								
2022	01	29	42	20	31	0.20		2.8		2.0								
2022	01	30	35	17		0.00		0.0		1.0								
2022	01	31	33	20	29	0.00		0.0		T								
Summary			46	25		6.85		7.8										

On 01/03/2022 0.60 in. rain fell which has a recurrence 1 in <1-year.

Empty, or blank, cells indicate that a data observation was not reported.

*Ground Cover: 1=Grass; 2=Fallow; 3=Bare Ground; 4=Brome grass; 5=Sod; 6=Straw mulch; 7=Grass muck; 8=Bare muck; 0=Unknown

"s" This data value failed one of NCDC's quality control tests. "At Obs." = Temperature at time of observation

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Data value inconsistency may be present due to rounding calculations during the conversion process from SI metric units to standard imperial units.

NOAA Atlas 14, Volume 2, Version 3
WALLACETON LK DRUMMOND
Station ID: 44-8837
Location name: Chesapeake, Virginia, USA*
Latitude: 36.5942°, Longitude: -76.4386°
Elevation:
Elevation (station metadata): 20 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.460** (0.419-0.507)	**0.542** (0.493-0.597)	**0.613** (0.557-0.676)	**0.699** (0.633-0.771)	**0.787** (0.710-0.866)	**0.865** (0.777-0.953)	**0.937** (0.838-1.03)	**1.01** (0.896-1.11)	**1.10** (0.965-1.21)	**1.18** (1.03-1.31)
10-min	**0.735** (0.669-0.811)	**0.866** (0.788-0.955)	**0.982** (0.893-1.08)	**1.12** (1.01-1.23)	**1.25** (1.13-1.38)	**1.38** (1.24-1.52)	**1.49** (1.33-1.64)	**1.60** (1.42-1.76)	**1.73** (1.53-1.92)	**1.86** (1.62-2.06)
15-min	**0.919** (0.837-1.01)	**1.09** (0.991-1.20)	**1.24** (1.13-1.37)	**1.41** (1.28-1.56)	**1.59** (1.43-1.75)	**1.74** (1.57-1.92)	**1.88** (1.68-2.07)	**2.02** (1.79-2.23)	**2.18** (1.92-2.41)	**2.34** (2.04-2.59)
30-min	**1.26** (1.15-1.39)	**1.50** (1.37-1.66)	**1.76** (1.60-1.95)	**2.05** (1.86-2.26)	**2.35** (2.12-2.59)	**2.63** (2.36-2.89)	**2.88** (2.58-3.18)	**3.14** (2.79-3.46)	**3.47** (3.06-3.84)	**3.78** (3.30-4.19)
60-min	**1.57** (1.43-1.73)	**1.89** (1.72-2.08)	**2.26** (2.06-2.50)	**2.67** (2.42-2.94)	**3.14** (2.83-3.45)	**3.56** (3.20-3.92)	**3.97** (3.55-4.38)	**4.40** (3.91-4.86)	**4.98** (4.39-5.51)	**5.52** (4.82-6.12)
2-hr	**1.82** (1.65-2.03)	**2.19** (1.98-2.43)	**2.68** (2.42-2.97)	**3.21** (2.89-3.56)	**3.85** (3.45-4.25)	**4.44** (3.96-4.91)	**5.04** (4.46-5.56)	**5.67** (4.99-6.27)	**6.54** (5.71-7.24)	**7.37** (6.37-8.16)
3-hr	**1.96** (1.77-2.20)	**2.36** (2.12-2.64)	**2.89** (2.60-3.23)	**3.49** (3.13-3.90)	**4.23** (3.77-4.71)	**4.94** (4.37-5.48)	**5.65** (4.97-6.27)	**6.44** (5.61-7.14)	**7.54** (6.50-8.37)	**8.59** (7.34-9.54)
6-hr	**2.36** (2.12-2.64)	**2.82** (2.54-3.16)	**3.47** (3.11-3.89)	**4.20** (3.75-4.69)	**5.11** (4.54-5.70)	**5.98** (5.28-6.65)	**6.88** (6.02-7.64)	**7.86** (6.83-8.72)	**9.26** (7.93-10.3)	**10.6** (8.98-11.8)
12-hr	**2.77** (2.48-3.12)	**3.32** (2.96-3.73)	**4.10** (3.65-4.61)	**4.98** (4.42-5.60)	**6.11** (5.38-6.84)	**7.20** (6.30-8.06)	**8.34** (7.23-9.31)	**9.61** (8.24-10.7)	**11.4** (9.65-12.7)	**13.2** (11.0-14.7)
24-hr	**3.07** (2.83-3.35)	**3.74** (3.45-4.08)	**4.82** (4.43-5.27)	**5.74** (5.26-6.25)	**7.09** (6.46-7.71)	**8.26** (7.46-8.97)	**9.54** (8.52-10.4)	**11.0** (9.69-11.9)	**13.1** (11.3-14.2)	**14.9** (12.7-16.3)
2-day	**3.60** (3.34-3.91)	**4.35** (4.04-4.73)	**5.59** (5.18-6.07)	**6.65** (6.13-7.21)	**8.25** (7.54-8.91)	**9.63** (8.72-10.4)	**11.2** (10.0-12.1)	**12.9** (11.4-14.0)	**15.5** (13.4-16.9)	**17.7** (15.1-19.4)
3-day	**3.84** (3.58-4.15)	**4.65** (4.33-5.03)	**5.94** (5.52-6.42)	**7.04** (6.51-7.58)	**8.65** (7.95-9.31)	**10.0** (9.13-10.8)	**11.5** (10.4-12.4)	**13.2** (11.8-14.3)	**15.7** (13.7-17.1)	**18.0** (15.5-19.7)
4-day	**4.09** (3.82-4.40)	**4.95** (4.62-5.33)	**6.30** (5.87-6.77)	**7.42** (6.89-7.96)	**9.05** (8.35-9.72)	**10.4** (9.54-11.2)	**11.9** (10.8-12.8)	**13.5** (12.1-14.6)	**15.9** (14.0-17.3)	**18.2** (15.8-19.9)
7-day	**4.82** (4.52-5.16)	**5.81** (5.45-6.23)	**7.31** (6.84-7.82)	**8.55** (7.97-9.12)	**10.3** (9.57-11.0)	**11.8** (10.9-12.6)	**13.4** (12.2-14.3)	**15.1** (13.7-16.2)	**17.6** (15.6-19.0)	**19.7** (17.2-21.4)
10-day	**5.48** (5.16-5.84)	**6.57** (6.19-7.00)	**8.14** (7.65-8.66)	**9.44** (8.85-10.0)	**11.3** (10.5-12.0)	**12.9** (11.9-13.7)	**14.5** (13.3-15.5)	**16.3** (14.8-17.4)	**18.8** (16.9-20.3)	**20.9** (18.5-22.7)
20-day	**7.47** (7.04-7.95)	**8.90** (8.40-9.48)	**10.8** (10.2-11.5)	**12.4** (11.7-13.2)	**14.6** (13.7-15.6)	**16.5** (15.3-17.5)	**18.4** (16.9-19.6)	**20.4** (18.6-21.8)	**23.3** (20.9-25.0)	**25.6** (22.7-27.7)
30-day	**9.20** (8.70-9.75)	**10.9** (10.3-11.6)	**13.2** (12.4-13.9)	**14.9** (14.1-15.8)	**17.4** (16.3-18.4)	**19.3** (18.1-20.5)	**21.3** (19.8-22.7)	**23.4** (21.6-24.9)	**26.2** (23.9-28.1)	**28.4** (25.7-30.7)
45-day	**11.5** (10.9-12.2)	**13.6** (12.9-14.5)	**16.3** (15.4-17.3)	**18.5** (17.4-19.6)	**21.5** (20.2-22.9)	**24.0** (22.5-25.6)	**26.6** (24.7-28.4)	**29.3** (27.0-31.3)	**33.1** (30.2-35.5)	**36.1** (32.6-39.0)
60-day	**13.8** (13.1-14.6)	**16.3** (15.5-17.3)	**19.3** (18.3-20.4)	**21.6** (20.5-22.9)	**24.9** (23.4-26.3)	**27.4** (25.7-29.0)	**30.0** (28.0-31.8)	**32.6** (30.3-34.6)	**36.2** (33.2-38.6)	**38.9** (35.5-41.8)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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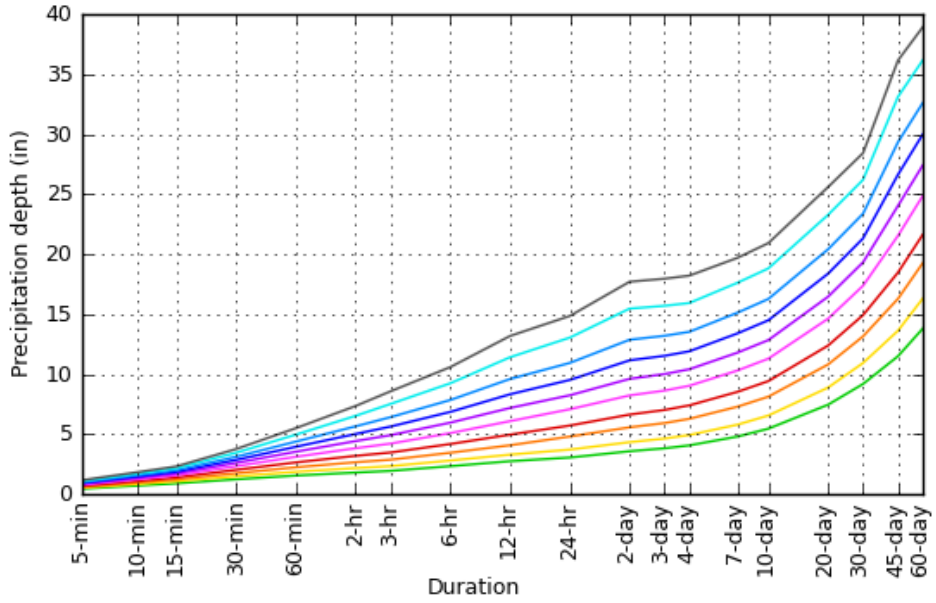
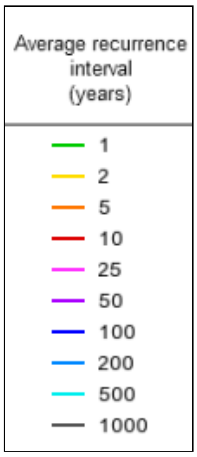
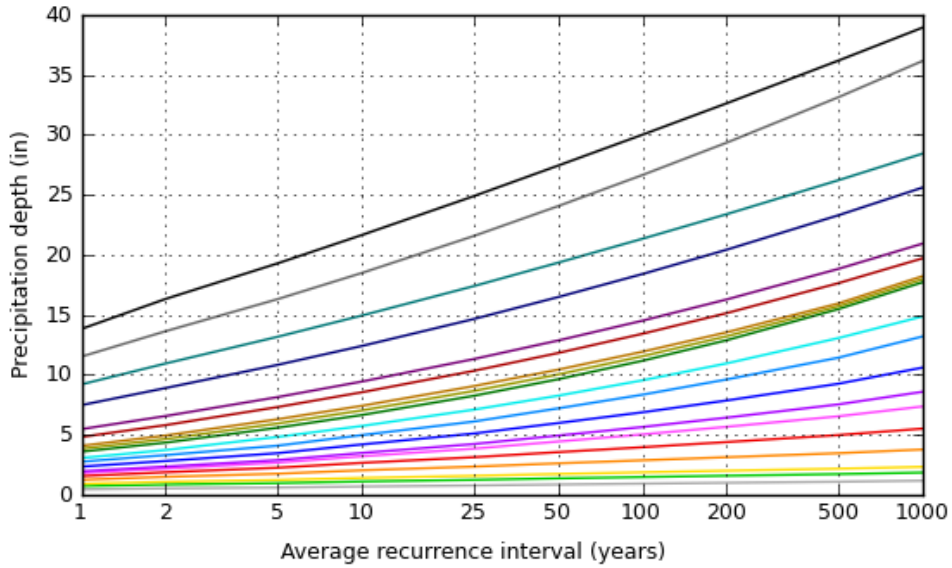
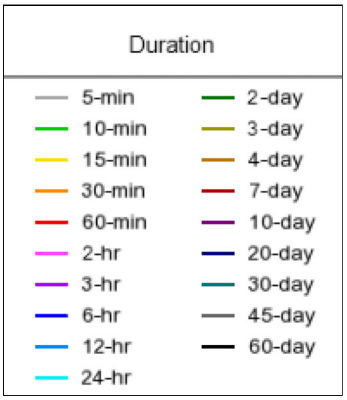
PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 36.5942°, Longitude: -76.4386°









NOAA Atlas 14, Volume 2, Version 3

Created (GMT): Wed Dec 14 19:59:21 2022

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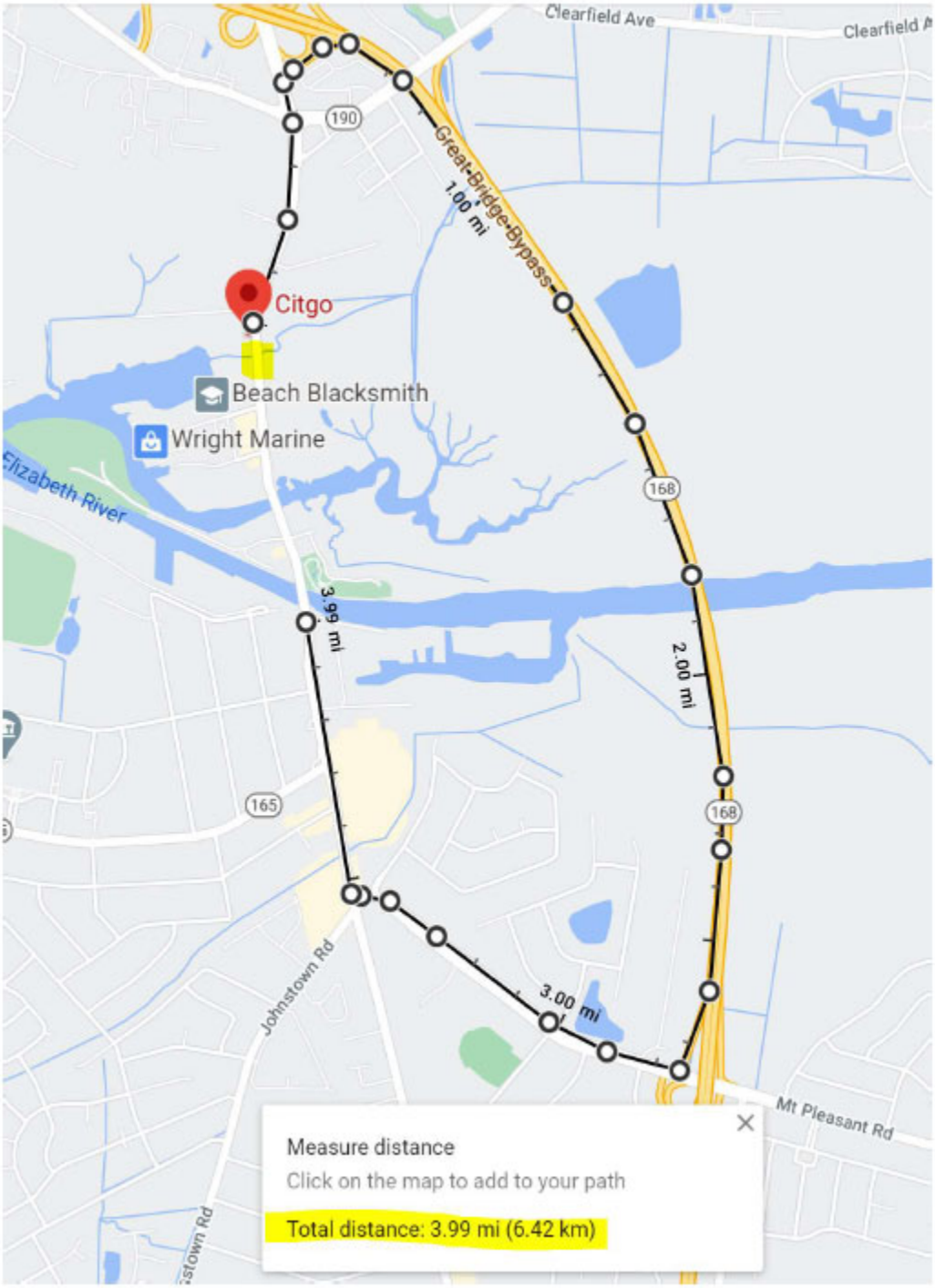
Maps & aerials

Small scale terrain

N Battlefield Blvd. January 3, 2022. Flood observed on all lanes.

Appendix E – Detour

Battlefield N Blvd. Detour



PROJECT NAME: N Battlefield Blvd at Tilden Ave

CATEGORY:

DESCRIPTION (BRIEF): Raise N Battlefield Blvd from el 4.5 to el 7 at Tilden Ave.
Fr Wayne Ave to Northfield St

ESTIMATED COST:

CONSTRUCTION:		$3,979,492	
CONTINGENCIES:	30.00%	1,193,848	
Fed Provisions			994,873
TOTAL BASE CONSTRUCTION:			$6,168,213
ENGINEERING:	33.00%		$2,056,071
CEI	incl in ENG		$0.00
LAND:			1,156,500
OTHER CONSTRUCTION: (INCLUDE UTILITY RELOCATION)			819,217
TOTAL:			**$10,200,000**

DATE: 10/5/2023 (mo / day / year) NAME: SHH

CHESAPEAKE

DEPARTMENT OF PUBLIC WORKS

PROJECT NUMBER			
PROJECT NAME	N Battlefield Blvd at Tilden Ave		
LOCATION	Fr Wayne Ave to Northfield St		
DATE	9/27/2023	**ESTIMATOR**	SHH

ENGINEER'S ESTIMATE

ITEM	DESCRIPTION OF WORK	UNIT OF MEASURE	QUANTITY	UNIT PRICE	ITEM TOTAL	
1	Mobilization	LS	1	361,772.00	361,772.00	
2	MOT	LS	1	60,000.00	60,000.00	
3	Replace DI Top	EA	13	1,500.00	19,500.00	
4	Demolition C&G, SW	LF	3600	50.00	180,000.00	
5	Curb & Gutter , CG-6	LF	3380	50.00	169,000.00	
6	5' Sidewalk	SY	1880	75.00	141,000.00	
7	Handicap Ramp	EA	36	1,500.00	54,000.00	
8	2" SM-9.5A	Ton	1538	200.00	307,600.00	
8	8" BM-2	Ton	6152	200.00	1,230,400.00	
8	21A Stone	CY	4833	100.00	483,300.00	
8	Borrow	CY	9320	50.00	466,000.00	
9	Erosion & Sediment Control	LS	1	20,000.00	20,000.00	
10	Topsoil, Seeding, and Restoration	LS	1	40,000.00	40,000.00	
11	Pavement Marking	LS	1	40,000.00	40,000.00	
12	Std CG-10	SY	853	40.00	34,120.00	
13	Std Vdot RW-2 Retaining Wall (2')	CY	166	500.00	83,000.00	
14	Concrete Barrier	LF	1698	100.00	169,800.00	
15	Extend Box Culvert	LF	20	6,000.00	120,000.00	
	TOTAL THIS SHEET				3,979,492.00	

CHESAPEAKE

DEPARTMENT OF PUBLIC WORKS

PROJECT NUMBER			
PROJECT NAME	N Battlefield Blvd at Tilden Ave		
LOCATION			
DATE	9/27/2023	**ESTIMATOR**	SHH

ENGINEER'S ESTIMATE

ITEM	DESCRIPTION OF WORK	UNIT OF MEASURE	QUANTITY	UNIT PRICE	ITEM TOTAL	
	Right of Way	SF	21690	20.00	433,800.00	
	50% conting				216,900.00	
	TCE	SF	43380	10.00	433,800.00	
	Commercial Cost	EA	24	3,000.00	72,000.00	
	TOTAL THIS SHEET				1,156,500.00	

Appendix C: Checklist All Categories

(*Benefit-cost analysis must be included if the proposed Project is over $2 million.)*

Detailed map of the project area(s) (Projects/Studies) **See Attachment A**.	✔ Yes □ No □ N/A
FIRMette of the project area(s) (Projects/Studies) **Appendix C of the BCA, included as Attachment B**	✔ Yes □ No □ N/A
Historic flood damage data and/or images (Projects/Studies) **Appendix D of the BCA, included as Attachment B**	✔ Yes □ No □ N/A
A link to or a copy of the current floodplain ordinance ADOPTED-Floodplain-Ordinance-7-16-2013-PDF (cityofchesapeake.net) *https://www.cityofchesapeake.net/DocumentCenter/View/7220/ADOPTED-Floodplain-Ordinance-7-16-2013-PDF?bidId=*	✔ Yes □ No □ N/A
Non-Fund financed maintenance and management plan for project extending a minimum of 10 years from project close **See Attachment C**.	✔ Yes □ No □ N/A
A link to or a copy of the current hazard mitigation plan 2022 Hampton Roads Hazard Mitigation Plan | Emergency Management | Departments | Departments | Emergency Management | Departments | Departments | Hampton Roads Planning District Commission (hrpdcva.gov) *https://www.hrpdcva.gov/departments/emergency-management/2022-hampton-roads-hazard-mitigation-plan*	✔ Yes □ No □ N/A
A link to or a copy of the current comprehensive plan *https://resources.cityofchesapeake.net/comp-plan-2035/#page=1y*	✔ Yes □ No □ N/A
Social vulnerability index score(s) for the project area from VFRIC SVI Layer **0.57, Moderate Social Vulnerability, see Attachment D**	✔ Yes □ No □ N/A

If applicant is not a town, city, or county, letters of support from affected communities	□ Yes □ No ✓ N/A
Letter of support from impacted stakeholders	□ Yes □ No ✓ N/A
Budget Narrative	
Supporting Documentation	**Included**
Budget Narrative	✓
Supporting Documentation, including the Benefit-Cost Analysis tool/narrative (for projects over $2 million) **As Attachment B**	✓
Authorization to request funding from the Fund from governing body or chief executive of the local government **As Attachment E**	✓ Yes □ No □ N/A
Signed pledge agreement from each contributing organization	□ Yes □ No ✓ N/A
Others – **Cost Estimate - Attachment F** **Flood History from BRIC 2022 – Attachment G**	

Appendix C: Checklist All Categories

(*Benefit-cost analysis must be included if the proposed Project is over $2 million.)*

Detailed map of the project area(s) (Projects/Studies) **See Attachment A**.	✔ Yes □ No □ N/A
FIRMette of the project area(s) (Projects/Studies) **Appendix C of the BCA, included as Attachment B**	✔ Yes □ No □ N/A
Historic flood damage data and/or images (Projects/Studies) **Appendix D of the BCA, included as Attachment B**	✔ Yes □ No □ N/A
A link to or a copy of the current floodplain ordinance ADOPTED-Floodplain-Ordinance-7-16-2013-PDF (cityofchesapeake.net) *https://www.cityofchesapeake.net/DocumentCenter/View/7220/ADOPTED-Floodplain-Ordinance-7-16-2013-PDF?bidId=*	✔ Yes □ No □ N/A
Non-Fund financed maintenance and management plan for project extending a minimum of 10 years from project close **See Attachment C**.	✔ Yes □ No □ N/A
A link to or a copy of the current hazard mitigation plan 2022 Hampton Roads Hazard Mitigation Plan | Emergency Management | Departments | Departments | Emergency Management | Departments | Departments | Hampton Roads Planning District Commission (hrpdcva.gov) *https://www.hrpdcva.gov/departments/emergency-management/2022-hampton-roads-hazard-mitigation-plan*	✔ Yes □ No □ N/A
A link to or a copy of the current comprehensive plan *https://resources.cityofchesapeake.net/comp-plan-2035/#page=1y*	✔ Yes □ No □ N/A
Social vulnerability index score(s) for the project area from VFRIC SVI Layer **0.57, Moderate Social Vulnerability, see Attachment D**	✔ Yes □ No □ N/A

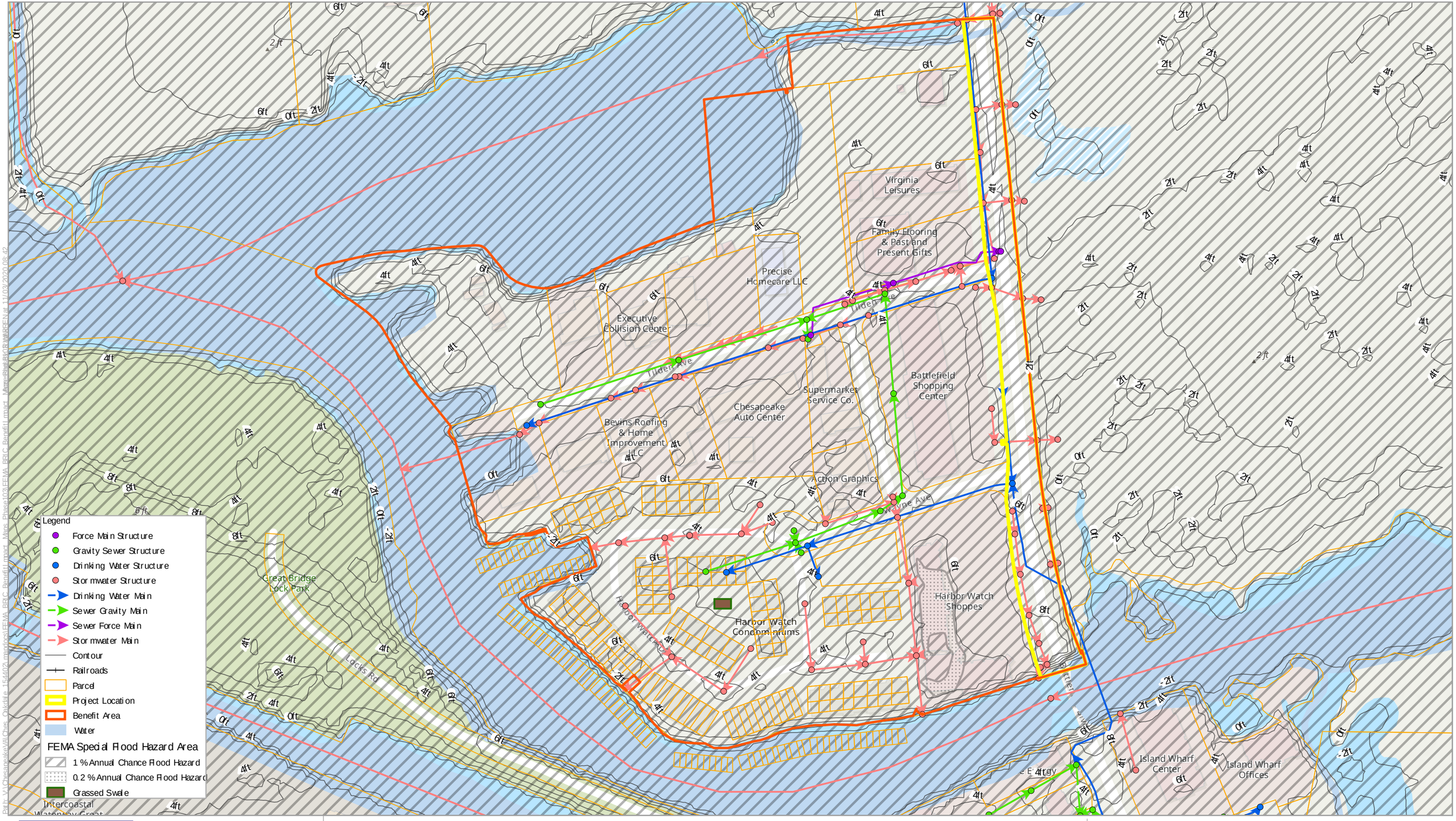
If applicant is not a town, city, or county, letters of support from affected communities	□ Yes □ No ✓ N/A
Letter of support from impacted stakeholders	□ Yes □ No ✓ N/A
Budget Narrative	
Supporting Documentation	**Included**
Budget Narrative	✓
Supporting Documentation, including the Benefit-Cost Analysis tool/narrative (for projects over $2 million) **As Attachment B**	✓
Authorization to request funding from the Fund from governing body or chief executive of the local government **As Attachment E**	✓ Yes □ No □ N/A
Signed pledge agreement from each contributing organization	□ Yes □ No ✓ N/A
Others – **Cost Estimate - Attachment F** **Flood History from BRIC 2022 – Attachment G**	

Appendix C: Checklist All Categories

(*Benefit-cost analysis must be included if the proposed Project is over $2 million.)*

Detailed map of the project area(s) (Projects/Studies) **See Attachment A**.	✔ Yes □ No □ N/A
FIRMette of the project area(s) (Projects/Studies) **Appendix C of the BCA, included as Attachment B**	✔ Yes □ No □ N/A
Historic flood damage data and/or images (Projects/Studies) **Appendix D of the BCA, included as Attachment B**	✔ Yes □ No □ N/A
A link to or a copy of the current floodplain ordinance ADOPTED-Floodplain-Ordinance-7-16-2013-PDF (cityofchesapeake.net) *https://www.cityofchesapeake.net/DocumentCenter/View/7220/ADOPTED-Floodplain-Ordinance-7-16-2013-PDF?bidId=*	✔ Yes □ No □ N/A
Non-Fund financed maintenance and management plan for project extending a minimum of 10 years from project close **See Attachment C**.	✔ Yes □ No □ N/A
A link to or a copy of the current hazard mitigation plan 2022 Hampton Roads Hazard Mitigation Plan | Emergency Management | Departments | Departments | Emergency Management | Departments | Departments | Hampton Roads Planning District Commission (hrpdcva.gov) *https://www.hrpdcva.gov/departments/emergency-management/2022-hampton-roads-hazard-mitigation-plan*	✔ Yes □ No □ N/A
A link to or a copy of the current comprehensive plan *https://resources.cityofchesapeake.net/comp-plan-2035/#page=1y*	✔ Yes □ No □ N/A
Social vulnerability index score(s) for the project area from VFRIC SVI Layer **0.57, Moderate Social Vulnerability, see Attachment D**	✔ Yes □ No □ N/A

If applicant is not a town, city, or county, letters of support from affected communities	□ Yes □ No ✓ N/A
Letter of support from impacted stakeholders	□ Yes □ No ✓ N/A
Budget Narrative	
Supporting Documentation	**Included**
Budget Narrative	✓
Supporting Documentation, including the Benefit-Cost Analysis tool/narrative (for projects over $2 million) **As Attachment B**	✓
Authorization to request funding from the Fund from governing body or chief executive of the local government **As Attachment E**	✓ Yes □ No □ N/A
Signed pledge agreement from each contributing organization	□ Yes □ No ✓ N/A
Others – **Cost Estimate - Attachment F** **Flood History from BRIC 2022 – Attachment G**	



Brown AND Caldwell

Date: 11/3/2020 8:40 AM

Spatial Reference:
Name: NAD 1983 HARN StatePlane Virginia South FIPS 4502 Feet

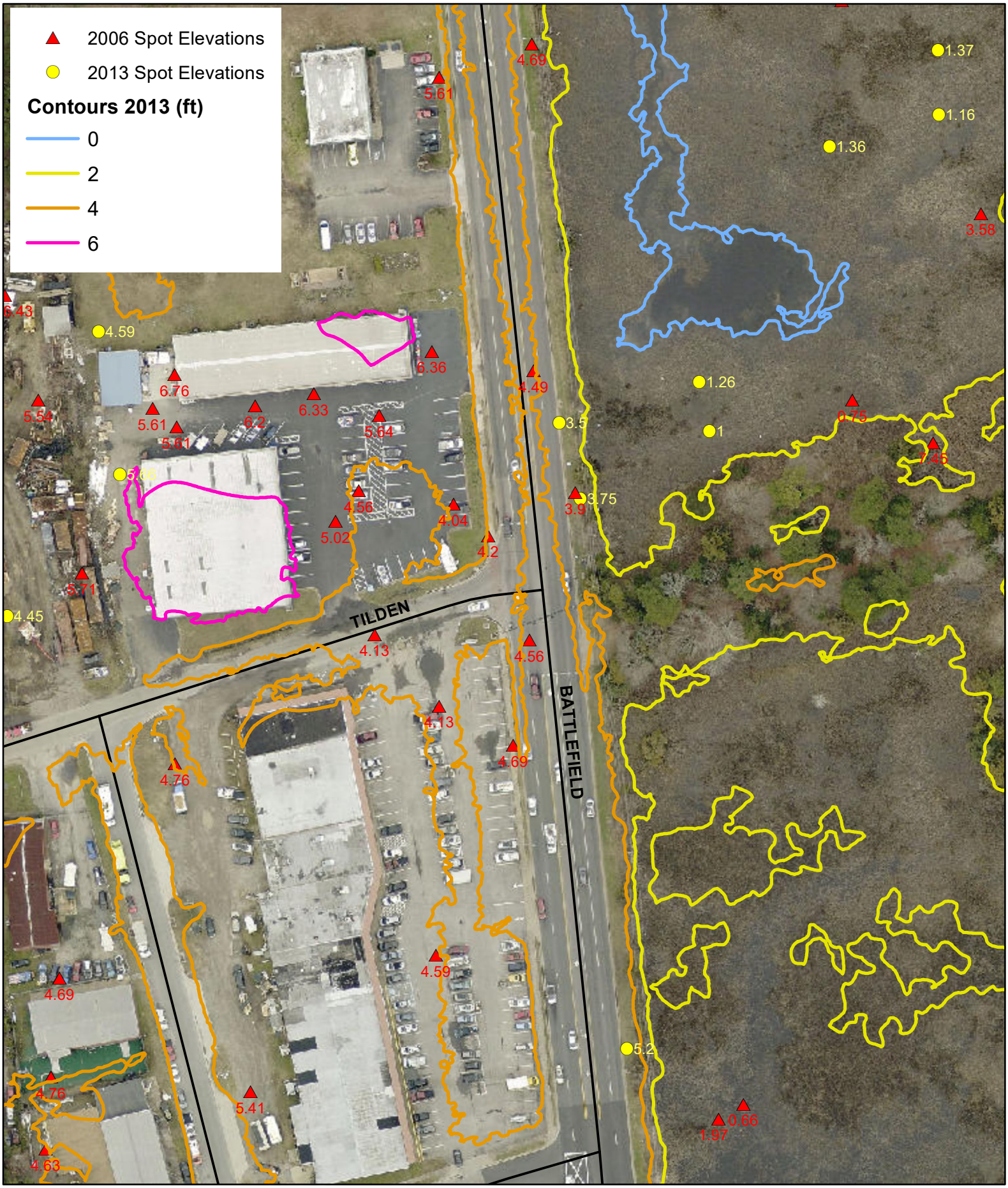
0 0.01 0.02 0.04 0.06 Miles

Benefit Area Map
North Battlefield Blvd
Latitude: 36.724664
Longitude: -76.241099

Battlefield/Tilden Elevations

10/4/2023

0 25 50 100 150 200 Feet



MEMORANDUM

TO: Crystal V. Bloom, P.E., Engineering Manager
Jay Tate, P.E., CFM, Director of Development and Permits

FROM: Deva Borah, PhD, P.E., Senior Project Engineer

DATE: November 6, 2023

SUBJECT: **AUTHORIZATION TO REQUEST FUNDING THROUGH COMMUNITY FLOOD PREPAREDNESS FUND (CFPF) GRANT PROGRAM FOR BATTLEFIELD BOULEVARD ROAD ELEVATION PROJECT**

The City of Chesapeake requests funding through the Community Flood Preparedness Fund (CFPF) grant program for the above-referenced flood prevention and protection project in accordance with the grant program requirements as provided in the 2023 Funding Manual for the Virginia Community Flood Preparedness Fund.

The total project cost is $10,200,000. The amount of funding requested through the CFPF is $7,000,000, approximately 68.6% of the project cost. The remaining cost of $3,200,000 will be a local match. City Council has approved a resolution to provide the required local match, see the attached resolution 23-R-051.

The grant program also requires a locality-certified floodplain manager (CFM) to confirm the project area is subject to recurrent flooding to ensure moneys from the program will be utilized for the primary purpose of implementing flood prevention and protection projects. This confirmation by the City's designated CFM is requested below.

Should you have any questions or need additional information, please contact me at extension 6472.

APPROVED BY:

Crystal V. Bloom, P.E., Engineering Manager
(Approval of Request)

11/6/23
Date

Jay Tate, P.E., CFM, Director of Development and Permits
(Confirmation of Project)

11/6/23
Date

DB

Attachments

23-R-051

A RESOLUTION REQUESTING AUTHORITY TO APPLY FOR GRANT FUNDING THROUGH THE VIRGINIA DEPARTMENT OF CONSERVATION AND RECREATION, COMMUNITY FLOOD PREPAREDNESS FUND PROGRAM, FOR THE BATTLEFIELD BOULEVARD ROAD ELEVATION PROJECT.

WHEREAS, Section 10.1-603.25 of the Code of Virginia, 1950, as amended, established the Virginia Community Flood Preparedness Fund ("CFPF") to provide support for regions and localities across Virginia to enhance flood prevention or protection and coastal resilience; and

WHEREAS, Virginia Department of Conservation and Recreation ("DCR") administers the CFPF Program, which makes funds available to local governments of the Commonwealth of Virginia primarily for the purpose of implementing flood prevention and protection projects and conducting studies in areas that are subject to recurrent flooding, among other purposes; and

WHEREAS, the City of Chesapeake is eligible to apply for and receive up to $7,500,000 in grant funding through the 2023 CFPF Program; and

WHEREAS, the City desires to seek CFPF Program funding for the Battlefield Boulevard Road Elevation Project, which will elevate an 1,800-foot segment of Battlefield Boulevard N. at its crossing with the headwaters of the Elizabeth River above the 100-year floodplain, improving public safety and providing a more reliable roadway network; and

WHEREAS, the estimated budget for the Battlefield Boulevard Road Elevation Project, including contingencies, is $10,200,000, a maximum of $5,100,000 of which may be funded through the CFPF Program, with the remaining $5,100,000 to be matched with local funds.

NOW, THEREFORE, BE IT RESOLVED that the Council of the City of Chesapeake, Virginia, herby authorizes the City Manager or designee to submit applications

City Attorney's Office
City of Chesapeake
Municipal Center
306 Cedar Road
Chesapeake, Virginia
23322
(757) 382-6586
Fax: (757) 382-8749

to DCR for CFPF funding for flood prevention and protection projects and studies related to the Battlefield Boulevard Road Elevation project in the maximum amount of $5,100,000.

BE IT FURTHER RESOLVED, that the City of Chesapeake hereby commits to fund its local share of preliminary engineering, right-of-way, and construction of the projects (as applicable) under agreement with DCR in accordance with the project financial documents in such form as may be approved by the City Attorney; and

BE IT FURTHER RESOLVED that the Council of the City of Chesapeake hereby grants authority for the City Manager or designee to apply for funds and execute project administration agreements, as well as other documents necessary for the projects, if awarded the funding, in such form as may be approved by the City Attorney.

ADOPTED by the Council of the City of Chesapeake, Virginia, this 24th day of October, 2023.

APPROVED:

Rick West
Mayor

ATTEST:
Sandra Madison
Clerk of the Council

APPROVED AS TO FORM:

Assistant City Attorney

City Attorney's Office
City of Chesapeake
Municipal Center
306 Cedar Road
Chesapeake, Virginia
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CHESAPEAKE
RIGHT OF WAY MAINTENANCE MANUAL

Public Works Department
Operations and Maintenance Division

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1. INTRODUCTION

City of Chesapeake (CoC) employees have an obligation to the residents and visitors of the City of Chesapeake to maintain the transportation system for the safe movement of the traveling public by implementing and following a maintenance program.

The goal of this manual is to provide maintenance employees with a centralized document that provides the necessary guidance on how to conduct various activities, the resources to use, and the specific targets to achieve.

1.1 Background Information

1.1.1 This manual collates Department of Public Works Departmental Regulations into a singular document to serve as a quick and easy to understand reference.

1.2 Purpose of the City of Chesapeake Right of Way Maintenance Manual

1.2.1 The purpose of this manual is to provide CoC employees with the necessary information to perform their responsibilities in conductingvarious activities safely, effectively, and efficiently.

1.2.2 These regulations provide clear purpose and policy in addition to the procedures necessary to provide a safe transportation system. Associated regulations are included to provide source references.

1.2.3 It is important to note, maintenance activities are location specific and environmental conditions throughout the City vary greatly. With the high degree of variability, the following guidelines may not always address specific needs. In these instances, the supervisor or other tasked CoC personnel have the experience and flexibility to utilize the information in this manual appropriately.

1.2.4 As indicated in the following regulations, this manual is not to be used singularly, rather this manual shall be used in conjunction with the referenced related policies/regulations

1.3 Regulation Template

1.3.1 The Regulations that follow are in a specific template format to ensure consistency and ease of comprehension.

A. The purpose of the regulation is stated to clarify the Regulation Subject.

B. The Policy clearly states the limits of the regulation to ensure all CoC personnel have complete understanding of the associated tasks. The Policy maximizes effectiveness by eliminating potential scope creep.

C. Procedures are clearly defined for each subsection of the Policy to ensure consistency of work.

1.4 Regulations Guidelines for Identified Programs

1.4.1 Regulations Guidelines including Purpose, Policy, Procedures and Related Policies/Regulations have been prepared for the following maintenance operations within a consistent adopted Template.

A. Snow Removal and Ice Control: The Department shall restore and maintain identified snow route roadways during snow and ice weather.

B. Street Maintenance Inspection: The Department shall ensure all right of way infrastructure is inspected for structural stability and safety as part of routine maintenance and in response to citizens.

C. Pavement Maintenance: The Department shall make every reasonable effort to effectively accommodate the traffic needs safely and efficiently while extending the life of the infrastructure as determined by available funds in the City's Budget. The City's Pavement Management System optimizes available funding and takes into account measured pavement ratings, rate of pavement deterioration and traffic volumes when prioritizing resurfacing. In addition, citizens can utilize the Customer Contact Center via phone or email to report any pavement issues.

D. Street Sweeping: The Department shall maintain roadway surfaces by sweeping. Neighborhood streets shall be swept four times per year based on budget, weather and equipment availability. Updates to the sweeping schedule are provided at: https://www.cityofchesapeake.net/1022/Street-Sweeping-Operations

E. Shoulder Maintenance: The Department shall prioritize the maintenance of primary/arterial shoulders. Customer Service shall provide citizen reports to City Staff for removal within two working days of notification. In addition, the City assesses shoulder maintenance in conjunction with pavement maintenance when applicable so that crews work as efficiently as possible.

F. Concrete Installation, Repair or Replacement: Concrete infrastructure such as: sidewalk, curb and gutter, valley gutter and driveway aprons, etc shall be installed/repaired/replaced in accordance with the various criteria in the regulation.

G. Pedestrian Crosswalk Pavement Markings: Pedestrian crosswalk

markings shall generally be installed at high volume intersections and not at mid-block unless under unique circumstances. In addition, citizens can utilize the Customer Contact Center via phone or email to report any pavement marking issues.

H. Pavement Markings: The Department shall reference the Manual on Uniform Traffic Control Devices for installation and Procedures within this regulation for CoC crew support. In addition, citizens can utilize the Customer Contact Center via phone or email to report any pavement marking issues.

I. Pavement Cut Restoration: The Department shall reference the Public Facilities Manual for all policies and procedures.

J. Traffic Signs: The Department shall reference the Manual on Uniform Traffic Control Devices, the Virginia Work Area Protection Manual, Manual on Roads and Bridges and the directives listed in the regulation with respect to the assembly, installation and maintenance of right of way signage. In addition, citizens can utilize the Customer Contact Center via phone or email to report any issues with traffic signs.

K. Sign Visibility and Vision Clearance: The Department shall reference the Manual on Uniform Traffic Control Devices for guidance on trimming vegetation and removal of obstructions from the right of way to allow for adequate visibility of traffic control signs.

L. Drainage Infrastructure Management: The Department shall maintain the open and closed drainage systems with the City's right of way and public easements to provide for the original design capacity to the greatest extent possible.

1.5 Roles and Responsibilities

1.5.1 The objective of all Public Works Operations personnel is to operate and maintain the City's right of way and public easements in order to meet the transportation needs of the City. This is done through timely and fiscally responsible delivery of services.

1.6 Environmental Compliance

1.6.1 It is imperative that CoC Operations personnel comply with established agency policies and guidance regarding environmental protection. Environmental compliance is included in Departmental Regulation Number 508 and is provided in this document.

1.7 Maintenance Regulation Desired Frequency

1.7.1 As mentioned in Section 1.2, the high degree of variability associated with City of Chesapeake rights of way makes adherence to rigid maintenance scheduling difficult. At a minimum, Public Works inspects every facet of its right of way system every two years and updates the Pavement Management System accordingly. In addition, Public Works values feedback from the citizens and further updates the Pavement Management System as needed based on reports to the Customer Contact Center. As such, Public Works Operations Staff have, over several decades, crafted Departmental Regulations and other maintenance policies to provide for a highly dynamic process that is constantly updated due to inter-departmental checks and balances. The Departmental Requlations are listed as follows:

2. SNOW REMOVAL AND ICE CONTROL

Department of Public Works	Chesapeake VIRGINIA	
Directive: Departmental Regulation	Number: 604	
Subject: Snow Removal and Ice Control	Supersedes: 10/25/18	Next Review: 04/05/24
Approved: Director of Public Works	Effective Date: 04/05/22 Initiator: Ross Brockwell	

I. Purpose

The purpose of this Departmental Regulation is to provide a policy and procedures for restoring and maintaining the identified snow route roadways within the City of Chesapeake during snow and ice weather events.

II. Policy

A. The Department of Public Works is responsible for snow removal and ice control on primary roads, secondary roads, bridges, and overpasses. Roads are designated in the snow plan as emergency, primary, secondary, and connector.

B. Local or residential streets shall not receive snow removal and ice control unless otherwise directed by the Director/designee.

C. Snow pushed to the side of the road shall not be removed by City forces. Disposal shall be via melting. This includes any debris created at driveways or commercial entrances.

D. Salt/anti-icing/de-icing operations on bridges and overpasses shall begin within two hours prior to the onset of the weather event, at the direction of the Operations Manager/designee, if required and as resources allow.

E. During a declared emergency, vehicles obstructing snow removal and ice control operations shall be either pushed out of the way or shall be towed out of the way at the owner's expense. Requests for towing shall be done through the City Garage.

F. All claims against the City for compensation for damages must be submitted by the claimant in writing to the City of Chesapeake City Attorney.

III. Responsibilities

A. The Operations Manager/designee shall be responsible for all snow removal and ice control activities within the City of Chesapeake. As deemed necessary by the Director of Public Works/designee supplemental staff and equipment shall be provided by other divisions within the Department and other Departments within the City.

B. Line of Succession

1. Director
2. Operations Manager
3. Operations Administrator
4. Operations Superintendent
5. General Supervisor
6. Duty Officer/designee

C. The Operations Manager/designee shall have annual inspections performed on all snow removal and ice control equipment by November to ensure that equipment is in ready condition.

D. Employee contact information shall be updated at the time of the annual inspection

E. The Operations Administrator/designee shall be responsible for ensuring the availability of an adequate supply of salt/anti-icer/de-icer. Anti-icer/salt/de-icer for each field office shall be restocked each October.

F. The Operations Manager/designee shall be responsible for monitoring local weather forecasts and advise staff of potential ice and snowstorms, in coordination with the Office of Emergency Management.

G. All Operations employees are considered ALPHA during an ice/snow emergency event unless advised otherwise by their immediate supervisor. The Operations Administrator/designee shall be responsible for ensuring that all employees are aware of their shift assignment (Shift A or Shift B) status, and the City's policy regarding employees who fail to report to work as directed.

H. After Hours Notification Process for Unforeseen Events and Incidents

1. The Police Dispatcher notifies the Public Works Duty Officer who notifies the Operations Manager/designee in charge of the shift.

2. The Operations Manager/designee notifies the Director, General Supervisors, Public Works Information Specialist, and the Safety Program Manager.

3. The Director notifies Purchasing and Garage.

I. The Operations Administrator/designee shall be responsible for ensuring that employees receive appropriate refresher training prior to November.

J. Personnel Scheduling

1. Unless otherwise advised, assigned crews shall work 12-hour shifts.

2. Route and vehicle assignments shall be completed by the Operations Administrator by November of each year.

3. If deemed necessary by the Operations Manager/designee crews may be pre-positioned throughout the City prior to the arrival of the anticipated storm.

4. When a storm is anticipated during off hours, staff shall be placed on alert.

K. General Supervisors should outfit and operate all snow equipment regularly during snow season for the purposes of training, upkeep, and operational readiness. To the fullest extent practical, this shall be done weekly and such that equipment is ready and available for unforeseen incidents during after working hours and weekends

L. Meal and rest breaks shall be provided at the approval and coordination of the shift supervisor.

M. Vehicle Accidents

1. The Shift Supervisor shall be notified of all vehicle accidents regardless of how minor the accident may be.

2. The Operator or the Supervisor shall notify the Public Works Safety Inspector and Police.

3. If able, the Operator shall secure traffic control around an accident site while waiting for support from Public Works Safety Inspector, Traffic Operations, and/or Police.

4. The vehicle shall not be moved until Police advisement.

5. The Employee shall file an accident report.

N. Personal Injury

1. The Employee shall notify the Supervisor immediately if personal injury occurs.

2. The Employee shall file an injury report.

O. Paperwork

1. Each operator shall be responsible for keeping a work sheet to cover all people working with them, equipment (including box spreader number and plow number), materials, and locations.

2. Operators shall call PWEOC as soon as they load their trucks and are ready to leave their assigned yards, to report the amount of material used, and their completed routes. Operators shall report in at regular intervals with status of route, equipment, and plowing/spreading activity.

3. PWEOC shall have employees staffed to input information into Maximo.

4. Loader operators shall record the amount of material loaded onto each vehicle.

5. Stockroom staff shall monitor and record all material and supplies used.

IV. Salt Procedures

A. Materials Application Guidelines

1. Material application shall be rock salt unless a mix is otherwise determined by Operations Administrator/designee.

2. Box spreader door height adjustment shall be set at 6 inches, unless otherwise directed by Supervisor.

B. Salt Loading Procedures

1. Equipment
   a. Payloaders and backhoes
   b. Excavators
   c. Gradalls
   d. Dump Trucks or Tandems

2. Materials - Salt, salt brine

3. Personnel – One qualified operator per vehicle or piece of equipment; one secondary person as resources allow.

4. Procedure

   a. Stockroom personnel, with the assistance of the payloader, excavator and/or gradall loading operators, shall remove the tarps from the stockpiles.
   b. The loading operator back-drags material to prevent frozen lumps of material in box spreaders.
   c. The loading operator directs the dump truck drivers to exit the vehicle during the loading operation.
   d. The loader operator fills center of box spreader with material. The loading procedures stop when the material is at the top of the spreader hopper.
   e. Vehicle operators shall observe the loading process and help ensure safety and proper loading.
   f. The loading operator honks his horn twice to alert dump truck driver that the loading operation is complete, and they may re-enter their vehicle and proceed to their assigned route.

C. Spreading Procedure – (application of material from back of truck)

1. The vehicle operator shall not exceed the speed limit or maximum safe speed as determined by the operator.

2. Spreading patterns and/or formations shall be as appropriate for each street segment.

3. While on route, if leaving the truck for any reason, employee shall notify supervisor of location.

4. Operator shall notify supervisor when route or bridge spreading is initiated and completed.

5. Area Supervisors/designees shall give a situation report regularly and at least every 2 hours to the Operations Administrator/designee, unless instructed otherwise.

D. Plowing Procedures

1. Plowing operations shall commence when approaching a 2" accumulation of snow or ice unless otherwise directed by supervisor.

2. Prior to plowing, the operator shall check the plow blade and wear shoes as part of the pre-trip inspection and shall take appropriate actions to have any deficiencies corrected. Re-inspection shall be repeated for every two hours of operation.

3. Multi-lane Roads – Generally, plow from the left lane into the right lane to shoulder or curb/gutter. Multi-lane passes shall be performed with one truck per lane plowing the far left lane first unless median strip provides for adequate storage of snow.

4. While on route, if leaving the truck for any reason, employee shall notify supervisor of location.

5. Single lane roads – Generally, plow from left side of road to the right side of road.

6. Bridges – operators shall stop prior to all bridge joints and raise the blade/wear shoes to prevent impacting header walls. Once the wear shoes have crossed the joint the blade/wear shoes may be lowered.

7. Obstructions – Report obstructions to supervisor.

8. Operator shall notify supervisor when route or bridge spreading/plowing/de-icing is completed.

9. Area Supervisors/designees shall give a situation report regularly and at least every 2 hours to the Shift Supervisor, unless instructed otherwise.

10. Post Storm Equipment Clean Up Procedures - The General Supervisors shall be responsible for ensuring that all vehicles used during snow removal and ice control operations are thoroughly cleaned and stored within 24 hours from the completion of operations unless otherwise directed, or unless another storm is anticipated within 24 hours. Only approved wash facilities or locations shall be used.

11. Cost Accounting - At the end of each shift, each operator/driver shall complete a daily work order and promptly submit via supervisor for subsequent input into the work order management system by a work order management call taker.

V. Brine (Anti-Icer) Procedures

A. Brine Application Guidelines

1. Each yard (Greenbrier, Hickory, and Bowers Hill) shall have pre-mixed brine solution stored in a 10,000 gallon tank. All pumps, valves, and piping shall be inspected at the time of the annual equipment inspection.

2. Equipment
    a. Pickup, crew cab truck, dump trucks
    b. Brine tank
    c. Spray bar attachment

3. Personnel – One qualified operator per vehicle.

4. Timing – Brine spray can be applied up to 48-hours in advance of an icing event. Rain occurring between application and the icing event will wash away the solution and lower the effectiveness.

5. Procedure

    a. Load tank on truck and install spray bar. Assure that the tank is strapped down securely in the bed of the truck.
    b. Check operation of remote spray valve prior to filling tank with brine. If valve does not operate properly, complete repairs prior to filling tank.
    c. Fill tank with brine.
    d. Spray assigned bridges. Open valve approximately 50' prior to bridge and spray to far end. Make one pass in each lane maintaining appropriate speed or maximum safe speed. If roadway traffic permits, it may be possible to cover two lanes in one pass.
    e. While on route, if leaving the truck for any reason, employee shall notify supervisor of location.
    f. Operator shall notify supervisor when route or bridge spreading is completed.
    g. Area Supervisors/designees shall give a situation report regularly and at least every 2 hours to the Shift Supervisor, unless instructed otherwise.

12. Post Storm Equipment Clean Up Procedures - The General Supervisors shall be responsible for ensuring that all vehicles used during de-icing operations are thoroughly cleaned within 24 hours from the completion of operations unless otherwise directed, or unless another storm is anticipated within 24 hours. Only approved wash facilities or locations shall be used.

12. Cost Accounting - At the end of each shift, each operator/driver shall complete a daily work order and promptly submit via supervisor for subsequent input into the work order management system by a work order management call taker.

3. STREET MAINTENANCE INSPECTION

Department of Public Works	Chesapeake VIRGINIA	
Directive: Departmental Regulation	Number: 605	
Subject: **Street Maintenance Inspection**	Supersedes: 10/26/18	Next Review: 12/30/24
Approved: for Director of Public Works	Effective Date: 12/30/22 Initiator: Steve Lawson	

I. Purpose

The purpose of this Departmental Regulation is to establish a policy for Street Maintenance Inspection.

II. Policy

All roadway, sidewalk, and curb & gutter infrastructure within the right-of-way shall be inspected by Street Maintenance General Supervisors or Contractual Services Inspectors for structural stability and safety as part of routine maintenance and in response to citizen requests.

III. Criteria

A. Pavement

1. The Pavement Management System consultant periodically inspects and rates all public roadways. The resurfacing schedule is determined by Contractual Services staff with input from Operations and other City departments.

2. The Street Maintenance division receives service requests and/or performs work as noted by the General Supervisor inspection.

3. Contractual Services performs resurfacing or patching where most efficient or beyond the scope of in-house capabilities.

B. Concrete Sidewalks

1. Remove tripping hazards with a 1" vertical separation or greater.
2. Street Maintenance repairs sidewalk that requires demolition and replacement, typically in sidewalk with a trip hazard greater than 2.5".
3. Contractual Services staff administers a contract that eliminates (grinds) trip hazards between 1" and 2.5".
4. All sidewalk handicap ramps must conform with the Americans with Disabilities Act when repair work on ramps or where roadway improvements adjacent to the ramps is performed.

C. Curb and Gutter

1. Cracked curb and gutter
    a. Hairline cracks– no action unless the curbing is still under the defect period.
        i. If under the defect period, developer/contractor shall make repairs.

2. Settled curb and gutter
    a. If settlement is greater than 1 inch in 10 feet as measured along the flow line, the curb and gutter shall be replaced.
    b. If the entire section is settled up to one inch below the edge of pavement, the section of curb and gutter shall be replaced.
    c. Street Maintenance manages these repairs unless done during roadway resurfacing in which Contractual Services administers.

D. Trees and Shrubs

1. All trees and bushes within the right of way shall be located according to the following:
    i. Generally, subdivisions or local streets (face of curb to face of curb measures 30') -10 feet behind the face of the curb
    ii. Generally, collector streets (face of curb to face of curb measures 40') -10 feet behind the face of the curb
    iii. Generally, major streets (4 lanes and greater)-varies, 7.5 – 10 behind the face to the curb
    iv. Sources of locating the right-of-way are the subdivision plats or street plans

2. Visibility Obstruction

    a. Trees and bushes obstructing the view of the motorist at the intersection of streets, or driveways and streets, shall be trimmed at the direction of Public Works Traffic Engineering.

3. Trees

    a. Overhanging limbs shall be trimmed to a height of 14' over pavement.
    b. Trees leaning over 30 degrees shall require evaluation by a certified Arborist or Development & Permits Environmental Coordinator.
    c. Public Works crews shall not remove trees/tree limbs within 10 feet of or hanging over utility lines.

IV. Street Maintenance procedures shall refer to the Maximo job plan.

References: PW Regulation 759: Maintenance Work Where No Easement Exist
PW Regulation 618: Sign Visibility and Vision Clearance

4. PAVEMENT MAINTENANCE

Department of Public Works		Chesapeake VIRGINIA	
Directive:	Departmental Regulation	Number: 609	
Subject:	**Pavement Maintenance**	Supersedes: 08/30/18	Next Review: 06/09/24
Approved: Director of Public Works		Effective Date: 06/09/22 Initiator: Steve Lawson	

I. Purpose

The purpose of this Departmental Regulation is to provide a policy and procedure for pavement maintenance.

II. Policy

It is the policy of the Department of Public Works to ensure that roadways effectively accommodate traffic needs safely and efficiently while extending the life of the infrastructure as determined by available funds in the Budget.

A. Pavement maintenance work is limited to City owned right-of-way exclusive of school properties, municipal properties, and utility cuts made by other agencies unless otherwise directed by the Operations Manager or the Operations Administrator.

B. Emergency potholes, generally classified as those deeper than 6" or that present an immediate danger as determined by PW staff (high volume roads and potholes within wheel paths), shall be temporarily filled or repaired immediately, not to exceed 24 hours.

C. Non-emergency potholes on primary/arterial roadways shall be repaired within 72 hours of notification depending on weather and availability of materials.

D. All other potholes shall be repaired within 14 calendar days of notification, depending on weather and availability of materials.

E. Periodically all public roadways within the City shall be inspected and rated by the pavement management consultant. Annually, staff shall develop the paving

on pavement rankings and available funds. Divisions are to coordinate maintenance activities with the resurfacing schedule. The paving schedule will also be coordinated with other city operating departments and franchise utilities.

III. Criteria

A. Potholes are pavement defects in excess of 3" wide and 1" deep.

B. Distinction must be made between potholes and defects caused by cave-ins or other issues. If a defect is determined to be caused by a cave-in, a temporary patch will be performed as necessary, and the permanent repair will be forwarded to the appropriate division/department.

C. If the road temperature is expected to drop below 32 degrees or in the event of precipitation, hot mix pothole repair operations shall only be performed if there is an immediate safety concern. Emergency repairs using cold mix may be done under any weather conditions.

D. Milling must exceed 1.5" in depth.

E. Pavement cracks ½" or less may be considered for crack sealing.

IV. Procedures

A. By the first week of March, the Operations Administrator/designees shall survey the winter pavement damage, prepare a prioritized list of areas for concentrated pothole repairs, inspect all pavement patching equipment, provide for refresher training to all pavement crewmembers, and obtain required materials and supplies.

B. By the first week of March, the Operations Administrator shall prepare a prioritized list of areas to be crack sealed, coordinate this list with the repaving schedule, inspect all crack seal equipment, provide for refresher training to all pavement repair crewmembers, and obtain required materials and supplies.

C. Pot Hole Repair

1. Personnel

a. Training – The General Supervisors shall ensure that all personnel assigned to pothole repair crews within their assigned work area shall be certified in flagging and trained in pothole repair procedures.

2. Repair Method

a. Square cut, as appropriate
b. Clean
c. Tack
d. Fill/compact
e. Safety and Repair Equipment refer to the Maximo work plan.

D. Crack Sealing

1. Cracks shall be ½" or less to qualify for crack sealing. Crack sealing applications shall be made when the pavement temperature is above 32 degrees.

E. Pavement Milling

a. Personnel
   i. Training – The General Supervisors shall ensure that all personnel assigned to pavement milling crews within their assigned work area shall be certified in flagging and trained in pavement grinding procedures.

b. Safety and Repair Equipment refer to the Maximo work plan.
   i. Materials refer to the Maximo work plan
   ii. Procedure refer to the Maximo work plan

F. Utility Cut/Bad Spot Repair

a. Personnel

   i. Training – The General Supervisors shall ensure that all personnel assigned to utility cut-repair crews within their assigned work area shall be certified in flagging and trained crack sealing procedures.

G. Cost Accounting: Labor, materials, and equipment shall be entered daily into the Maximo system.

Reference Materials: Virginia Work Area Protection Manual, OSHA Regulations

5. STREET SWEEPING

Department of Public Works	Chesapeake VIRGINIA	
Directive: Departmental Regulation	Number: 610	
Subject: Street Sweeping	Supersedes: 08/30/18	Next Review: 06/09/24
Approved:  Director Of Public Works	Effective Date: 06/09/22 Initiator: Steve Lawson	

I. Purpose

The purpose of this Departmental Regulation is to provide a policy and procedures for the City's Street Sweeping program.

II. Policy

A. All primary roadways constructed with curb and gutter shall be swept four to six times per year. Neighborhood streets with curb and gutter shall be swept four times per year based on budget, weather, and equipment availability. Routings shall be based on observation, visibility, and traffic volumes. Citizen requests shall be evaluated on an individual basis and a determination shall be made by the supervisor or his appointed lead person if an unscheduled sweeping is warranted.

B. Sweeping after non-City sponsored special events shall not be performed unless directed by the Director of Public Works.

C. Municipal parking lots are not included in the sweeping schedule unless otherwise directed by the Director/designee.

D. The Street Sweeping Section shall not clean accident debris, hazardous spills/materials, or burned materials unless otherwise directed by the Director/designee.

E. Scheduled work hours for the Street Sweeping staff is 7:00 am to 3:30 pm Monday through Friday. The Division Head/Supervisor may authorize sweeping primary roads Thursday or Friday 10:00pm to Saturday 6:30am.

F. Streets shall be dry swept when air temperature drops below 32 degrees. If dust creates a safety hazard sweeping shall cease until the temperature allows the use of water to control the dust.

G. Crash cushion vehicles shall be utilized when sweeping bridges and overpasses.

H. The Street Sweeping supervisor shall retain manufacturer operating and maintenance instructions on all equipment assigned to the division.

I. Water shall be obtained only from approved sources equipped with backflow preventers (see City Code section 78-58. Protection of city's utilities and Public Utilities Administrative Policy for withdrawal from fire hydrants dated February 10, 1994).

Department of Public Works	Chesapeake VIRGINIA	
Directive: Departmental Regulation	Number: 610	
Subject: Street Sweeping	Supersedes: 08/30/18	Next Review: 06/09/24
Approved:  Director Of Public Works	Effective Date: 06/09/22 Initiator: Steve Lawson	

III. Procedures

A. Sweeper Start Up Procedures

1. Complete pre-trip inspection checklist

2. Check that all brooms are in the up position

3. Start vehicle in accordance with the manufacturer instructions for the specific unit as provided by the Street Sweeping supervisor.

WARNING:

Never sweep up flammable liquids such as gasoline or burned materials.
Never exit cab of sweeper while brooms are turning.
Never use water when air temperature drops below 32 degrees.

B. Sweeper Dumping Procedures

1. Sweeper debris shall be taken to an authorized landfill either directly or by intermediate dump truck with cover.

2. Perform dumping operations in accordance with manufacturer instructions for the specific unit as provided by the Street Sweeping supervisor.

3. Walk around sweeper and dump truck to ensure there is no spillage. If there is spillage, sweep it up using the broom and shovel stored inside street sweeper.

C. Sweeper Wash Out Procedures

1. Washing the sweeper must be done according to the instructions in the owner's manual. If the manual does not require daily cleaning, then the following shall apply. Washing out the sweeper is not mandatory as long as no hydraulic material or other objectionable materials have been swept.

2. Wash out sweeper in accordance with manufacturer instructions for the specific unit as provided by the Street Sweeper supervisor.

3. Washing out procedures shall only be done in the vicinity of an oil/water separator.

D. End of Shift Duties

1. Perform GPS download at the Greenbrier yard if applicable.

2. Park sweeper at designated location.

3. Complete post trip vehicle inspection checklist.

4. Complete daily worksheet.

5. During fall and winter months drain all water from tanks in accordance with manufacturer instructions for the specific unit as provided by the Street Cleaning supervisor.

IV. Sweeping Schedule

Schedule is available from the Street Sweeing Supervisor. A schedule shall be posted on the City of Chesapeake website.

6. SHOULDER MAINTENANCE

Department of Public Works	Chesapeake VIRGINIA	
Directive: Departmental Regulation	Number: 612	
Subject: **Shoulder Maintenance**	Supersedes: 09/07/18	Next Review: 06/09/24
Approved: Director of Public Works	Effective Date: 06/09/22 Initiator: Steve Lawson	

I. Purpose

The purpose of this Departmental Regulation is to establish a policy, procedures, and criteria for shoulder maintenance located within the City's right of way.

II. Policy

A. Shoulder maintenance on primary/arterial roadways shall receive maintenance priority.

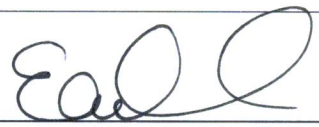
B. Debris shall be removed from the shoulder within two working days of notification. Unsafe conditions shall be marked with cone or barrel promptly upon notification. Removal shall be coordinated between Street Maintenance, Contractual Services, and Waste Management.

C. Reports of obstructions such as basketball goals, skateboard ramps, vehicles for sale, illegal signs, etc. shall be referred to Public Works Customer Service for investigation and resolution.

III. Criteria

A. Shoulder maintenance shall be scheduled when the pavement/shoulder drop off is greater than 4 inches, or when roadway deterioration indicates the need for grading to improve drainage.

B. Asphalt shoulder repair is limited to areas not to exceed 5' x 10'. Areas more than 5' x 10' shall be referred to the Operations Administrator or Operations Manager for review and repair plan.

Department of Public Works		Chesapeake VIRGINIA	
Directive:	Departmental Regulation	Number: 612	
Subject:	**Shoulder Maintenance**	Supersedes: 09/07/18	Next Review: 06/09/24
Approved:  Director of Public Works		Effective Date: 06/09/22 Initiator: Steve Lawson	

IV. Procedures

A. Asphalt Shoulder Repair shall refer to the Maximo work plan.

B. Regrading Shoulders and Removal of Excess Dirt/Gravel (Pulling Shoulder) shall refer to the Maximo work plan.

7. CONCRETE INSTALLATION, REPAIR OR REPLACEMENT

Department of Public Works		Chesapeake VIRGINIA	
Directive:	Departmental Regulation	Number: 613	
Subject:	**Concrete Installation, Repair, or Replacement**	Supersedes: 10/25/18	Next Review: 06/09/24
Approved: Director of Public Works		Effective Date: 06/09/22 Initiator: Steve Lawson	

I. Purpose

The purpose of this Departmental Regulation is to establish policy, criteria, and procedures for the installation, repair, or replacement of concrete structures located within the City's right of way to include sidewalks, curb/gutter, valley gutters, and driveway aprons.

II. Policy

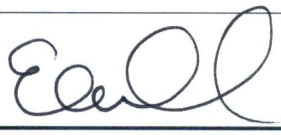
It is the policy of the Department of Public Works that concrete infrastructure installation, repair, or replacement be performed in accordance with the criteria listed in this regulation.

III. Criteria

A. Concrete shall be placed when the air temperature is 40 degrees or higher. Concrete shall not be placed if the temperature is expected to dip below 32 degrees within 24 hours of placing or if heavy rain is expected.

B. Repairs/installation/replacement in excess of 100 linear feet requires the prior approval of the Operations Administrator and/or the Operations Superintendent. Service requests for this work shall be brought to the Operations Superintendent's attention.

C. Refer to Public Works Regulation 605: Street Maintenance Inspection for additional criteria.

Department of Public Works		Chesapeake VIRGINIA	
Directive:	Departmental Regulation	Number: 613	
Subject:	**Concrete Installation, Repair, or Replacement**	Supersedes: 10/25/18	Next Review: 06/09/24
Approved:  Director of Public Works		Effective Date: 06/09/22 Initiator: Steve Lawson	

IV. Concrete installation, repair, and replacement procedures shall refer to Maximo work plan.

8. PEDESTRIAN CROSSWALK PAVEMENT MARKINGS

Department of Public Works	Chesapeake VIRGINIA	
Directive: Departmental Regulation	Number: 614	
Subject: **Pedestrian Crosswalk Pavement Markings**	Supersedes: 10/12/18	Next Review: 01/12/25
Approved: Sam Sawyer for Director of Public Works	Effective Date: 01/12/23 Initiator: Troy Eisenberger	

I. Purpose

The purpose of this Departmental Regulation is to establish a policy and procedures for the placement and characteristics of pedestrian crosswalk pavement markings.

II. Policy

A. Crosswalks shall be installed after review by Traffic Engineering. They are generally installed at high volume signalized intersections with pedestrian push buttons. They are not installed mid-block except under unique circumstances and with approval of the City Engineer. Evaluation of Pedestrian Crossing Accommodations at Unsignalized Locations shall be in accordance with Instructional & Informational Memorandum 5 General Subject: Pavement Markings Signs Pedestrians Number: IIM-TE-384.0.

B. City standard for marking pattern is the continental (or "ladder") style crosswalk with lines parallel to the direction of travel as outlined in Chapter 3B of the MUTCD. Other surfaces (pavers, stamped asphalt, etc.) or patterns to be installed on a case-by-case basis. Crosswalks shall be placed to have the vehicular wheel path avoid the paint markings to the greatest extent practical.

C. In the instance of refreshing existing crosswalk markings, it shall be at the discretion of the Traffic Engineering Division if the pattern of existing markings should be matched, or if the markings should be updated to the continental pattern.

D. The Traffic Engineering Division shall be responsible for identifying and approving the placement of Pedestrian Crosswalk Pavement Markings.

E. Traffic Engineering shall notify Operations, via work order, of the location and all pertinent specifications of the crosswalk.

F. The Traffic Operations General Supervisor shall assign the work order to the pavement marking supervisor.

G. The installation of crosswalks shall be performed in accordance with the Virginia Work Area Protection Manual (VWAPM). The standards of the VWAPM apply to the U.S. Code, Sections 109(b), 109(d), and 402 (a).

H. When possible, crosswalks shall be installed with the least inconvenience to traffic.

III. Criteria

A. Crosswalks that are installed using thermoplastic material must follow the manufactures specifications.

IV. Procedures

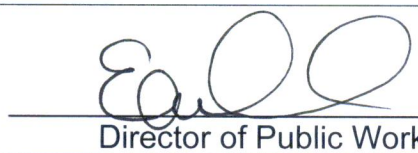
A. Crew shall set up advance warning signs.
B. Lines shall be marked off using either chalk line, or marking paint.
C. Area where material shall be applied is cleaned.
D. Material is applied.
    1. If using liquid, follow "Liquid Thermoplastic" procedure (VDOT Manual for Certification for Pavement Marking).
    2. If using pre-mark, follow "Pre-Fabricated Thermoplastic" procedure (VDOT Manual for Certification for Pavement Marking).

V. Required Resources

A. Equipment and personnel (the equipment and number of personnel needed shall depend largely on the location of the crosswalk).
    1. Thermo kettle truck (if using liquid thermoplastic). One operator.
    2. Pick-up truck for signs and cones. One operator.
    3. Large truck for transporting thermo applicator machines, and material.
    4. Driver and additional personnel (usually 2-3).
    5. Thermo applicator machine (if using liquid).
    6. Crash cushion truck. One operator.

B. Materials
    1. White thermoplastic powder (if using liquid).
    2. Reflective beads (if using liquid).
    3. Propane (for burners in kettles and applicators).
    4. Pre-mark material (8" or 12").
    5. Safety cones (number depends of location of job).
    6. Warning signs. Each approach shall have the following:
        a) "Road Painting Ahead"
        b) "Be Prepared to Stop"
        c) "Flagman Ahead"

9. PAVEMENT MARKINGS

Department of Public Works		Chesapeake VIRGINIA	
Directive:	Departmental Regulation	Number: 615	
Subject:	**Pavement Markings**	Supersedes: 09/07/18	Next Review: 06/09/24
Approved:  Director of Public Works		Effective Date: 06/09/22 Initiator: James Lomogda	

I. Purpose

The purpose of this Departmental Regulation is to establish a policy and procedures for pavement markings to ensure uniform design, position, and application.

II. Policy

The Department of Public Works adheres to the pavement marking standards listed in the Manual on Uniform Traffic Control Devices (MUTCD) and the procedures listed in this Departmental Regulation.

III. Procedures

A. Painting Operations

1. Inform crew of vehicles needed and location of 1st road to be painted.

   a. Vehicles and number of crew needed:

      1) Point truck – (pick-up) 1 person
      2) Paint truck – (T-011) 2 persons
      3) Cone truck – (pick-up) > to set cones out 2 persons
      4) Crash truck – 1 person

      *Note: Three people are to be used on paint truck if work force is available. If work force is not available, then one person must paint centerline and edge line at separate times.
      *Note: Crash trucks are not required be used on roads less than 45 mph.

   b. On two lane roads, a police unit shall be used to stop traffic in one direction until the painting vehicle is able to pull completely off the roadway.

   c. Crew shall put out signs in both directions on road segment to be painted.

   d. Photographs shall be taken of the warning signs along the segment of road being painted and the photos will include street name signs or other landmarks.

e. At least two people shall take the paint truck to the compound to clear water from paint lines and put paint into system. The water tank shall also be checked and filled if needed. All systems shall be checked for proper operational capability.

    1) One Equipment Operator II or above shall be present.

f. Paint operations begin at a speed of no less than 7 mph and no more than 10 mph. Cones shall be put on freshly painted lines at intervals determined by volume and speed of traffic. Cone truck operators assist painter in watching for overspray, lack of beads and vehicles riding in paint. If a vehicle is riding in the paint, either the crash cushion operator, or the person placing cones shall inform driver that the paint is wet.

g. After completion of road, cones and signs shall be picked up (in that order) and signs shall be placed at next location, if another location is scheduled.

h. When painting operations are completed for the day, the painter shall give counter totals to supervisor to be calculated and put on to work order. Crews shall return to the shop to pump paint and beads as needed.

    1) Paint and bead usage calculation

        - Paint – The linear feet of paint is measured automatically by the truck's digital read out and the gallons of paint used is measured by measuring increments in the tank (per specifications)
        - Beads – Beads are measured by the amount of bags added prior to a job

B. Preventive maintenance on equipment is done during times that the weather does not permit painting operations to be performed.

    1. Twice per month, the plumbing system on the paint truck is flushed. *Note: Waste water that is accumulated flushing lines is put into 55 gallon drums and disposed of in the gravity sanitary sewer.

C. All primary roads should be painted once per year and all other roads as needed, depending on paint wear due to volume of traffic.

Related Policies/Regulations:
Manual on Uniform Traffic Control Devices (MUTCD)

10. PAVEMENT CUT RESTORATION

Department of Public Works	Chesapeake VIRGINIA	
Directive: Departmental Regulation	Number: 616	
Subject: Pavement Cut Restoration	Supersedes: 10/25/18	Next Review: 06/14/24
Approved:  Director of Public Works	Effective Date: 06/14/22 Initiator: Steve Lawson	

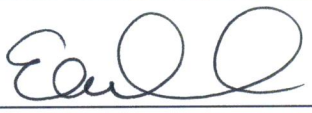
I. Purpose

The purpose of this Departmental Regulation is to establish a policy for pavement cut restoration.

II. Policy

The Department of Public Works pavement cut restoration shall adhere to the standards identified in PFM Vol. II, Sections PC-1 (1of2), PC-1 (2of2), PC-2, PC-3, PC-4.

11. TRAFFIC SIGNS

Department of Public Works	Chesapeake VIRGINIA	
Directive: Departmental Regulation	**Number:** 617	
Subject: **Traffic Signs**	Supersedes: 09/07/18	Next Review: 06/14/24
Approved:  Director of Public Works	Effective Date: 06/14/22 Initiator: James Lomogda	

I. Purpose

The purpose of this Departmental Regulation is to establish a policy for the assembly, installation and maintenance of traffic control signage.

II. Policy

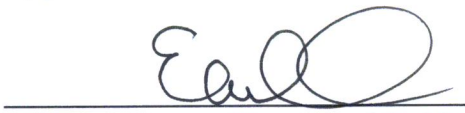
A. The Department of Public Works shall adhere to the regulations within the Federal Manual on Uniform Traffic Control Devices (MUTCD), the Virginia Work Area Protection Manual, Manual on Roads and Bridges and the directives listed in this regulation.
B. Signs shall be assembled, installed and maintained and advertisements removed in accordance to Federal, State and Local statutes.

III. Criteria

A. Signs:
    1. Various Regulatory (stop, speed limit, etc.)
    2. Warning (school, curve, etc.)
    3. Guide and Construction signs
B. Posts:
    1. Wood – 4"x4" post, 6" x 6" post,, etc.
    2. Metal – 2" pipe, 7', 10' and 12' U-channel, angle aluminum, flat aluminum and telspar.
C. Channeling Devices:
    1. Group 1, tubular markers and cones
    2. Group 2, Drums, Vertical Panels, Directional Indicators Barricades and Longitudinal Channelizing Devices
    3. Type 3 Barricades

Related Policies/Regulations: Federal Manual on Uniform Traffic Control Devices (MUTCD), Virginia Work Area Protection Manual, Manual on Roads and Bridges

12. SIGN VISIBILITY AND VISION CLEARANCE

Department of Public Works	Chesapeake VIRGINIA	
Directive: Departmental Regulation	Number: 618	
Subject: **Sign Visibility and Vision Clearance**	Supersedes: 10/12/18	Next Review: 07/26/24
Approved:  Director of Public Works	Effective Date: 07/26/22 Initiator: James Lomogda	

I. Purpose

The purpose of this Departmental Regulation is to establish a policy and procedure for sign visibility and vision clearance.

II. Policy

The Department of Public Works trims tree branches and other vegetation or removes other obstructions from the public right-of-way to allow adequate visibility of traffic control signs and signals by motorists and pedestrians.

A. During regular inspection of signs for maintenance and replacement, visibility of the signs is also checked, and any obstructions are reported to customer service for creation of a work order.
B. During regular maintenance or repairs to traffic signals, the visibility of the signal is also checked, and any obstructions are reported to customer service for creation of a work order.
C. Site visibility shall be determined by Traffic Engineering.

Related Regulations: MUTCD 2009, Section 2A-22, MUTCD Section 2A.22 Maintenance Guidance:
01 Maintenance activities should consider proper position, cleanliness, legibility, and daytime and nighttime visibility (see Section 2A.09). Damaged or deteriorated signs, gates, or object markers should be replaced.
02 To assure adequate maintenance, a schedule for inspecting (both day and night), cleaning, and replacing signs, gates, and object markers should be established. Employees of highway, law enforcement, and other public agencies whose duties require that they travel on the roadways should be encouraged to report any damaged, deteriorated, or obscured signs, gates, or object markers at the first opportunity.
03 Steps should be taken to see that weeds, trees, shrubbery, and construction, maintenance, and utility materials and equipment do not obscure the face of any sign or object marker.

Department of Public Works	Chesapeake VIRGINIA	
Directive: Departmental Regulation	Number: 618	
Subject: **Sign Visibility and Vision Clearance**	Supersedes: 10/12/18	Next Review: 07/26/24
Approved:  Director of Public Works	Effective Date: 07/26/22 Initiator: James Lomogda	

III. Procedure

When obstructions to visibility of signs or signals are noted, the following steps are taken:

A. Assess the size and location to determine if the base is located on public or private property.

B. If located on private property, the owner is contacted via written request prior to clearing the obstruction.

C. Foliage and small limbs located in the public right-of-way are cleared by Traffic Operations. If the removal of trees is necessary, coordinate with Street Maintenance for removal.

13. DRAINAGE INFRASTRUCTURE MANAGEMENT

Department of Public Works		Chesapeake VIRGINIA	
Directive:	Departmental Regulation	Number: 755	
Subject:	**Drainage Infrastructure Management**	Supersedes: 10/30/18	Next Review: 07/26/24
Approved: Director of Public Works		Effective Date: 07/26/22 Initiator: Steve Lawson	

I. Purpose

The purpose of this Departmental Regulation is to establish policy and procedures to manage the City's street drainage infrastructure.

II. Policy

A. Public Works shall maintain the open and closed drainage systems within the City's rights of way and easements to provide for the original design capacity to the extent possible.

B. Open systems are defined as roadside ditches, lead or perimeter ditches within rights of way, or existing easements. Closed systems include inlet structures, manholes, catch basins, pipes, and culverts.

C. Public lakes and ponds that serve as holding facilities to temporarily store and gradually release stormwater shall be maintained to provide for positive flow. The maintenance activities shall be limited to the outfall structures. All other maintenance work such as mowing and bank restoration shall be the property owner's responsibility. Public Works is not responsible for dredging of recreational or navigational purposes.

D. The placement of new driveway culverts or the extension of existing driveway culverts is the responsibility of the property owner. The property owner must obtain a permit from the Department of Development and Permits, prior to installing new culverts or extending existing culverts.

Related Regulations: City of Chesapeake City Code Chapter 26, Article VIII.

III. Procedures

A. Cave Ins or Structural Repairs

1. Securing and/or filling cave-ins or structures, when necessary, shall be performed within twenty-four (24) hours of receiving the report. Securing may consist of placing cones, barrels, safety signs, safety fencing, or filling the location with dirt and/or crusher run.

2. A Maximo Log Entry Form for each cave-in and/or structure noting the pipe or structure material, pipe diameter, invert depth, number of cave-ins, type of structure, number of pictures taken (there should at least be two showing the structure & street view), location of the cave in, and whether asphalt, concrete, curb & gutter, or driveway apron repairs will be needed. The estimated amount of and material for asphalt, concrete, curb & gutter, and driveway apron repairs will also be provided.

3. Any structure that needs to be immediately repaired (broken basin tops, broken brickwork, etc.) because it is a danger to the public and/or vehicles shall be addressed as soon as possible.

B. Cave Ins – To Be Repaired by City Crews

1. If the cave-in is caused by a separation of less than four (4) inches between pipe joints, a brick collar shall be placed around the pipe, filter fabric shall be placed around the separated joint, and the area shall be backfilled. Separations greater than four (4) inches shall require the separated pipe joints be re-laid or replaced.

2. If the pipe is large enough to crawl into, Stormwater crews may choose to perform the repair by placing mortar on the damaged section from inside the pipe. Confined space entry procedures MUST be followed for this type of repair.

3. If the pipe or culvert repair requires pavement to be removed, crews shall backfill and compact the repair area with select fill and/or crusher run in compacted six (6) inch lifts so that the final grade is between one (1) and one and half (1 ½) below the adjacent pavement edges.

4. It shall be the responsibility of the General Supervisor (in charge of the job) to provide the size of the repair in length, width, and depth on the Maximo work order used for the job.

5. If the pipe or culvert repair is made in an unpaved area, crews shall restore the area by compacting the sub-grade fill in six (6) inch lifts and placing at least two (2) inches of topsoil. The topsoil shall be seeded and stabilized with straw, jute mesh, or other landscaping measures to reduce the likelihood of erosion, while the grass seed germinates and becomes established.

6. It will NOT be the responsibility of city crews to replace illegally placed fencing, sprinkler systems, or other landscape features located in the city drainage easement or right-of-way. The Stormwater Superintendent or the General Supervisor (in charge of the job) shall leave a door hanger advising the citizen that the item (fence, bush, etc.) will be removed and not replaced.

C. Updating Inventory & GIS – Stormwater Structures

1. Discrepancies in inventory information noted during repair work shall be provided to the Operations GIS Analyst for updating the system.

2. As part of a continual updating of the Stormwater structures and information in Arc GIS, the structures throughout the city (catch basins, manholes, drop inlets, junction boxes, pipes, etc.) shall be inspected (by either pole camera or CCTV truck) every six (6) to eight (8) years.

3. During the investigation, crews shall annotate the pipe size, depth, structural material, any conflicts, flow direction, etc. A still picture and/or video shall be taken to capture the condition of the structure and pipe.

D. Cave Ins – To Be Repaired by A Contractor

1. If the cave-in and/or structure repair work is given to an outside contractor, Contractual Services shall add the information to the contractor's spreadsheet located in Sharepoint.

2. The following conditions must be met in order to assign the work to a contractor:

    - Extensive or complicated confined space entry shall be needed.
    - Major reconstruction of structure walls or basin is needed.
    - A long stretch of pipe, more than one hundred (100) feet, with a diameter greater than twelve (12) inches, shall need to be slip-lined.
    - There are multiple cave-ins along a stretch of pipe.
    - Cave in(s) are located under a high-volume roadway (i.e., Battlefield Blvd, Greenbrier Parkway, etc.).

E. Plans or Requests for New Pipes or Structures

1. Any plans and/or requests for new pipes and/or structures are requested through the Drainage Engineer's Office or other city department.

F. Pipe washing Requests

1. When a report of a clogged structure (catch basin, drop inlet, driveway pipe, etc.) is received, crews shall schedule a pipe washer to respond.
2. If there is a flooding situation due to a heavy rain event and a structure is suspected of being blocked, a pipe washer shall be dispatched immediately.
3. Pipe washers may be scheduled at the request of the CCTVing crew to flush a pipe thereby allowing them to TV the pipe and/or structure, or by the cave-in crew to flush a basin or pipe to assist with cave-in repairs.

G. Ditches

1. Once an investigation is completed, a work order is assigned to a General Supervisor.
2. There are various types of ditch work that can take place – cleaning & clearing (blockage removal), regrading (small area or large area), and erosion repairs. The location – concrete or earthen ditch, wetlands area, stretch of road needing traffic control – will have an impact on what type of work may be performed and when it should be scheduled (e.g. - some ditch cleaning must be scheduled when school is out).

3. City crews are not responsible for removing leaf and lawn debris that is placed or has fallen into the ditches, unless there is a blockage causing flooding or the ditch is over three (3) feet deep. Citizens shall be responsible for removing leaves and other debris (lawn clippings, etc.) that may be blocking ditches that are three (3) feet and under.

4. Lead ditch cleaning shall be performed in compliance with the MS-4 permit. A list of the lead ditches that have been cleaned, the date, and the date of the next cleaning shall be maintained. A map showing the ditch to be cleaned, along with any pertinent information (easements, wetlands, etc.) shall be attached to the Maximo work order.

5. Roadside ditches on a preventive maintenance schedule shall be cleaned in compliance with the MS-4 permit, depending on the backlog of work orders.

H. Citizen Requests – Driveway Pipes & Piping in Ditches

1. A property owner wishing to install a new driveway pipe or extend an existing driveway pipe within the city right-of-way or drainage easement abutting their property, shall be responsible for obtaining a permit from the Department of Development & Permits and for purchasing and installing the pipe in accordance with the permit.

2. Any public or private utility work required, for or resulting from, the pipe or culvert work shall be paid for by the property owner. Replacement pipes must be the same material, sized equal to, or greater than, the existing culvert.

3. A property owner wishing to pipe a ditch that carries public water shall obtain a permit from the Department of Development & Permits. The design for the piping and structures shall conform to the City's Public Facilities Manual and be approved by the Public Works Engineering Division. The property owner shall be responsible for purchasing and installing the piping and structures, in accordance with the approved design. Any public or private utility work required for, or resulting from, the pipe or culvert work shall be paid for by the property owner.

CHESAPEAKE
RIGHT OF WAY MAINTENANCE MANUAL

Public Works Department
Operations and Maintenance Division

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1. INTRODUCTION

City of Chesapeake (CoC) employees have an obligation to the residents and visitors of the City of Chesapeake to maintain the transportation system for the safe movement of the traveling public by implementing and following a maintenance program.

The goal of this manual is to provide maintenance employees with a centralized document that provides the necessary guidance on how to conduct various activities, the resources to use, and the specific targets to achieve.

1.1 Background Information

1.1.1 This manual collates Department of Public Works Departmental Regulations into a singular document to serve as a quick and easy to understand reference.

1.2 Purpose of the City of Chesapeake Right of Way Maintenance Manual

1.2.1 The purpose of this manual is to provide CoC employees with the necessary information to perform their responsibilities in conductingvarious activities safely, effectively, and efficiently.

1.2.2 These regulations provide clear purpose and policy in addition to the procedures necessary to provide a safe transportation system. Associated regulations are included to provide source references.

1.2.3 It is important to note, maintenance activities are location specific and environmental conditions throughout the City vary greatly. With the high degree of variability, the following guidelines may not always address specific needs. In these instances, the supervisor or other tasked CoC personnel have the experience and flexibility to utilize the information in this manual appropriately.

1.2.4 As indicated in the following regulations, this manual is not to be used singularly, rather this manual shall be used in conjunction with the referenced related policies/regulations

1.3 Regulation Template

1.3.1 The Regulations that follow are in a specific template format to ensure consistency and ease of comprehension.

A. The purpose of the regulation is stated to clarify the Regulation Subject.

B. The Policy clearly states the limits of the regulation to ensure all CoC personnel have complete understanding of the associated tasks. The Policy maximizes effectiveness by eliminating potential scope creep.

C. Procedures are clearly defined for each subsection of the Policy to ensure consistency of work.

1.4 Regulations Guidelines for Identified Programs

1.4.1 Regulations Guidelines including Purpose, Policy, Procedures and Related Policies/Regulations have been prepared for the following maintenance operations within a consistent adopted Template.

A. Snow Removal and Ice Control: The Department shall restore and maintain identified snow route roadways during snow and ice weather.

B. Street Maintenance Inspection: The Department shall ensure all right of way infrastructure is inspected for structural stability and safety as part of routine maintenance and in response to citizens.

C. Pavement Maintenance: The Department shall make every reasonable effort to effectively accommodate the traffic needs safely and efficiently while extending the life of the infrastructure as determined by available funds in the City's Budget. The City's Pavement Management System optimizes available funding and takes into account measured pavement ratings, rate of pavement deterioration and traffic volumes when prioritizing resurfacing. In addition, citizens can utilize the Customer Contact Center via phone or email to report any pavement issues.

D. Street Sweeping: The Department shall maintain roadway surfaces by sweeping. Neighborhood streets shall be swept four times per year based on budget, weather and equipment availability. Updates to the sweeping schedule are provided at: https://www.cityofchesapeake.net/1022/Street-Sweeping-Operations

E. Shoulder Maintenance: The Department shall prioritize the maintenance of primary/arterial shoulders. Customer Service shall provide citizen reports to City Staff for removal within two working days of notification. In addition, the City assesses shoulder maintenance in conjunction with pavement maintenance when applicable so that crews work as efficiently as possible.

F. Concrete Installation, Repair or Replacement: Concrete infrastructure such as: sidewalk, curb and gutter, valley gutter and driveway aprons, etc shall be installed/repaired/replaced in accordance with the various criteria in the regulation.

G. Pedestrian Crosswalk Pavement Markings: Pedestrian crosswalk

markings shall generally be installed at high volume intersections and not at mid-block unless under unique circumstances. In addition, citizens can utilize the Customer Contact Center via phone or email to report any pavement marking issues.

H. Pavement Markings: The Department shall reference the Manual on Uniform Traffic Control Devices for installation and Procedures within this regulation for CoC crew support. In addition, citizens can utilize the Customer Contact Center via phone or email to report any pavement marking issues.

I. Pavement Cut Restoration: The Department shall reference the Public Facilities Manual for all policies and procedures.

J. Traffic Signs: The Department shall reference the Manual on Uniform Traffic Control Devices, the Virginia Work Area Protection Manual, Manual on Roads and Bridges and the directives listed in the regulation with respect to the assembly, installation and maintenance of right of way signage. In addition, citizens can utilize the Customer Contact Center via phone or email to report any issues with traffic signs.

K. Sign Visibility and Vision Clearance: The Department shall reference the Manual on Uniform Traffic Control Devices for guidance on trimming vegetation and removal of obstructions from the right of way to allow for adequate visibility of traffic control signs.

L. Drainage Infrastructure Management: The Department shall maintain the open and closed drainage systems with the City's right of way and public easements to provide for the original design capacity to the greatest extent possible.

1.5 Roles and Responsibilities

1.5.1 The objective of all Public Works Operations personnel is to operate and maintain the City's right of way and public easements in order to meet the transportation needs of the City. This is done through timely and fiscally responsible delivery of services.

1.6 Environmental Compliance

1.6.1 It is imperative that CoC Operations personnel comply with established agency policies and guidance regarding environmental protection. Environmental compliance is included in Departmental Regulation Number 508 and is provided in this document.

1.7 Maintenance Regulation Desired Frequency

1.7.1 As mentioned in Section 1.2, the high degree of variability associated with City of Chesapeake rights of way makes adherence to rigid maintenance scheduling difficult. At a minimum, Public Works inspects every facet of its right of way system every two years and updates the Pavement Management System accordingly. In addition, Public Works values feedback from the citizens and further updates the Pavement Management System as needed based on reports to the Customer Contact Center. As such, Public Works Operations Staff have, over several decades, crafted Departmental Regulations and other maintenance policies to provide for a highly dynamic process that is constantly updated due to inter-departmental checks and balances. The Departmental Requlations are listed as follows:

2. SNOW REMOVAL AND ICE CONTROL

Department of Public Works	Chesapeake VIRGINIA	
Directive: Departmental Regulation	Number: 604	
Subject: Snow Removal and Ice Control	Supersedes: 10/25/18	Next Review: 04/05/24
Approved: Director of Public Works	Effective Date: 04/05/22 Initiator: Ross Brockwell	

I. Purpose

The purpose of this Departmental Regulation is to provide a policy and procedures for restoring and maintaining the identified snow route roadways within the City of Chesapeake during snow and ice weather events.

II. Policy

A. The Department of Public Works is responsible for snow removal and ice control on primary roads, secondary roads, bridges, and overpasses. Roads are designated in the snow plan as emergency, primary, secondary, and connector.

B. Local or residential streets shall not receive snow removal and ice control unless otherwise directed by the Director/designee.

C. Snow pushed to the side of the road shall not be removed by City forces. Disposal shall be via melting. This includes any debris created at driveways or commercial entrances.

D. Salt/anti-icing/de-icing operations on bridges and overpasses shall begin within two hours prior to the onset of the weather event, at the direction of the Operations Manager/designee, if required and as resources allow.

E. During a declared emergency, vehicles obstructing snow removal and ice control operations shall be either pushed out of the way or shall be towed out of the way at the owner's expense. Requests for towing shall be done through the City Garage.

F. All claims against the City for compensation for damages must be submitted by the claimant in writing to the City of Chesapeake City Attorney.

III. Responsibilities

A. The Operations Manager/designee shall be responsible for all snow removal and ice control activities within the City of Chesapeake. As deemed necessary by the Director of Public Works/designee supplemental staff and equipment shall be provided by other divisions within the Department and other Departments within the City.

B. Line of Succession

1. Director
2. Operations Manager
3. Operations Administrator
4. Operations Superintendent
5. General Supervisor
6. Duty Officer/designee

C. The Operations Manager/designee shall have annual inspections performed on all snow removal and ice control equipment by November to ensure that equipment is in ready condition.

D. Employee contact information shall be updated at the time of the annual inspection

E. The Operations Administrator/designee shall be responsible for ensuring the availability of an adequate supply of salt/anti-icer/de-icer. Anti-icer/salt/de-icer for each field office shall be restocked each October.

F. The Operations Manager/designee shall be responsible for monitoring local weather forecasts and advise staff of potential ice and snowstorms, in coordination with the Office of Emergency Management.

G. All Operations employees are considered ALPHA during an ice/snow emergency event unless advised otherwise by their immediate supervisor. The Operations Administrator/designee shall be responsible for ensuring that all employees are aware of their shift assignment (Shift A or Shift B) status, and the City's policy regarding employees who fail to report to work as directed.

H. After Hours Notification Process for Unforeseen Events and Incidents

1. The Police Dispatcher notifies the Public Works Duty Officer who notifies the Operations Manager/designee in charge of the shift.

2. The Operations Manager/designee notifies the Director, General Supervisors, Public Works Information Specialist, and the Safety Program Manager.

3. The Director notifies Purchasing and Garage.

I. The Operations Administrator/designee shall be responsible for ensuring that employees receive appropriate refresher training prior to November.

J. Personnel Scheduling

1. Unless otherwise advised, assigned crews shall work 12-hour shifts.

2. Route and vehicle assignments shall be completed by the Operations Administrator by November of each year.

3. If deemed necessary by the Operations Manager/designee crews may be pre-positioned throughout the City prior to the arrival of the anticipated storm.

4. When a storm is anticipated during off hours, staff shall be placed on alert.

K. General Supervisors should outfit and operate all snow equipment regularly during snow season for the purposes of training, upkeep, and operational readiness. To the fullest extent practical, this shall be done weekly and such that equipment is ready and available for unforeseen incidents during after working hours and weekends

L. Meal and rest breaks shall be provided at the approval and coordination of the shift supervisor.

M. Vehicle Accidents

1. The Shift Supervisor shall be notified of all vehicle accidents regardless of how minor the accident may be.

2. The Operator or the Supervisor shall notify the Public Works Safety Inspector and Police.

3. If able, the Operator shall secure traffic control around an accident site while waiting for support from Public Works Safety Inspector, Traffic Operations, and/or Police.

4. The vehicle shall not be moved until Police advisement.

5. The Employee shall file an accident report.

N. Personal Injury

1. The Employee shall notify the Supervisor immediately if personal injury occurs.

2. The Employee shall file an injury report.

O. Paperwork

1. Each operator shall be responsible for keeping a work sheet to cover all people working with them, equipment (including box spreader number and plow number), materials, and locations.

2. Operators shall call PWEOC as soon as they load their trucks and are ready to leave their assigned yards, to report the amount of material used, and their completed routes. Operators shall report in at regular intervals with status of route, equipment, and plowing/spreading activity.

3. PWEOC shall have employees staffed to input information into Maximo.

4. Loader operators shall record the amount of material loaded onto each vehicle.

5. Stockroom staff shall monitor and record all material and supplies used.

IV. Salt Procedures

A. Materials Application Guidelines

1. Material application shall be rock salt unless a mix is otherwise determined by Operations Administrator/designee.

2. Box spreader door height adjustment shall be set at 6 inches, unless otherwise directed by Supervisor.

B. Salt Loading Procedures

1. Equipment
   a. Payloaders and backhoes
   b. Excavators
   c. Gradalls
   d. Dump Trucks or Tandems

2. Materials - Salt, salt brine

3. Personnel – One qualified operator per vehicle or piece of equipment; one secondary person as resources allow.

4. Procedure

   a. Stockroom personnel, with the assistance of the payloader, excavator and/or gradall loading operators, shall remove the tarps from the stockpiles.
   b. The loading operator back-drags material to prevent frozen lumps of material in box spreaders.
   c. The loading operator directs the dump truck drivers to exit the vehicle during the loading operation.
   d. The loader operator fills center of box spreader with material. The loading procedures stop when the material is at the top of the spreader hopper.
   e. Vehicle operators shall observe the loading process and help ensure safety and proper loading.
   f. The loading operator honks his horn twice to alert dump truck driver that the loading operation is complete, and they may re-enter their vehicle and proceed to their assigned route.

C. Spreading Procedure – (application of material from back of truck)

1. The vehicle operator shall not exceed the speed limit or maximum safe speed as determined by the operator.

2. Spreading patterns and/or formations shall be as appropriate for each street segment.

3. While on route, if leaving the truck for any reason, employee shall notify supervisor of location.

4. Operator shall notify supervisor when route or bridge spreading is initiated and completed.

5. Area Supervisors/designees shall give a situation report regularly and at least every 2 hours to the Operations Administrator/designee, unless instructed otherwise.

D. Plowing Procedures

1. Plowing operations shall commence when approaching a 2" accumulation of snow or ice unless otherwise directed by supervisor.

2. Prior to plowing, the operator shall check the plow blade and wear shoes as part of the pre-trip inspection and shall take appropriate actions to have any deficiencies corrected. Re-inspection shall be repeated for every two hours of operation.

3. Multi-lane Roads – Generally, plow from the left lane into the right lane to shoulder or curb/gutter. Multi-lane passes shall be performed with one truck per lane plowing the far left lane first unless median strip provides for adequate storage of snow.

4. While on route, if leaving the truck for any reason, employee shall notify supervisor of location.

5. Single lane roads – Generally, plow from left side of road to the right side of road.

6. Bridges – operators shall stop prior to all bridge joints and raise the blade/wear shoes to prevent impacting header walls. Once the wear shoes have crossed the joint the blade/wear shoes may be lowered.

7. Obstructions – Report obstructions to supervisor.

8. Operator shall notify supervisor when route or bridge spreading/plowing/de-icing is completed.

9. Area Supervisors/designees shall give a situation report regularly and at least every 2 hours to the Shift Supervisor, unless instructed otherwise.

10. Post Storm Equipment Clean Up Procedures - The General Supervisors shall be responsible for ensuring that all vehicles used during snow removal and ice control operations are thoroughly cleaned and stored within 24 hours from the completion of operations unless otherwise directed, or unless another storm is anticipated within 24 hours. Only approved wash facilities or locations shall be used.

11. Cost Accounting - At the end of each shift, each operator/driver shall complete a daily work order and promptly submit via supervisor for subsequent input into the work order management system by a work order management call taker.

V. Brine (Anti-Icer) Procedures

A. Brine Application Guidelines

1. Each yard (Greenbrier, Hickory, and Bowers Hill) shall have pre-mixed brine solution stored in a 10,000 gallon tank. All pumps, valves, and piping shall be inspected at the time of the annual equipment inspection.

2. Equipment
    a. Pickup, crew cab truck, dump trucks
    b. Brine tank
    c. Spray bar attachment

3. Personnel – One qualified operator per vehicle.

4. Timing – Brine spray can be applied up to 48-hours in advance of an icing event. Rain occurring between application and the icing event will wash away the solution and lower the effectiveness.

5. Procedure

    a. Load tank on truck and install spray bar. Assure that the tank is strapped down securely in the bed of the truck.
    b. Check operation of remote spray valve prior to filling tank with brine. If valve does not operate properly, complete repairs prior to filling tank.
    c. Fill tank with brine.
    d. Spray assigned bridges. Open valve approximately 50' prior to bridge and spray to far end. Make one pass in each lane maintaining appropriate speed or maximum safe speed. If roadway traffic permits, it may be possible to cover two lanes in one pass.
    e. While on route, if leaving the truck for any reason, employee shall notify supervisor of location.
    f. Operator shall notify supervisor when route or bridge spreading is completed.
    g. Area Supervisors/designees shall give a situation report regularly and at least every 2 hours to the Shift Supervisor, unless instructed otherwise.

12. Post Storm Equipment Clean Up Procedures - The General Supervisors shall be responsible for ensuring that all vehicles used during de-icing operations are thoroughly cleaned within 24 hours from the completion of operations unless otherwise directed, or unless another storm is anticipated within 24 hours. Only approved wash facilities or locations shall be used.

12. Cost Accounting - At the end of each shift, each operator/driver shall complete a daily work order and promptly submit via supervisor for subsequent input into the work order management system by a work order management call taker.

3. STREET MAINTENANCE INSPECTION

Department of Public Works	Chesapeake VIRGINIA	
Directive: Departmental Regulation	Number: 605	
Subject: **Street Maintenance Inspection**	Supersedes: 10/26/18	Next Review: 12/30/24
Approved: for Director of Public Works	Effective Date: 12/30/22 Initiator: Steve Lawson	

I. Purpose

The purpose of this Departmental Regulation is to establish a policy for Street Maintenance Inspection.

II. Policy

All roadway, sidewalk, and curb & gutter infrastructure within the right-of-way shall be inspected by Street Maintenance General Supervisors or Contractual Services Inspectors for structural stability and safety as part of routine maintenance and in response to citizen requests.

III. Criteria

A. Pavement

1. The Pavement Management System consultant periodically inspects and rates all public roadways. The resurfacing schedule is determined by Contractual Services staff with input from Operations and other City departments.

2. The Street Maintenance division receives service requests and/or performs work as noted by the General Supervisor inspection.

3. Contractual Services performs resurfacing or patching where most efficient or beyond the scope of in-house capabilities.

B. Concrete Sidewalks

1. Remove tripping hazards with a 1" vertical separation or greater.
2. Street Maintenance repairs sidewalk that requires demolition and replacement, typically in sidewalk with a trip hazard greater than 2.5".
3. Contractual Services staff administers a contract that eliminates (grinds) trip hazards between 1" and 2.5".
4. All sidewalk handicap ramps must conform with the Americans with Disabilities Act when repair work on ramps or where roadway improvements adjacent to the ramps is performed.

C. Curb and Gutter

1. Cracked curb and gutter
    a. Hairline cracks– no action unless the curbing is still under the defect period.
        i. If under the defect period, developer/contractor shall make repairs.

2. Settled curb and gutter
    a. If settlement is greater than 1 inch in 10 feet as measured along the flow line, the curb and gutter shall be replaced.
    b. If the entire section is settled up to one inch below the edge of pavement, the section of curb and gutter shall be replaced.
    c. Street Maintenance manages these repairs unless done during roadway resurfacing in which Contractual Services administers.

D. Trees and Shrubs

1. All trees and bushes within the right of way shall be located according to the following:
    i. Generally, subdivisions or local streets (face of curb to face of curb measures 30') -10 feet behind the face of the curb
    ii. Generally, collector streets (face of curb to face of curb measures 40') -10 feet behind the face of the curb
    iii. Generally, major streets (4 lanes and greater)-varies, 7.5 – 10 behind the face to the curb
    iv. Sources of locating the right-of-way are the subdivision plats or street plans

2. Visibility Obstruction

    a. Trees and bushes obstructing the view of the motorist at the intersection of streets, or driveways and streets, shall be trimmed at the direction of Public Works Traffic Engineering.

3. Trees

    a. Overhanging limbs shall be trimmed to a height of 14' over pavement.
    b. Trees leaning over 30 degrees shall require evaluation by a certified Arborist or Development & Permits Environmental Coordinator.
    c. Public Works crews shall not remove trees/tree limbs within 10 feet of or hanging over utility lines.

IV. Street Maintenance procedures shall refer to the Maximo job plan.

References: PW Regulation 759: Maintenance Work Where No Easement Exist
PW Regulation 618: Sign Visibility and Vision Clearance

4. PAVEMENT MAINTENANCE

Department of Public Works		Chesapeake VIRGINIA	
Directive:	Departmental Regulation	Number: 609	
Subject:	**Pavement Maintenance**	Supersedes: 08/30/18	Next Review: 06/09/24
Approved: Director of Public Works		Effective Date: 06/09/22 Initiator: Steve Lawson	

I. Purpose

The purpose of this Departmental Regulation is to provide a policy and procedure for pavement maintenance.

II. Policy

It is the policy of the Department of Public Works to ensure that roadways effectively accommodate traffic needs safely and efficiently while extending the life of the infrastructure as determined by available funds in the Budget.

A. Pavement maintenance work is limited to City owned right-of-way exclusive of school properties, municipal properties, and utility cuts made by other agencies unless otherwise directed by the Operations Manager or the Operations Administrator.

B. Emergency potholes, generally classified as those deeper than 6" or that present an immediate danger as determined by PW staff (high volume roads and potholes within wheel paths), shall be temporarily filled or repaired immediately, not to exceed 24 hours.

C. Non-emergency potholes on primary/arterial roadways shall be repaired within 72 hours of notification depending on weather and availability of materials.

D. All other potholes shall be repaired within 14 calendar days of notification, depending on weather and availability of materials.

E. Periodically all public roadways within the City shall be inspected and rated by the pavement management consultant. Annually, staff shall develop the paving

on pavement rankings and available funds. Divisions are to coordinate maintenance activities with the resurfacing schedule. The paving schedule will also be coordinated with other city operating departments and franchise utilities.

III. Criteria

A. Potholes are pavement defects in excess of 3" wide and 1" deep.

B. Distinction must be made between potholes and defects caused by cave-ins or other issues. If a defect is determined to be caused by a cave-in, a temporary patch will be performed as necessary, and the permanent repair will be forwarded to the appropriate division/department.

C. If the road temperature is expected to drop below 32 degrees or in the event of precipitation, hot mix pothole repair operations shall only be performed if there is an immediate safety concern. Emergency repairs using cold mix may be done under any weather conditions.

D. Milling must exceed 1.5" in depth.

E. Pavement cracks ½" or less may be considered for crack sealing.

IV. Procedures

A. By the first week of March, the Operations Administrator/designees shall survey the winter pavement damage, prepare a prioritized list of areas for concentrated pothole repairs, inspect all pavement patching equipment, provide for refresher training to all pavement crewmembers, and obtain required materials and supplies.

B. By the first week of March, the Operations Administrator shall prepare a prioritized list of areas to be crack sealed, coordinate this list with the repaving schedule, inspect all crack seal equipment, provide for refresher training to all pavement repair crewmembers, and obtain required materials and supplies.

C. Pot Hole Repair

1. Personnel

a. Training – The General Supervisors shall ensure that all personnel assigned to pothole repair crews within their assigned work area shall be certified in flagging and trained in pothole repair procedures.

2. Repair Method

a. Square cut, as appropriate
b. Clean
c. Tack
d. Fill/compact
e. Safety and Repair Equipment refer to the Maximo work plan.

D. Crack Sealing

1. Cracks shall be ½" or less to qualify for crack sealing. Crack sealing applications shall be made when the pavement temperature is above 32 degrees.

E. Pavement Milling

a. Personnel
   i. Training – The General Supervisors shall ensure that all personnel assigned to pavement milling crews within their assigned work area shall be certified in flagging and trained in pavement grinding procedures.

b. Safety and Repair Equipment refer to the Maximo work plan.
   i. Materials refer to the Maximo work plan
   ii. Procedure refer to the Maximo work plan

F. Utility Cut/Bad Spot Repair

a. Personnel

   i. Training – The General Supervisors shall ensure that all personnel assigned to utility cut-repair crews within their assigned work area shall be certified in flagging and trained crack sealing procedures.

G. Cost Accounting: Labor, materials, and equipment shall be entered daily into the Maximo system.

Reference Materials: Virginia Work Area Protection Manual, OSHA Regulations

5. STREET SWEEPING

Department of Public Works	Chesapeake VIRGINIA	
Directive: Departmental Regulation	Number: 610	
Subject: Street Sweeping	Supersedes: 08/30/18	Next Review: 06/09/24
Approved:  Director Of Public Works	Effective Date: 06/09/22 Initiator: Steve Lawson	

I. Purpose

The purpose of this Departmental Regulation is to provide a policy and procedures for the City's Street Sweeping program.

II. Policy

A. All primary roadways constructed with curb and gutter shall be swept four to six times per year. Neighborhood streets with curb and gutter shall be swept four times per year based on budget, weather, and equipment availability. Routings shall be based on observation, visibility, and traffic volumes. Citizen requests shall be evaluated on an individual basis and a determination shall be made by the supervisor or his appointed lead person if an unscheduled sweeping is warranted.

B. Sweeping after non-City sponsored special events shall not be performed unless directed by the Director of Public Works.

C. Municipal parking lots are not included in the sweeping schedule unless otherwise directed by the Director/designee.

D. The Street Sweeping Section shall not clean accident debris, hazardous spills/materials, or burned materials unless otherwise directed by the Director/designee.

E. Scheduled work hours for the Street Sweeping staff is 7:00 am to 3:30 pm Monday through Friday. The Division Head/Supervisor may authorize sweeping primary roads Thursday or Friday 10:00pm to Saturday 6:30am.

F. Streets shall be dry swept when air temperature drops below 32 degrees. If dust creates a safety hazard sweeping shall cease until the temperature allows the use of water to control the dust.

G. Crash cushion vehicles shall be utilized when sweeping bridges and overpasses.

H. The Street Sweeping supervisor shall retain manufacturer operating and maintenance instructions on all equipment assigned to the division.

I. Water shall be obtained only from approved sources equipped with backflow preventers (see City Code section 78-58. Protection of city's utilities and Public Utilities Administrative Policy for withdrawal from fire hydrants dated February 10, 1994).

Department of Public Works	Chesapeake VIRGINIA	
Directive: Departmental Regulation	Number: 610	
Subject: Street Sweeping	Supersedes: 08/30/18	Next Review: 06/09/24
Approved:  Director Of Public Works	Effective Date: 06/09/22 Initiator: Steve Lawson	

III. Procedures

A. Sweeper Start Up Procedures

1. Complete pre-trip inspection checklist

2. Check that all brooms are in the up position

3. Start vehicle in accordance with the manufacturer instructions for the specific unit as provided by the Street Sweeping supervisor.

WARNING:

Never sweep up flammable liquids such as gasoline or burned materials.
Never exit cab of sweeper while brooms are turning.
Never use water when air temperature drops below 32 degrees.

B. Sweeper Dumping Procedures

1. Sweeper debris shall be taken to an authorized landfill either directly or by intermediate dump truck with cover.

2. Perform dumping operations in accordance with manufacturer instructions for the specific unit as provided by the Street Sweeping supervisor.

3. Walk around sweeper and dump truck to ensure there is no spillage. If there is spillage, sweep it up using the broom and shovel stored inside street sweeper.

C. Sweeper Wash Out Procedures

1. Washing the sweeper must be done according to the instructions in the owner's manual. If the manual does not require daily cleaning, then the following shall apply. Washing out the sweeper is not mandatory as long as no hydraulic material or other objectionable materials have been swept.

2. Wash out sweeper in accordance with manufacturer instructions for the specific unit as provided by the Street Sweeper supervisor.

3. Washing out procedures shall only be done in the vicinity of an oil/water separator.

D. End of Shift Duties

1. Perform GPS download at the Greenbrier yard if applicable.

2. Park sweeper at designated location.

3. Complete post trip vehicle inspection checklist.

4. Complete daily worksheet.

5. During fall and winter months drain all water from tanks in accordance with manufacturer instructions for the specific unit as provided by the Street Cleaning supervisor.

IV. Sweeping Schedule

Schedule is available from the Street Sweeing Supervisor. A schedule shall be posted on the City of Chesapeake website.

6. SHOULDER MAINTENANCE

Department of Public Works	Chesapeake VIRGINIA	
Directive: Departmental Regulation	Number: 612	
Subject: **Shoulder Maintenance**	Supersedes: 09/07/18	Next Review: 06/09/24
Approved: Director of Public Works	Effective Date: 06/09/22 Initiator: Steve Lawson	

I. Purpose

The purpose of this Departmental Regulation is to establish a policy, procedures, and criteria for shoulder maintenance located within the City's right of way.

II. Policy

A. Shoulder maintenance on primary/arterial roadways shall receive maintenance priority.

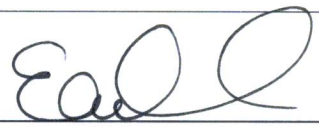
B. Debris shall be removed from the shoulder within two working days of notification. Unsafe conditions shall be marked with cone or barrel promptly upon notification. Removal shall be coordinated between Street Maintenance, Contractual Services, and Waste Management.

C. Reports of obstructions such as basketball goals, skateboard ramps, vehicles for sale, illegal signs, etc. shall be referred to Public Works Customer Service for investigation and resolution.

III. Criteria

A. Shoulder maintenance shall be scheduled when the pavement/shoulder drop off is greater than 4 inches, or when roadway deterioration indicates the need for grading to improve drainage.

B. Asphalt shoulder repair is limited to areas not to exceed 5' x 10'. Areas more than 5' x 10' shall be referred to the Operations Administrator or Operations Manager for review and repair plan.

Department of Public Works		Chesapeake VIRGINIA	
Directive:	Departmental Regulation	Number: 612	
Subject:	**Shoulder Maintenance**	Supersedes: 09/07/18	Next Review: 06/09/24
Approved:  Director of Public Works		Effective Date: 06/09/22 Initiator: Steve Lawson	

IV. Procedures

A. Asphalt Shoulder Repair shall refer to the Maximo work plan.

B. Regrading Shoulders and Removal of Excess Dirt/Gravel (Pulling Shoulder) shall refer to the Maximo work plan.

7. CONCRETE INSTALLATION, REPAIR OR REPLACEMENT

Department of Public Works		Chesapeake VIRGINIA	
Directive:	Departmental Regulation	Number: 613	
Subject:	**Concrete Installation, Repair, or Replacement**	Supersedes: 10/25/18	Next Review: 06/09/24
Approved: Director of Public Works		Effective Date: 06/09/22 Initiator: Steve Lawson	

I. Purpose

The purpose of this Departmental Regulation is to establish policy, criteria, and procedures for the installation, repair, or replacement of concrete structures located within the City's right of way to include sidewalks, curb/gutter, valley gutters, and driveway aprons.

II. Policy

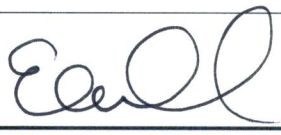
It is the policy of the Department of Public Works that concrete infrastructure installation, repair, or replacement be performed in accordance with the criteria listed in this regulation.

III. Criteria

A. Concrete shall be placed when the air temperature is 40 degrees or higher. Concrete shall not be placed if the temperature is expected to dip below 32 degrees within 24 hours of placing or if heavy rain is expected.

B. Repairs/installation/replacement in excess of 100 linear feet requires the prior approval of the Operations Administrator and/or the Operations Superintendent. Service requests for this work shall be brought to the Operations Superintendent's attention.

C. Refer to Public Works Regulation 605: Street Maintenance Inspection for additional criteria.

Department of Public Works		Chesapeake VIRGINIA	
Directive:	Departmental Regulation	Number: 613	
Subject:	**Concrete Installation, Repair, or Replacement**	Supersedes: 10/25/18	Next Review: 06/09/24
Approved:  Director of Public Works		Effective Date: 06/09/22 Initiator: Steve Lawson	

IV. Concrete installation, repair, and replacement procedures shall refer to Maximo work plan.

8. PEDESTRIAN CROSSWALK PAVEMENT MARKINGS

Department of Public Works	Chesapeake VIRGINIA	
Directive: Departmental Regulation	Number: 614	
Subject: **Pedestrian Crosswalk Pavement Markings**	Supersedes: 10/12/18	Next Review: 01/12/25
Approved: Sam Sawyer for Director of Public Works	Effective Date: 01/12/23 Initiator: Troy Eisenberger	

I. Purpose

The purpose of this Departmental Regulation is to establish a policy and procedures for the placement and characteristics of pedestrian crosswalk pavement markings.

II. Policy

A. Crosswalks shall be installed after review by Traffic Engineering. They are generally installed at high volume signalized intersections with pedestrian push buttons. They are not installed mid-block except under unique circumstances and with approval of the City Engineer. Evaluation of Pedestrian Crossing Accommodations at Unsignalized Locations shall be in accordance with Instructional & Informational Memorandum 5 General Subject: Pavement Markings Signs Pedestrians Number: IIM-TE-384.0.

B. City standard for marking pattern is the continental (or "ladder") style crosswalk with lines parallel to the direction of travel as outlined in Chapter 3B of the MUTCD. Other surfaces (pavers, stamped asphalt, etc.) or patterns to be installed on a case-by-case basis. Crosswalks shall be placed to have the vehicular wheel path avoid the paint markings to the greatest extent practical.

C. In the instance of refreshing existing crosswalk markings, it shall be at the discretion of the Traffic Engineering Division if the pattern of existing markings should be matched, or if the markings should be updated to the continental pattern.

D. The Traffic Engineering Division shall be responsible for identifying and approving the placement of Pedestrian Crosswalk Pavement Markings.

E. Traffic Engineering shall notify Operations, via work order, of the location and all pertinent specifications of the crosswalk.

F. The Traffic Operations General Supervisor shall assign the work order to the pavement marking supervisor.

G. The installation of crosswalks shall be performed in accordance with the Virginia Work Area Protection Manual (VWAPM). The standards of the VWAPM apply to the U.S. Code, Sections 109(b), 109(d), and 402 (a).

H. When possible, crosswalks shall be installed with the least inconvenience to traffic.

III. Criteria

A. Crosswalks that are installed using thermoplastic material must follow the manufactures specifications.

IV. Procedures

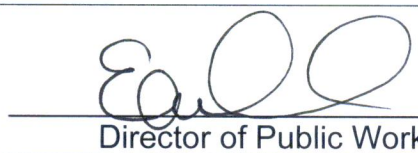
A. Crew shall set up advance warning signs.
B. Lines shall be marked off using either chalk line, or marking paint.
C. Area where material shall be applied is cleaned.
D. Material is applied.
    1. If using liquid, follow "Liquid Thermoplastic" procedure (VDOT Manual for Certification for Pavement Marking).
    2. If using pre-mark, follow "Pre-Fabricated Thermoplastic" procedure (VDOT Manual for Certification for Pavement Marking).

V. Required Resources

A. Equipment and personnel (the equipment and number of personnel needed shall depend largely on the location of the crosswalk).
    1. Thermo kettle truck (if using liquid thermoplastic). One operator.
    2. Pick-up truck for signs and cones. One operator.
    3. Large truck for transporting thermo applicator machines, and material.
    4. Driver and additional personnel (usually 2-3).
    5. Thermo applicator machine (if using liquid).
    6. Crash cushion truck. One operator.

B. Materials
    1. White thermoplastic powder (if using liquid).
    2. Reflective beads (if using liquid).
    3. Propane (for burners in kettles and applicators).
    4. Pre-mark material (8" or 12").
    5. Safety cones (number depends of location of job).
    6. Warning signs. Each approach shall have the following:
        a) "Road Painting Ahead"
        b) "Be Prepared to Stop"
        c) "Flagman Ahead"

9. PAVEMENT MARKINGS

Department of Public Works		Chesapeake VIRGINIA	
Directive:	Departmental Regulation	Number: 615	
Subject:	**Pavement Markings**	Supersedes: 09/07/18	Next Review: 06/09/24
Approved:  Director of Public Works		Effective Date: 06/09/22 Initiator: James Lomogda	

I. Purpose

The purpose of this Departmental Regulation is to establish a policy and procedures for pavement markings to ensure uniform design, position, and application.

II. Policy

The Department of Public Works adheres to the pavement marking standards listed in the Manual on Uniform Traffic Control Devices (MUTCD) and the procedures listed in this Departmental Regulation.

III. Procedures

A. Painting Operations

1. Inform crew of vehicles needed and location of 1st road to be painted.

   a. Vehicles and number of crew needed:

      1) Point truck – (pick-up) 1 person
      2) Paint truck – (T-011) 2 persons
      3) Cone truck – (pick-up) > to set cones out 2 persons
      4) Crash truck – 1 person

      *Note: Three people are to be used on paint truck if work force is available. If work force is not available, then one person must paint centerline and edge line at separate times.
      *Note: Crash trucks are not required be used on roads less than 45 mph.

   b. On two lane roads, a police unit shall be used to stop traffic in one direction until the painting vehicle is able to pull completely off the roadway.

   c. Crew shall put out signs in both directions on road segment to be painted.

   d. Photographs shall be taken of the warning signs along the segment of road being painted and the photos will include street name signs or other landmarks.

e. At least two people shall take the paint truck to the compound to clear water from paint lines and put paint into system. The water tank shall also be checked and filled if needed. All systems shall be checked for proper operational capability.

    1) One Equipment Operator II or above shall be present.

f. Paint operations begin at a speed of no less than 7 mph and no more than 10 mph. Cones shall be put on freshly painted lines at intervals determined by volume and speed of traffic. Cone truck operators assist painter in watching for overspray, lack of beads and vehicles riding in paint. If a vehicle is riding in the paint, either the crash cushion operator, or the person placing cones shall inform driver that the paint is wet.

g. After completion of road, cones and signs shall be picked up (in that order) and signs shall be placed at next location, if another location is scheduled.

h. When painting operations are completed for the day, the painter shall give counter totals to supervisor to be calculated and put on to work order. Crews shall return to the shop to pump paint and beads as needed.

    1) Paint and bead usage calculation

        - Paint – The linear feet of paint is measured automatically by the truck's digital read out and the gallons of paint used is measured by measuring increments in the tank (per specifications)
        - Beads – Beads are measured by the amount of bags added prior to a job

B. Preventive maintenance on equipment is done during times that the weather does not permit painting operations to be performed.

    1. Twice per month, the plumbing system on the paint truck is flushed. *Note: Waste water that is accumulated flushing lines is put into 55 gallon drums and disposed of in the gravity sanitary sewer.

C. All primary roads should be painted once per year and all other roads as needed, depending on paint wear due to volume of traffic.

Related Policies/Regulations:
Manual on Uniform Traffic Control Devices (MUTCD)

10. PAVEMENT CUT RESTORATION

Department of Public Works	Chesapeake VIRGINIA	
Directive: Departmental Regulation	Number: 616	
Subject: Pavement Cut Restoration	Supersedes: 10/25/18	Next Review: 06/14/24
Approved:  Director of Public Works	Effective Date: 06/14/22 Initiator: Steve Lawson	

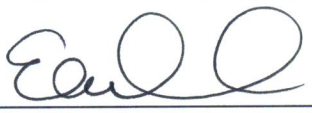
I. Purpose

The purpose of this Departmental Regulation is to establish a policy for pavement cut restoration.

II. Policy

The Department of Public Works pavement cut restoration shall adhere to the standards identified in PFM Vol. II, Sections PC-1 (1of2), PC-1 (2of2), PC-2, PC-3, PC-4.

11. TRAFFIC SIGNS

Department of Public Works	Chesapeake VIRGINIA	
Directive: Departmental Regulation	**Number:** 617	
Subject: **Traffic Signs**	Supersedes: 09/07/18	Next Review: 06/14/24
Approved:  Director of Public Works	Effective Date: 06/14/22 Initiator: James Lomogda	

I. Purpose

The purpose of this Departmental Regulation is to establish a policy for the assembly, installation and maintenance of traffic control signage.

II. Policy

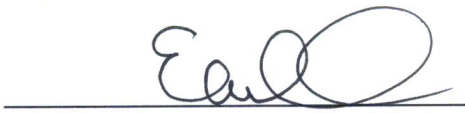
A. The Department of Public Works shall adhere to the regulations within the Federal Manual on Uniform Traffic Control Devices (MUTCD), the Virginia Work Area Protection Manual, Manual on Roads and Bridges and the directives listed in this regulation.
B. Signs shall be assembled, installed and maintained and advertisements removed in accordance to Federal, State and Local statutes.

III. Criteria

A. Signs:
    1. Various Regulatory (stop, speed limit, etc.)
    2. Warning (school, curve, etc.)
    3. Guide and Construction signs
B. Posts:
    1. Wood – 4"x4" post, 6" x 6" post,, etc.
    2. Metal – 2" pipe, 7', 10' and 12' U-channel, angle aluminum, flat aluminum and telspar.
C. Channeling Devices:
    1. Group 1, tubular markers and cones
    2. Group 2, Drums, Vertical Panels, Directional Indicators Barricades and Longitudinal Channelizing Devices
    3. Type 3 Barricades

Related Policies/Regulations: Federal Manual on Uniform Traffic Control Devices (MUTCD), Virginia Work Area Protection Manual, Manual on Roads and Bridges

12. SIGN VISIBILITY AND VISION CLEARANCE

Department of Public Works	Chesapeake VIRGINIA	
Directive: Departmental Regulation	Number: 618	
Subject: **Sign Visibility and Vision Clearance**	Supersedes: 10/12/18	Next Review: 07/26/24
Approved:  Director of Public Works	Effective Date: 07/26/22 Initiator: James Lomogda	

I. Purpose

The purpose of this Departmental Regulation is to establish a policy and procedure for sign visibility and vision clearance.

II. Policy

The Department of Public Works trims tree branches and other vegetation or removes other obstructions from the public right-of-way to allow adequate visibility of traffic control signs and signals by motorists and pedestrians.

A. During regular inspection of signs for maintenance and replacement, visibility of the signs is also checked, and any obstructions are reported to customer service for creation of a work order.
B. During regular maintenance or repairs to traffic signals, the visibility of the signal is also checked, and any obstructions are reported to customer service for creation of a work order.
C. Site visibility shall be determined by Traffic Engineering.

Related Regulations: MUTCD 2009, Section 2A-22, MUTCD Section 2A.22 Maintenance Guidance:
01 Maintenance activities should consider proper position, cleanliness, legibility, and daytime and nighttime visibility (see Section 2A.09). Damaged or deteriorated signs, gates, or object markers should be replaced.
02 To assure adequate maintenance, a schedule for inspecting (both day and night), cleaning, and replacing signs, gates, and object markers should be established. Employees of highway, law enforcement, and other public agencies whose duties require that they travel on the roadways should be encouraged to report any damaged, deteriorated, or obscured signs, gates, or object markers at the first opportunity.
03 Steps should be taken to see that weeds, trees, shrubbery, and construction, maintenance, and utility materials and equipment do not obscure the face of any sign or object marker.

Department of Public Works	Chesapeake VIRGINIA	
Directive: Departmental Regulation	Number: 618	
Subject: **Sign Visibility and Vision Clearance**	Supersedes: 10/12/18	Next Review: 07/26/24
Approved:  Director of Public Works	Effective Date: 07/26/22 Initiator: James Lomogda	

III. Procedure

When obstructions to visibility of signs or signals are noted, the following steps are taken:

A. Assess the size and location to determine if the base is located on public or private property.

B. If located on private property, the owner is contacted via written request prior to clearing the obstruction.

C. Foliage and small limbs located in the public right-of-way are cleared by Traffic Operations. If the removal of trees is necessary, coordinate with Street Maintenance for removal.

13. DRAINAGE INFRASTRUCTURE MANAGEMENT

Department of Public Works		Chesapeake VIRGINIA	
Directive:	Departmental Regulation	Number: 755	
Subject:	**Drainage Infrastructure Management**	Supersedes: 10/30/18	Next Review: 07/26/24
Approved: Director of Public Works		Effective Date: 07/26/22 Initiator: Steve Lawson	

I. Purpose

The purpose of this Departmental Regulation is to establish policy and procedures to manage the City's street drainage infrastructure.

II. Policy

A. Public Works shall maintain the open and closed drainage systems within the City's rights of way and easements to provide for the original design capacity to the extent possible.

B. Open systems are defined as roadside ditches, lead or perimeter ditches within rights of way, or existing easements. Closed systems include inlet structures, manholes, catch basins, pipes, and culverts.

C. Public lakes and ponds that serve as holding facilities to temporarily store and gradually release stormwater shall be maintained to provide for positive flow. The maintenance activities shall be limited to the outfall structures. All other maintenance work such as mowing and bank restoration shall be the property owner's responsibility. Public Works is not responsible for dredging of recreational or navigational purposes.

D. The placement of new driveway culverts or the extension of existing driveway culverts is the responsibility of the property owner. The property owner must obtain a permit from the Department of Development and Permits, prior to installing new culverts or extending existing culverts.

Related Regulations: City of Chesapeake City Code Chapter 26, Article VIII.

III. Procedures

A. Cave Ins or Structural Repairs

1. Securing and/or filling cave-ins or structures, when necessary, shall be performed within twenty-four (24) hours of receiving the report. Securing may consist of placing cones, barrels, safety signs, safety fencing, or filling the location with dirt and/or crusher run.

2. A Maximo Log Entry Form for each cave-in and/or structure noting the pipe or structure material, pipe diameter, invert depth, number of cave-ins, type of structure, number of pictures taken (there should at least be two showing the structure & street view), location of the cave in, and whether asphalt, concrete, curb & gutter, or driveway apron repairs will be needed. The estimated amount of and material for asphalt, concrete, curb & gutter, and driveway apron repairs will also be provided.

3. Any structure that needs to be immediately repaired (broken basin tops, broken brickwork, etc.) because it is a danger to the public and/or vehicles shall be addressed as soon as possible.

B. Cave Ins – To Be Repaired by City Crews

1. If the cave-in is caused by a separation of less than four (4) inches between pipe joints, a brick collar shall be placed around the pipe, filter fabric shall be placed around the separated joint, and the area shall be backfilled. Separations greater than four (4) inches shall require the separated pipe joints be re-laid or replaced.

2. If the pipe is large enough to crawl into, Stormwater crews may choose to perform the repair by placing mortar on the damaged section from inside the pipe. Confined space entry procedures MUST be followed for this type of repair.

3. If the pipe or culvert repair requires pavement to be removed, crews shall backfill and compact the repair area with select fill and/or crusher run in compacted six (6) inch lifts so that the final grade is between one (1) and one and half (1 ½) below the adjacent pavement edges.

4. It shall be the responsibility of the General Supervisor (in charge of the job) to provide the size of the repair in length, width, and depth on the Maximo work order used for the job.

5. If the pipe or culvert repair is made in an unpaved area, crews shall restore the area by compacting the sub-grade fill in six (6) inch lifts and placing at least two (2) inches of topsoil. The topsoil shall be seeded and stabilized with straw, jute mesh, or other landscaping measures to reduce the likelihood of erosion, while the grass seed germinates and becomes established.

6. It will NOT be the responsibility of city crews to replace illegally placed fencing, sprinkler systems, or other landscape features located in the city drainage easement or right-of-way. The Stormwater Superintendent or the General Supervisor (in charge of the job) shall leave a door hanger advising the citizen that the item (fence, bush, etc.) will be removed and not replaced.

C. Updating Inventory & GIS – Stormwater Structures

1. Discrepancies in inventory information noted during repair work shall be provided to the Operations GIS Analyst for updating the system.

2. As part of a continual updating of the Stormwater structures and information in Arc GIS, the structures throughout the city (catch basins, manholes, drop inlets, junction boxes, pipes, etc.) shall be inspected (by either pole camera or CCTV truck) every six (6) to eight (8) years.

3. During the investigation, crews shall annotate the pipe size, depth, structural material, any conflicts, flow direction, etc. A still picture and/or video shall be taken to capture the condition of the structure and pipe.

D. Cave Ins – To Be Repaired by A Contractor

1. If the cave-in and/or structure repair work is given to an outside contractor, Contractual Services shall add the information to the contractor's spreadsheet located in Sharepoint.

2. The following conditions must be met in order to assign the work to a contractor:

    - Extensive or complicated confined space entry shall be needed.
    - Major reconstruction of structure walls or basin is needed.
    - A long stretch of pipe, more than one hundred (100) feet, with a diameter greater than twelve (12) inches, shall need to be slip-lined.
    - There are multiple cave-ins along a stretch of pipe.
    - Cave in(s) are located under a high-volume roadway (i.e., Battlefield Blvd, Greenbrier Parkway, etc.).

E. Plans or Requests for New Pipes or Structures

1. Any plans and/or requests for new pipes and/or structures are requested through the Drainage Engineer's Office or other city department.

F. Pipe washing Requests

1. When a report of a clogged structure (catch basin, drop inlet, driveway pipe, etc.) is received, crews shall schedule a pipe washer to respond.
2. If there is a flooding situation due to a heavy rain event and a structure is suspected of being blocked, a pipe washer shall be dispatched immediately.
3. Pipe washers may be scheduled at the request of the CCTVing crew to flush a pipe thereby allowing them to TV the pipe and/or structure, or by the cave-in crew to flush a basin or pipe to assist with cave-in repairs.

G. Ditches

1. Once an investigation is completed, a work order is assigned to a General Supervisor.
2. There are various types of ditch work that can take place – cleaning & clearing (blockage removal), regrading (small area or large area), and erosion repairs. The location – concrete or earthen ditch, wetlands area, stretch of road needing traffic control – will have an impact on what type of work may be performed and when it should be scheduled (e.g. - some ditch cleaning must be scheduled when school is out).

3. City crews are not responsible for removing leaf and lawn debris that is placed or has fallen into the ditches, unless there is a blockage causing flooding or the ditch is over three (3) feet deep. Citizens shall be responsible for removing leaves and other debris (lawn clippings, etc.) that may be blocking ditches that are three (3) feet and under.

4. Lead ditch cleaning shall be performed in compliance with the MS-4 permit. A list of the lead ditches that have been cleaned, the date, and the date of the next cleaning shall be maintained. A map showing the ditch to be cleaned, along with any pertinent information (easements, wetlands, etc.) shall be attached to the Maximo work order.

5. Roadside ditches on a preventive maintenance schedule shall be cleaned in compliance with the MS-4 permit, depending on the backlog of work orders.

H. Citizen Requests – Driveway Pipes & Piping in Ditches

1. A property owner wishing to install a new driveway pipe or extend an existing driveway pipe within the city right-of-way or drainage easement abutting their property, shall be responsible for obtaining a permit from the Department of Development & Permits and for purchasing and installing the pipe in accordance with the permit.

2. Any public or private utility work required, for or resulting from, the pipe or culvert work shall be paid for by the property owner. Replacement pipes must be the same material, sized equal to, or greater than, the existing culvert.

3. A property owner wishing to pipe a ditch that carries public water shall obtain a permit from the Department of Development & Permits. The design for the piping and structures shall conform to the City's Public Facilities Manual and be approved by the Public Works Engineering Division. The property owner shall be responsible for purchasing and installing the piping and structures, in accordance with the approved design. Any public or private utility work required for, or resulting from, the pipe or culvert work shall be paid for by the property owner.

BUDGET NARRATIVE

Each application must include a detailed Budget Narrative explaining all proposed expenditures. A budget narrative is applicable to requests from any category of grants in this manual. **Applicants must submit a budget narrative via the WebGrants Portal.**

***Estimated total project cost*:** This amount must reflect the total cost of bringing the project to completion. Estimates for all work to be completed by third parties (engineers, contractors, etc.) on the specified project should be included. If multiple project types are selected, a detailed breakdown of how the funding is proposed to be allocated must be included for each selected project type.

$10,200,000

This amount represents the total project cost and represents the costs associated with design and construction and related items. The project cost estimate can be found in *Attachment F*. The project cost includes design (including construction administration and inspection) of $2,056,071, construction (including a 30% contingency and allowances for Federal provisions and public and private utility relocations) of $6,987,429, plus a budget of $1,156,500 to address direct costs related to property/easement acquisition.

***Amount of funds requested from the Fund*:** This is the total amount of any grant assistance sought from the Fund. Include a detailed breakdown of how this funding is proposed to be allocated. At a minimum this should include a breakdown of salaries, including any position requested, position title, 100 percent of salary amount and percent directly dedicated to grant activity fringe benefits, travel, equipment, supplies, construction, contracts, and any other direct costs. The budget narrative must include details and costs for each budget category sufficient to determine reasonableness and allowability.

$7,000,000

This is the total amount of any grant assistance sought from the Fund. It represents the difference between the total estimated design and construction cost and the amount of local match that the City is proposing to supply. The amount requested is less than 69% of the total cost. The City is able to contribute a higher percentage match than the 15% required.

Estimated Funding Request Breakdown

- **Salaries, 0**
- **Fringe Benefits, 0**
- **Travel, 0**
- **Equipment, 0**
- **Supplies, 0**
- **Construction, 68.50% or $4,795,295**
- **Contracts, 20.16% or $1,411,029**
- **Other Direct Costs, 11.34% or $793,676**

Indirect costs are not eligible for funding. Salaries of existing staff are ineligible; however, salaries of staff who provide direct and documented support to the grant effort may be considered as match. Please refer to the match requirements in Part III of this manual. For local governments designated as low-income geographic areas, 100 percent of the estimated total project costs should be included.

***Amount of funds available*:** This amount, when combined with the amount of funding requested from the Fund, must reflect the total estimated project cost to demonstrate that all necessary funding has been secured to complete the project. Include a description of the source of these funds and evidence of the applicant's ability to obtain these funds to complete the project.

$3,200,000

See *Attachment E* for the approved City Council Resolution indicating the availability of and ability to obtain funding sufficient funds to cover the match requirement for this grant application.

Authorization to request for funding: Local governments seeking funding shall also attach signed documentation authorizing the request for funding.

See *Attachment E* for a letter authorizing a request for funding through the program.

SCOPE OF WORK NARRATIVE

Project Information: Describe in detail the area to be studied or protected including the following. *Note that information should be provided on the local government(s) in which the project is taking place, even if that local government is not the grant applicant*. Projects undertaken by 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, must be consistent with resilience plans and efforts in the local government where the project takes place. Letters of support from affected local governments must be included with the application. Applicants may also wish to include letters of support from impacted community stakeholders.

This application is for the project known as Battlefield Boulevard Road Elevation.

N. Battlefield Boulevard is an important arterial road in Chesapeake, Virginia that crosses the headwaters of the Elizabeth River and the intercoastal waterway (a human-made canal). A cluster of small businesses and a 237-unit residential development located north of the Elizabeth River rely on the road for day-to-day access to the surrounding community and as a lifeline for evacuation and access to medical facilities and care in emergencies. Unfortunately, the road lies within the FEMA 100-year floodplain and is anticipated to be regularly impacted by sea level rise by 2030.

Additionally, this section of roadway is listed as an important evacuation route within the City of Chesapeake and has been identified as flood prone since 2002 (2002 City of Chesapeake Vulnerability Assessment). The project reduces vulnerability of the community main evacuation route to flooding events by lessening disruptions to critical services.

The proposed hazard mitigation project would raise the traveled roadway of N. Battlefield Boulevard above the 100-year floodplain along a 1,800-foot segment of the road stretching north from where it crosses the Elizabeth River. The road, which is currently four (4) feet above sea level at its lowest point, would be raised up to three (3) feet to a new elevation of seven (7) feet above sea level. Project construction would involve removing the existing road surface, adding, and compacting fill material

to increase the elevation, and constructing a new roadway and adjacent sidewalk. On the east side of the road, a low retaining wall would reduce the project's footprint to avoid impacting the wetlands to the east. Alternatively, the project could enhance the wetlands by including a Living Shoreline on the east side, creating a vegetated slope down to the existing marshland that would protect against erosion and treat roadway runoff. Implementation of this nature-based solution would benefit from the lessons learned from the Living Shoreline project constructed at the nearby Great Bridge Battlefield Historic Park in 2015. On the west side, the road would gently return to existing grade, providing an opportunity for native plantings.

Existing utilities would be relocated or raised along with the road and the project construction would be phased to maximize accessibility for residents, employees, and customers during construction. In addition to the lifting of the roadway, the project would include the reconstruction of several hundred feet of intersecting local roads and approximately six private driveways to meet the new raised elevation of the Battlefield Boulevard. Construction of the project may require the reconfiguration of commercial parking lots, which would be accomplished in collaboration with the relevant parcel landowners. The project would not impact the existing bridge over the Elizabeth River.

The project will address transportation, public and mental health, providing a more secure evacuation route by elevating the lowest segment of the Road to above the 100 yr Event. The project will address tidal flooding by storms or Hurricanes as well as heavy rain flooding events.

Future stages of project scoping and design may identify opportunities for the installation of culverts along the roadway as it is raised, potentially relieving floodwaters and restoring a more natural flow regime for the city-owned wetland areas to the east of the road.

Additional benefits include:

• Increasing pedestrian safety and by reconfiguring the existing sidewalk on the west side of the road and improving walking between surrounding community (including the nearby Great Bridge Battlefield Historic Park) and supporting planned aspects of the 2050 Trails Plan (including separate bike lanes).

• Adding informational signage about nearby wetland habitat, the project's location within the larger watershed of the Elizabeth River and the Chesapeake Bay watershed, and design to protect against flooding.

• Conducting outreach to local community and businesses about managing flood risk and participating in the existing Bay Star Homes Program, which encourages Hampton Roads region residents to make property improvements that help restore local waterways.#

To date, the City has conceptualized the project in order to develop a design & construction cost estimate. A detailed map of the project area including topographic information can be found as Attachment A. The City of Chesapeake Department of

Public Works will be responsible for completing all activities and tasks associated with this project.

As part of the design process, the City will conduct public outreach with stakeholders including impacted residents and businesses through focused Citizen Information Meetings (CIMs) and the recurring Town Hall meeting process and additional, specific outreach as needed. The typical process for consultant-designed projects applicable for this project is provided below:

After the OWNER reviews the 60% Design and provides comments to the ENGINEER, the comments will be incorporated into the 60% Design which will be presented at the Citizen Information Meeting (CIM).

The ENGINEER will prepare the newspaper advertisement for the CIM and forward it to the OWNER for review and publication.

The OWNER will mail letters to the affected property owners conveying the information in the advertisement. In addition, a large message board sign will be placed in the project area for advertisement.

The ENGINEER will then prepare displays, brochures, handouts, comment sheets, and a comment box for the Public Hearing Meeting. The ENGINEER will provide an aerial photograph dry mounted on foam-core boards to be included as a display for the meeting. A minimum of two (2) copies of each display is required.

The ENGINEER will attend the CIM, evaluate comments, summarize the comments, and provide recommended responses to each comment. The format for the CIM will resemble an open house, with displays and handouts, and with the ENGINEER's and OWNER's staff available to dialogue with the public and answer questions.

The results of the CIM will be summarized and reported back to City Council.

a. *Population* - Provide population data for the local government in which the project is taking place, including identification of any low-income geographic area and the estimated number of residents that will be impacted by this project.

Population data for Chesapeake – 249,422 as of 2020 Census

Identification of any low-income geographic area that will be impacted by the project: the project is located in Census Tract 209.07, Chesapeake city, VA. The median household income for that Tracts is $ 62,105. That is less than 73% of the Chesapeake median household income of $85,563. The project also borders Census Tract 208.04. However, the portion of that tract adjacent to the project area is undevelopable/wetland area. Source of data: **Census data** ACS 2021 5-year

The estimate number of residents impacted by the project: 70,000

b. *Historic flooding data and hydrologic studies projecting flood frequency* - Provide information on the flood risk of the project area, including whether the project is in a mapped floodplain, what flood zone it is in, and when it was last mapped. If the property or area around it has been flooded before, share information on the dates of past flood events and the amount of damage sustained.

Flood risk of the project area: Appendix C of the previously developed BCA Report included as Attachment B provides the FIRM and FIRMette for the project area. The project will remove the roadway from 100-yr AE flood zone, last mapped on 12/16/2014.

Information on the dates of past flood events and the amount of damage sustained: Appendix C of the previously developed BCA Report provides past flood event information including dates, duration and available water depth and pictorial documentation. The History of Flooding Hazards from the 2022 BRIC application is included as Attachment G.

c. *No adverse impact* – Studies, data, reports must demonstrate proposed project minimizes flood vulnerabilities and does not create flooding or increased flooding (adverse impact) to other properties.

The project does not change any existing drainage patterns therefore no adverse impact is anticipated. Analysis to be conducted during design shall confirm that this is the case.

d. *The ability of the local government to provide its share of the cost* - This must include an estimate of the total project cost, a description of the source of the funds being used, evidence of the local government's ability to pay for the project in full or quarterly prior to reimbursement, and a signed pledge agreement from each contributing organization.

Estimate of total project cost: $10,200,000

Source of the funds being used: Proposed in draft FY25 CIP and guaranteed by City Resolution

Evidence of Ability to Pay: See Budget Narrative and Attachment E

Signed Pledge Agreement: N/A

e. *Benefit-cost analysis must be submitted with project applications over $2,000,000*. In lieu of using the FEMA benefit-cost analysis tool, applicants may submit a narrative to describe in detail the cost benefits and value. The narrative must explicitly indicate the risk reduction benefits of a flood mitigation project and compares those benefits to its cost-effectiveness. (https://www.fema.gov/grants/tools/benefit-cost-analysis)

See the BCA report prepared for this project to accompany a BRIC 2022 application, included as Attachment B. Note that project costs have been revised since the development of that BCA report to reflect recent bids on similar projects. The current cost estimate is included as Attachment F.

Using the traditional 7% Discount Rate, the estimated project benefits are $8,728,599. The total project cost for design and construction, not including maintenance costs, is now $10,200,000, resulting in a BCR of ~0.85.

With a social vulnerability index (SVI) score of 0.57, the project is just shy of the required SVI score of 0.6 required to apply the alternative cost-effectiveness methodology allowed for 2022 BRIC and FMA that allows the use of a 3% Discount Rate. That methodology would result in benefits of $16,273,381 and a BCR of 1.60. VDEM representatives have shared with the City that they believe a 3% Discount Rate is now universally allowed; however, no documentation to that effect could be provided.

f. *The administration of local floodplain management regulations* - The Department will determine if the community is in good standing with the NFIP. If applicable, provide the Department with a link to the current floodplain ordinance, or attach a PDF or Word document of the ordinance.

Link to a copy of the current floodplain ordinance:

ADOPTED-Floodplain-Ordinance-7-16-2013-PDF (cityofchesapeake.net)

g. *Other necessary information to establish project priority*

i. Repetitive Loss and/or Severe Repetitive Loss Properties

- Do not provide the addresses for these properties, but include an exact number of repetitive loss and/or severe repetitive loss structures within the project area. Work with the local floodplain administrator or emergency manager to find this information. If they do not have a list of repetitive loss/severe repetitive loss structures, the Department can assist them in accessing these lists for NFIP insured structures. Please note, that repetitive loss and/or severe repetitive loss often occurs outside of the SFHA and to properties not captured in NFIP reporting. All flooding involving these properties should be tracked and addressed by the community.

Exact number of repetitive loss /severe repetitive loss structures within the project area: 5

Residential and/or Commercial Structures

- Describe the residential and commercial structures impacted by this project, including how they contribute to the community such as historic, economic, or social value. Provide an exact number of residential structures and commercial structures in the project area.

The project is identified in the City of Chesapeake's 2002 Hazard Vulnerability Assessment and in the 2022 Hampton Roads Hazard Mitigation Plan, which is incorporated by reference into the DCR-approved City of Chesapeake Resilience Plan. Currently, this project directly benefits the Harbor Watch condominiums (pop.356), but it should be noted that this will be a foundational project that has the ability, in conjunction with other future projects to impact large portions of the communities directly south of the project site. Approximately 70,000 residents are located south of Battlefield Blvd and are impacted by road closures along this evacuation route. This project will therefore benefit approximately 27% of the overall population.

Exact number of residential structures and commercial structures within the project area: There are 237 residential structures and 18 commercial structures in the project area.

ii. Critical Facilities

- If there are critical facilities within the project area, describe each facility.

N/A

***Need for Assistance*:** Identify and describe any relevant issues or problems that will be addressed by the project.

a. Explain the local government's financial and staff resources.

i. Identify relevant staff members (floodplain administrators, planners, emergency managers, building officials, engineers) employed with the local government.

The majority of City infrastructure improvements are funded through the Capital Improvement Budget. The approved FY24 CIB is available at:

https://www.cityofchesapeake.net/DocumentCenter/View/12906/FY-2024-to-28-Adopted-Capital-Improvement-Program-PDF?bidId=

Number of relevant staff members:

- **1 Floodplain Administrator**
- **1 additional Certified Floodplain Manager**
- **7 Civil Engineers**
- **1 Plan Review & Codes Administrator**
- **1 Permit Services Administrator**
- **1 Principal Planner**
- **2 Senior Planners**
- **1 Deputy Coordinator of Emergency Management**

ii. Identify relevant software the local government has access to.

Relevant Software: Accela for plan review, numerous stormwater modeling programs (SWMM, Autodesk Hydraflow, Autodesk Storm & Sewer Analysis, Bentley Civil Storm, Culvert Master, etc.), Microsoft Office Suite, ArcGIS

iii. Explain the local government's capabilities.

Capabilities: The City has several teams within Public Works to manage the study, design and construction work performed by consultants and contractors. One of the teams also takes on in-house design for small projects that can be accomplished using on-call contractors. There is a team that focuses solely on managing construction and includes engineers as well as inspectors.

b. The Department will prioritize low-income geographic areas for funding.

i. The Department will consider the project area's social vulnerability index score when reviewing grant applications. The Social Vulnerability Index layer, available through Virginia Flood Risk Information System (VFRIS), will be used for this review.
ii. This index is based on census block data; the index score for the census block that contains the project area should be used. If the project area falls within multiple census blocks, please provide the scores for all census blocks. The average score for the project area will be used for scoring the application.

iii. For more information on social vulnerability, please see ADAPT Virginia's fact sheet.

This map has been provided as *Attachment D*.

***Alternatives*:** If the project proposed does not employ a nature-based or hybrid solution and the total project cost is greater than $2 million, describe at least one alternative that could reasonably address the issue identified. Please also consider the No Action Option as a third alternative as part of the analysis. Explain these alternatives and the reason the proposed project was selected.

The project plans to reduce the risk of flooding by elevating the existing road elevation an additional 3 ft. establishing the new 7 ft. above sea level, going above the 100 yr Flooding Event.

Impacts of inaction are anticipated to be disruption and lack of accessibility of critical lifelines, especially for medical and emergency services and delayed emergency response times due to the potential isolation of the immediate neighboring communities. There is also potential for adverse impacts of inaction to increase given the current projections for sea level rise on top of existing and potentially more intense future flood events. The City would not be in a position to undertake the project at this time if the project is not successful in being awarded funding.

The city considered an alternative of raising the roadway to six (6) feet above sea level rather than seven (7) feet. For this alternative, the scope of work would be the same as the currently proposed project, but the finished road would be one foot lower, reducing project cost.

Upon financial evaluation it was determined that the 6-foot elevation would not remove an adequate level of flood risk and not yield substantial enough benefit using the FEMA BCA tool, particularly when taking into account potential base flood elevation. Investigating this alternative guided support for selection of 7 feet above sea level as the project target elevation#

Opportunities to provide additional protection, within budget, if physically and financially feasible, will be examined during the design process.#

Goals and Objectives: Identify and describe the goals and objectives of the project. Include a description of the expected results of the completed project and explain the expected benefits of the project. This may include financial benefits, increased awareness, decreased risk, etc.

The project will address transportation, public and mental health, providing a more secure evacuation route by elevating the lowest segment of the Road to above the 100 yr event, thereby removing the roadway from the 100-year floodplain, within the 3-year performance period allowed by the program. The project will address tidal flooding by storms or Hurricanes as well as heavy rain flooding events. The road lies within the FEMA 100-year floodplain and is anticipated to be regularly impacted by sea level rise by 2030. For additional rain and flooding information as well as the calculation of project benefits, refer to BCA report and documentation included as Attachment B.

The community lifelines addressed by this project include transportation and safety & security. The project reduces vulnerability of the community main evacuation route to flooding events by lessening disruptions to critical services.

Long-term changes to the protected areas are anticipated to include increased flooding due to sea level rise and a projected increase in the intensity and potential frequency of precipitation events. These changes bring about and heighten existing flood risks in the area and the potential disruption of access to multiple lifelines for local communities. When implemented, the project would mitigate these risks, particularly risks in accessing critical lifelines including health and medical facilities, essential transportation infrastructure (including mass transit), and safety and security. The project would specifically enable access to health and safety lifelines for local hospitals and medical facilities including Chesapeake Regional Medical Center, while supporting the City of Chesapeake Flood Management Program. By enabling access routes to residential and commercial areas in the local community, this project will also support faster response (including evacuation and reduced emergency response time) and enhance recovery time in the case of a future, 100- or 500-year flood event. This is highly important as the current City of Chesapeake Flood Insurance Rate Map (FIRM) shows that the community adjacent to the project site as well as the neighboring Centerville Turnpike lie within the 100-year flood zone. The project site would also protect the local #014 bus route which is the only mass transit route for the adjacent residential community.

This project also provides an opportunity to support the Virginia Department of Conservation and Recreation's Conservation Vision through the planting and re-establishment of native vegetation. The project may implement a preferred shoreline best management practice along the road-to-marsh interface, supporting the further development of the area's Living Shorelines. All of the above benefits neighboring residential and commercial areas through the reduction of and protection against changing flood risks.

The project can also consider a re-evaluation at the end of the anticipated end of life for the elevated route (e.g. approx. 50 years post-construction) to determine changes and updates to the state of science in the projected frequency and intensity of storm events and potential acceleration of sea level rise.

Project success shall be documented through continued collection of flooding data and comparison with rainfall data to evaluate performance under various storm and tidal conditions. Lack of flooding during an event similar to the 100-yr design storm will be considered a success.

***Approach, Milestones, and Deliverables*:** Outline a plan of action laying out the scope and detail of how the proposed work will be accomplished with a timeline identifying expected completion dates. Determine milestones for the project that will be used to track progress. Explain what deliverables can be expected at each milestone, and what the final project deliverables will be. Identify other potential project partners.

- If assistance is sought for a project that will be carried out in concert with a federal agency, provide evidence of an agreement with the federal agency endorsing the project.

The following is the anticipated schedule including milestones – used to track progress – and period of performance from design through construction of the project. Completion dates assume an executed grant agreement date of May 1, 2024, which is subject to change. The City Public Works Department regularly provides project progress reports to the City Manager's office. This process will be used to ensure the project meets the requirements of the grant agreement and is delivered on time.

Milestone	Period of Performance	Expected Completion Date	Anticipated Deliverables
Design Scoping	**2 months**	**July 1, 2024**	**Design Contract**
Design & Engineering including Private Utility Relocation & ROW acquisition	**16 months (go/no-go milestone)**	**November 1, 2025**	**Final Approved Bid Documents including construction cost estimate**
Procurement Process & Award of Contract	**4 months**	**March 1, 2026**	**Construction Contract**
Construction	**12 months**	**March 1, 2027**	**Built project & Record Drawings**
Project inspections & closeout	**2 months**	**May 1, 2027**	**As needed**

There are no project partners.

***Relationship to Other Projects*:** Where applicable, briefly describe the relationship between this project and other past, current, or future resilience projects. If the applicant has received or applied for any other grants or loans through the CFPF, please identify those projects, and, if applicable, describe any problems that arose with meeting the obligations of the grant and how the obligations of this project will be met.

There is no relationship between this project and any other past, present, or future resilience project.

The City has applied for the following CFPF grants:

- **Grant Round 1**
  - **Planning & Capacity Building – Resilience Plan (awarded)**
  - **Study – Southern Chesapeake Watershed 5 (awarded)**
- **Grant Round 3**
  - **Study – Goose Creek Watershed (awarded)**
  - **Project – Greenbrier Outfall Resiliency Improvements (awarded)**
  - **Project – Oakdale Area BMP and Drainage Improvements (not awarded)**

There have not been any problems that have arisen with meeting the obligations of any of the grants.

The obligations of this project grant will be met by contracting with a consultant to perform study and design which will be overseen and managed by City staff in the Public Works Department.

Maintenance Plan: For ongoing projects or projects that will require future maintenance, such as infrastructure, flood warning and response systems, signs, websites, or flood risk applications, a maintenance, management, and monitoring plan for the projects must be provided demonstrating how they will be maintained, managed, and monitored after the lifespan of this award for a minimum of ten years or the expected lifespan of the project, whichever is longer.

Once constructed this infrastructure will be part of the City's Road system. As such it will be maintained by the Public Works Department Operations & Maintenance Division, staffed by more than 200 personnel. The Operations & Maintenance Division is responsible for maintaining almost 2,300 lane miles of streets and highways throughout the City. We also maintain several on-call contracts for maintenance services when assistance is necessary. The City has staff that respond to infrastructure complaints, so if any concerns are received for any portion of the project, the city will inspect the area so that plans can be made for any necessary repairs. Should any portion of the project fail under normal operating conditions within 50 years of project completion, the City will utilize road maintenance funds to repair the part of the project that is failing. For catastrophic failures, the Public Works Department will request an emergency appropriation of funds through City Council for immediate repairs. If the incident is due to negligence, the City's attorneys will begin legal proceedings to recoup the cost. If the incident has no negligent party, then the cost of the emergency repairs is borne by the City.

Procedures for monitoring, inspection, and maintenance of this project that will be followed throughout the project's useful life can be found in *Attachment C*.

The total project cost as identified in the application is for design construction and related costs only. Funding for maintenance is non-fund financed.

Criteria: Describe how the project meets each of the applicable scoring criteria contained in Appendix D and provide the required documentation where necessary. Documentation can be incorporated into the Scope of Work Narrative or included as attachments to the application.

For local governments that are not towns, cities, or counties, the documentation provided for the criteria below should be based on the local government or local governments in which the project is located and/or directly impacts.

Appendix D: Scoring Criteria

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

SCORING CRITERIA PER CATEGORY

Projects

Eligible Projects, 10 points.

- *All other projects (10)*

Removal or relocation of structures from flood-prone areas where the land will not be returned to open space

Social Vulnerability Index Score, 5 points.

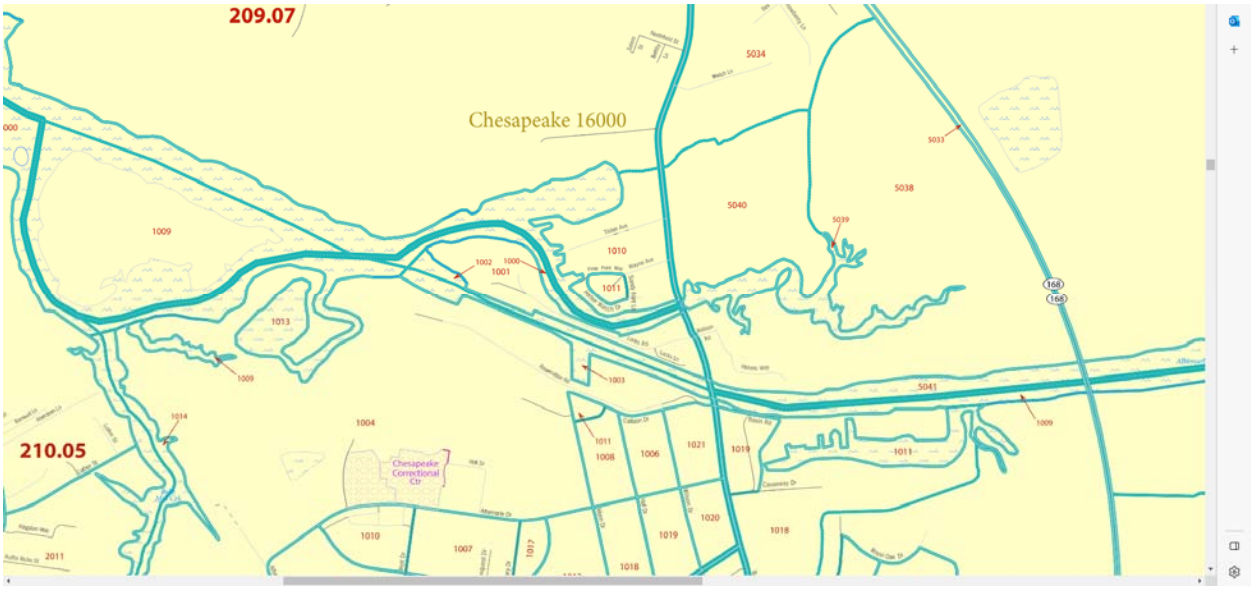
- *Moderate Social Vulnerability (0.0 to 1.0) (5)*

The project area has a SVI score of 0.57; see Attachment D.

Community scale of benefits, 30 points.

- *More than one census block (30)*

The project benefits approximately 27% of the population of Chesapeake.



Expected lifespan of project, 10 points.

- *Over 20 Years (10)*

Useful life, 50 years

Remedy for NFIP probation or suspension, 0 points.

No, the City of Chesapeake is in good standing with the NFIP.

Proposed project part of a low-income geographic area, 10 points.

Yes, the project is located in census tract 209.07, which has a median household income of less than 73% of that of the City of Chesapeake.

Proposed project implements a Chesapeake Bay TMDL BMP, yes 5

Yes, there is a living shoreline proposed with the road elevation project that can be applied towards the Chesapeake Bay TMDL.

e. *Benefit-cost analysis must be submitted with project applications over $2,000,000*. In lieu of using the FEMA benefit-cost analysis tool, applicants may submit a narrative to describe in detail the cost benefits and value. The narrative must explicitly indicate the risk reduction benefits of a flood mitigation project and compares those benefits to its cost-effectiveness. (https://www.fema.gov/grants/tools/benefit-cost-analysis)

See the BCA report prepared for this project to accompany a BRIC 2022 application, included as Attachment B. Note that project costs have been revised since the development of that BCA report to reflect recent bids on similar projects. The current cost estimate is included as Attachment F.

Using the traditional 7% Discount Rate, the estimated project benefits are $8,728,599. The total project cost for design and construction, not including maintenance costs, is now $10,200,000, resulting in a BCR of ~0.85.

With a social vulnerability index (SVI) score of 0.57, the project is just shy of the required SVI score of 0.6 required to apply the alternative cost-effectiveness methodology allowed for 2022 BRIC and FMA that allows the use of a 3% Discount Rate. That methodology would result in benefits of $16,273,381 and a BCR of 1.60. VDEM representatives have shared with the City that they believe a 3% Discount Rate is now universally allowed; however, no documentation to that effect could be provided.

c. *No adverse impact* – Studies, data, reports must demonstrate proposed project minimizes flood vulnerabilities and does not create flooding or increased flooding (adverse impact) to other properties.

The project does not change any existing drainage patterns therefore no adverse impact is anticipated. Analysis to be conducted during design shall confirm that this is the case.

***Approach, Milestones, and Deliverables*:** Outline a plan of action laying out the scope and detail of how the proposed work will be accomplished with a timeline identifying expected completion dates. Determine milestones for the project that will be used to track progress. Explain what deliverables can be expected at each milestone, and what the final project deliverables will be. Identify other potential project partners.

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The obligations of this project grant will be met by contracting with a consultant to perform study and design which will be overseen and managed by City staff in the Public Works Department.

d. *The ability of the local government to provide its share of the cost* - This must include an estimate of the total project cost, a description of the source of the funds being used, evidence of the local government's ability to pay for the project in full or quarterly prior to reimbursement, and a signed pledge agreement from each contributing organization.

Estimate of total project cost: $10,200,000

Source of the funds being used: Proposed in draft FY25 CIP and guaranteed by City Resolution

Evidence of Ability to Pay: See Budget Narrative and Attachment E

Signed Pledge Agreement: N/A

b. *Historic flooding data and hydrologic studies projecting flood frequency* - Provide information on the flood risk of the project area, including whether the project is in a mapped floodplain, what flood zone it is in, and when it was last mapped. If the property or area around it has been flooded before, share information on the dates of past flood events and the amount of damage sustained.

Flood risk of the project area: Appendix C of the previously developed BCA Report included as Attachment B provides the FIRM and FIRMette for the project area. The project will remove the roadway from 100-yr AE flood zone, last mapped on 12/16/2014.

Information on the dates of past flood events and the amount of damage sustained: Appendix C of the previously developed BCA Report provides past flood event information including dates, duration and available water depth and pictorial documentation. The History of Flooding Hazards from the 2022 BRIC application is included as Attachment G.

g. *Other necessary information to establish project priority*

i. Repetitive Loss and/or Severe Repetitive Loss Properties

- Do not provide the addresses for these properties, but include an exact number of repetitive loss and/or severe repetitive loss structures within the project area. Work with the local floodplain administrator or emergency manager to find this information. If they do not have a list of repetitive loss/severe repetitive loss structures, the Department can assist them in accessing these lists for NFIP insured structures. Please note, that repetitive loss and/or severe repetitive loss often occurs outside of the SFHA and to properties not captured in NFIP reporting. All flooding involving these properties should be tracked and addressed by the community.

Exact number of repetitive loss /severe repetitive loss structures within the project area: 5

Residential and/or Commercial Structures

- Describe the residential and commercial structures impacted by this project, including how they contribute to the community such as historic, economic, or social value. Provide an exact number of residential structures and commercial structures in the project area.

The project is identified in the City of Chesapeake's 2002 Hazard Vulnerability Assessment and in the 2022 Hampton Roads Hazard Mitigation Plan, which is incorporated by reference into the DCR-approved City of Chesapeake Resilience Plan. Currently, this project directly benefits the Harbor Watch condominiums (pop.356), but it should be noted that this will be a foundational project that has the ability, in conjunction with other future projects to impact large portions of the communities directly south of the project site. Approximately 70,000 residents are located south of Battlefield Blvd and are impacted by road closures along this evacuation route. This project will therefore benefit approximately 27% of the overall population.

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