1877 - CID510156_CityofSuffolk_CFPF

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 9, 2023 1:05 PM
Initially Submitted By:	Heather Baggett
Last Submit Date:	
Last Submitted By:	

Contact Information

Primary Contact Information

Active User*:	Yes
Type:	External User
Name*:	Mrs. (Salutation) Heather (First Name) Middle Name Baggett (Last Name)
Title:	Environmental Specialist
Email*:	hbaggett@suffolkva.us
Address*:	442 W. Washington St.
	Suffolk (City) Virginia (State/Province) 23434 (Postal Code/Zip)
Phone*:	757-514-7627 Ext. (Phone) ###-###-####
Fax:	###-###-####
Comments:	

Organization Information

Status*:	Approved
Name*:	SUFFOLK, CITY OF
Organization Type*:	Local Government
Tax ID*:	54-6001636
Unique Entity Identifier (UEI)*:	PFBEDV4G5MF3

Organization Website: https://www.suffolkva.us/

Address*: 42 W. Washington Street

Suffolk Virginia 23434-
City State/Province Postal Code/Zip

Phone*: (757) 514-7627 Ext.
###-###-####

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

Benefactor:

Vendor ID:

Comments:

VCFPF Applicant Information

Project Description

Name of Local Government*: City of Suffolk

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

NFIP/DCR Community Identification Number (CID)*: 510156

If a state or federally recognized Indian tribe,

Name of Tribe:

Authorized Individual*: Albert Moor
First Name Last Name

Mailing Address*: P.O. Box 1858
Address Line 1

City Manager's Office
Address Line 2

Suffolk Virginia 23439
City State Zip Code

Telephone Number*: 757-514-7627

Cell Phone Number*: 757-266-8130

Email*: amoor@suffolkva.us

Is the contact person different than the authorized individual?

Contact Person*: Yes

Contact: Heather Baggett
First Name Last Name

P.O. Box 1858
Address Line 1

Public Works Engineering
Address Line 2

Suffolk Virginia 23439
City State Zip Code

Telephone Number: 757-514-7627

Cell Phone Number: 757-266-8130

Email Address: hbaggett@suffolkva.us

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

Project Description*:

The Driver Drainage Improvements project is an upgrade to the storm drainage system in the Driver area of Suffolk. Driver is a village, neighborhood, commercial, and historic district that experiences recurring flooding of roads and personal property. The current consultant, Timmons Group, completed a hydrologic & hydraulic study followed by a conceptual design in 2021. The project includes regrading existing ditches, upsizing existing pipes, and installing new pipes (in the intersection).

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*: No

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

Census Block(s) Where Project will Occur*: 1005, 2011, 2012, 2013, 2014 of 755.02

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

Is Project Located in a Special Flood Hazard Area?*: No

Flood Zone(s) (if applicable): majority X, outfall in X (shaded) or AE

Flood Insurance Rate Map Number(s) (if applicable): 5101560109E & 5101560128E

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*: No

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*: No

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:

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*: Scope of Work.pdf

Comments:
Scope of Work

Budget Narrative

Budget Narrative Attachment*: Budget Narrative.pdf

Comments:
Budget Narrative

Scope of Work Supporting Information - Projects

Supporting Information - Projects

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

Population*: 98537.00

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*: Historic Flooding Data.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*: No adverse impact.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*: The ability of local government to provide its share of the cost.pdf

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

Benefit-Cost Analysis*: Benefit-cost Analysis.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*: Repetitive loss and severe repetitive loss structures.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*:

This project directly benefits the residents and businesses of the village of Driver,
approximately 10% of the population of the City of Suffolk.

Driver is a neighborhood in the City of Suffolk located at the junction of State Route
337, State Route 125, and State Route 627. Originally named Persimmon Orchard, Driver was once located on the now-abandoned Atlantic Coast Line Railroad's line in the former Nansemond County between the former town of Suffolk and the City of Portsmouth, which itself was located in the former Norfolk County. In modern times, as the Hampton Roads area has become largely urbanized all around it, it has been said that Driver is a town "suspended in time." Driver, Suffolk, Virginia - Wikipedia

Driver Historic District is a national historic district located in Suffolk, Virginia. The district encompasses 20 contributing buildings in the crossroads community of Driver in Suffolk. The district includes eight residences, two churches, two school structures, a lodge, an outbuilding, and five commercial structures. They are in a variety of popular 19th and early-20th century architectural styles including Federal, Queen Anne, and Colonial Revival. Notable buildings include the Parker House (1820-1840), Norfolk and Carolina Railroad depot and station master's house (c. 1890), Brannon House (c. 1892), Arthur's Store (c. 1925),
Randy's Rods, Driver Variety Store, Beech Grove United Methodist Church, Berea
Congregational Christian Church (c. 1891), Dejarnette High School (1926), and Harmony Lodge #149 (1938). Driver Historic District - Wikipedia

The project is included in the DCR-approved City of Suffolk Resilience Plan and is consistent with the mitigation actions identified in the 2022 Hampton Roads Hazard Mitigation Plan.

There are 3,163 residential structures (census tracts 755.02, 752.07, and 752.08) (Source: Census Tract 752.07, Suffolk, VA - Profile data - Census Reporter) and 683 commercial structures in the project area (Source: 23435 ZIP Code Profile, Map, Data & Demographics (hometownlocator.com)).

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

Critical Facilities/Infrastructure*:

Suffolk Fire and Rescue Station #10 at 4869 Bennetts Pasture Rd.
Nansemond River High School at 3301 Nansemond Pkwy.
John Yeates Middle School at 4901 Bennetts Pasture Rd.

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 Plan. The approved FY24 CIP is available at:
www.suffolkva.us/DocumentCenter/View/8095/FY-2024-2033-Planning-Commission-Adopted-

Capital-Improvements-Program-and-Plan

Number of relevant staff members:
- 1 Floodplain Administrator
- 1 Development and Environmental Manager
- 1 additional Certified Floodplain Manager
- 4 Civil Engineers
- 1 Senior Environmental Planner
- 1 Deputy Emergency Management Coordinator

Relevant Software: Cityworks, Bluebeam Revu, Microsoft Office Suite, ArcGIS

Capabilities: The City has engineers and environmental staff in Public Works Engineering and Public Works Operations to manage the design and construction work performed by consultants and contractors, as well as construction inspectors to conduct inspections during each phase of construction.

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*:

This area experiences frequent flooding due to the old and undersized drainage system. The 2021 Timmons Group study included as Attachment A recommended drainage improvements to improve the conditions and prevent flooding. This project includes the construction of stormwater pipes and inlets to support connections to the existing system and ditches to enhance stormwater drainage capacity. The project will address transportation, public and mental health, providing a more secure evacuation route by alleviating flooding among other locations, at the primary intersection in the study area, within the 3-year performance period allowed by the program.

Goal 1. Reduce the frequency and severity of flooding impacts to the project area.

Currently, much of the area floods during the 5-yr 24-hr design storm. Very little of the system has the capacity for the 10-yr storm. See Attachment A for more details.

Goal 2. Improve the quality of life for impacted residents and businesses. Improve transportation network and emergency response, access, and egress by reducing roadway flooding.

The expected results and benefits of the project are in line with the project goals to decrease flooding risk and increase resilience as it relates to emergency response, access and egress. Additional benefits include provision of a neighborhood amenity and decreased financial burden and loss associated with flooding.

Primary benefits provided by the project include: (1) Reduces physical damage to road and building infrastructure from frequent flooding and (2) Reduces loss of service to road infrastructure. Secondary benefits provided by the project include social benefits including more reliable access to the community therefore reducing impacts to the livelihoods of the hundreds of residents in the community.
Project success shall be documented through continued collection of flooding data and citizen reports and comparison with rainfall data to evaluate performance under various storm and tidal conditions. Lack of flooding during an event similar to the 10-year 24-hr storm will be considered a success.

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 milestones and deliverables.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*:

This project is included in the City of Suffolk DCR-approved Resilience Plan. 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- Staff Training & Resilience Plan Development (awarded)
- Grant Round 3- Study- Finney Outfall to Nansemond River Drainage Area Study (awarded)
- Grant Round 3- Study- Kimberly Bridge Feasibility Study (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 drainage analysis 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*: Maintenance and management plan.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*:

SCORING CRITERIA PER CATEGORY
Projects

Eligible Projects, 10 points.
-All other projects (10), Storm system upgrades

Social Vulnerability Index Score, 5 points.
-Moderate Social Vulnerability (0.0 to 1.0) (5)
Average SVI of 0.8.

Community scale of benefits, 30 points.
-More than one census block (30)
Census blocks 1005, 2011, 2012 2013, 2014 of 755.02

Expected lifespan of project, 10 points.
-Over 20 Years (10)

Remedy for NFIP probation or suspension- No (0 points)

Proposed project part of a low-income geographic area- No (0 points)

Proposed project implements a Chesapeake Bay TMDL BMP- No (0 points)

Budget

Budget Summary

Grant Matching Requirement*: All other Projects - Fund 50%/Match 50%

Total Project Amount*: $1,960,000.00

REQUIRED Match Percentage Amount: $980,000.00

BUDGET TOTALS

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

Match Percentage: 50.00%
Verify that your match percentage matches your required match percentage amount above.

Total Requested Fund Amount: $980,000.00

Total Match Amount: $980,000.00

TOTAL: $1,960,000.00

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
Phase I + Phase II + pipe installation	$801,913.00	$801,913.00	Driver Drainage CIP and Citywide Drainage CIP
	$801,913.00	**$801,913.00**	

Contracts

Description	Requested Fund Amount	Match Amount	Match Source
Design and CEI	$148,087.00	$148,087.00	Driver Drainage CIP and Citywide Drainage CIP
	$148,087.00	**$148,087.00**	

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
Easement costs	$30,000.00	$30,000.00	Driver Drainage CIP and Citywide Drainage CIP
	$30,000.00	**$30,000.00**	

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)		Att. A- Driver Lane Drainage Study (including maps)	AttA_Driver Lane Recommended Mitigation Measures Report.pdf	pdf	4 MB	11/09/2023 08:41 AM
FIRMette of the project area(s) (Projects/Studies)		Att. B- FIRMette for Driver area	AttB_FIRMETTE_e8c0b4f3-20dd-4b98-b24d-de1e201a34df.pdf	pdf	714 KB	11/08/2023 09:07 AM
Historic flood damage data and/or images (Projects/Studies)		Att. C- Photos and Videos of flooding in Driver Nov 2020	AttC_City files ref flooding.zip	zip	202 MB	11/09/2023 11:10 AM
A link to or a copy of the current floodplain ordinance		Link to Suffolk's current floodplain ordinance	Link to current floodplain ordinance.pdf	pdf	700 KB	11/08/2023 08:57 AM
Maintenance and management plan for project		Maintenance and management plan	Maintenance and management plan.pdf	pdf	736 KB	11/08/2023 09:05 AM
A link to or a copy of the current hazard mitigation plan		Link to current hazard mitigation plan	Link to copy of current hazard mitigation plan.pdf	pdf	359 KB	11/08/2023 09:26 AM
A link to or a copy of the current comprehensive plan		Link to current Comprehensive Plan	Link to current Comprehensive Plan for Suffolk.pdf	pdf	393 KB	11/08/2023 09:27 AM
Social vulnerability index score(s) for the project area		Att. D- Social Vulnerability Index Map for Driver	AttD_SVImapDriver.pdf	pdf	206 KB	11/09/2023 11:11 AM
Authorization to request funding from the Fund from governing body or chief executive of the local government		Att. E Authorization to request funding letter	Att. E- Signed Authorization Letter.pdf	pdf	312 KB	11/09/2023 11:08 AM
Signed pledge agreement from each contributing organization						
Maintenance Plan		Maintenance and management plan	Maintenance and management plan.pdf	pdf	736 KB	11/09/2023 08:38 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		Benefit-cost Analysis- N/A	Benefit-cost Analysis.pdf	pdf	701 KB	11/09/2023 08:39 AM
Other Relevant Attachments		Att. F Cost Estimate and Att. G Concept Plan	Att F Cost Estimate and Att G Concept Plan.pdf	pdf	7 MB	11/09/2023 11:02 AM

Letters of Support

Description	File Name	Type	Size	Upload Date
No files attached.				

Resilience Plan

Resilience Plan

Description	File Name	Type	Size	Upload Date
City of Suffolk Resilience Plan	Suffolk Final Resilience Plan_11-21-2022.pdf	pdf	6 MB	11/06/2023 02:54 PM

RESILIENCE PLAN

CITY OF SUFFOLK, VIRGINIA

NOVEMBER 2022

Prepared by: The City of Suffolk Department of Public Works

With assistance from: Timmons Group

RESILIENCE PLAN

CITY OF SUFFOLK, VIRGINIA

DRAFT SUBMITTED AUGUST 2022

RESUBMITTED SEPTEMBER 2022

FINAL SUBMITTED NOVEMBER 2022

PREPARED FOR:

THE CITY OF SUFFOLK

PREPARED BY:

TIMMONS GROUP
YOUR VISION ACHIEVED THROUGH OURS.

2901 S Lynnhaven Road, Suite 200

Virginia Beach, Virginia 23452

757.213.6679

www.timmons.com

Contents

List of Tables & Figures

Executive Summary

The City of Suffolk has developed this 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 to 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 Suffolk 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 Suffolk 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 Suffolk plans to explore looking forward. At this time, the City has identified 15 individual projects and 3 phased projects representing planned improvements to improve flooding resilience. These projects vary in scope, cost, funding availability, and anticipated implementation.

Ultimately, the City of Suffolk 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 Suffolk 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 Suffolk 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 Suffolk.

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 to 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, Parks and Recreation, 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 Suffolk's History

The banks of the Nansemond River were first settled by the British around 1608, setting up the path for the city's rich history[1]. Suffolk was established in 1742 and was originally part of the County of Nansemond. The town was incorporated as a city in 1910. In 1974, Suffolk merged with Whaleyville, Holland, and the County of Nansemond, becoming the largest city in Virginia (geographically) [c2][2].

As the largest city by size in Virginia and the 11th largest in the country, Suffolk has an overall land area of nearly 430 square miles, or 275,200 acres[3]. Located in the center of the Hampton Roads region of Southeastern Virginia, the city is bounded by the cities of Portsmouth and Chesapeake, the counties of Southampton and Isle of Wight, the James River, and the state of North Carolina[4]. In 1900, the population of the City of Suffolk was about 23,000 people. By 1970, the population had doubled to just over 45,000 people. Between 1970 and 1990, the city experienced rapid growth with the population growing by another 50% to 52,143 people[5]. In 2020, the city had a population of 92,108 people[6].

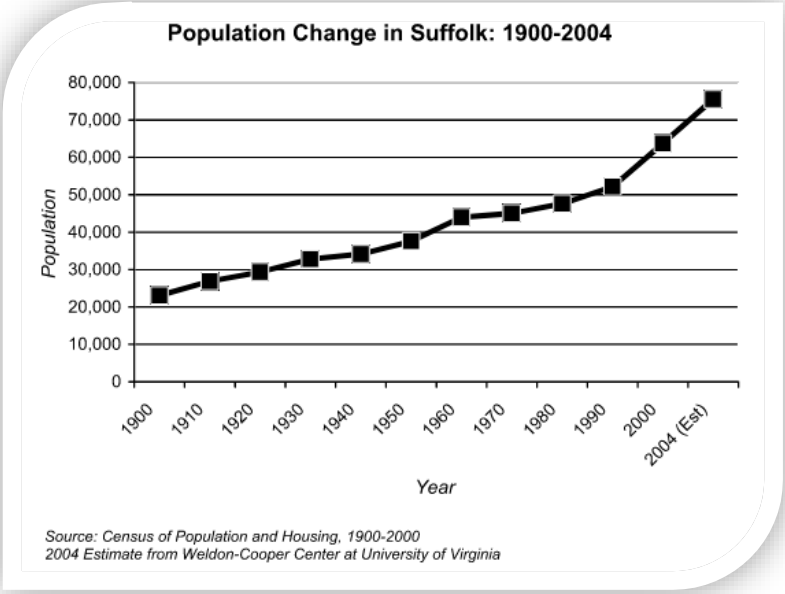


Figure 1: Population Growth in Suffolk from 1900 to 2004

[1] (Suffolk, Virginia, 2005)
[2] (Hampton Roads Planning District Commission, 2017)
[3] (Hampton Roads Planning District Commission, 2017)
[4] (City of Suffolk, 2016)
[5] (Planning C. o., Comprehensive Plan for 2026, 2006)
[6] (Planning B. , 2018)

Although about 75% of the city is considered agricultural, the city continues to grow. An increase in flooding and natural hazards has accompanied growth experienced by the city and is projected to continue increasing. Suffolk is located partially in the James River Watershed, the Chowan River Watershed, and the Dismal Swamp Watershed, all of which can be seen in Figure 2. Approximately 98,508 acres, or 38.3%, lies within the James River Watershed. Approximately 79,989 acres, 31.1%, lies within the Chowan River Watershed. Approximately 78,703 acres, or 30.6%, lies within the Dismal Swamp Watershed [c2][7].

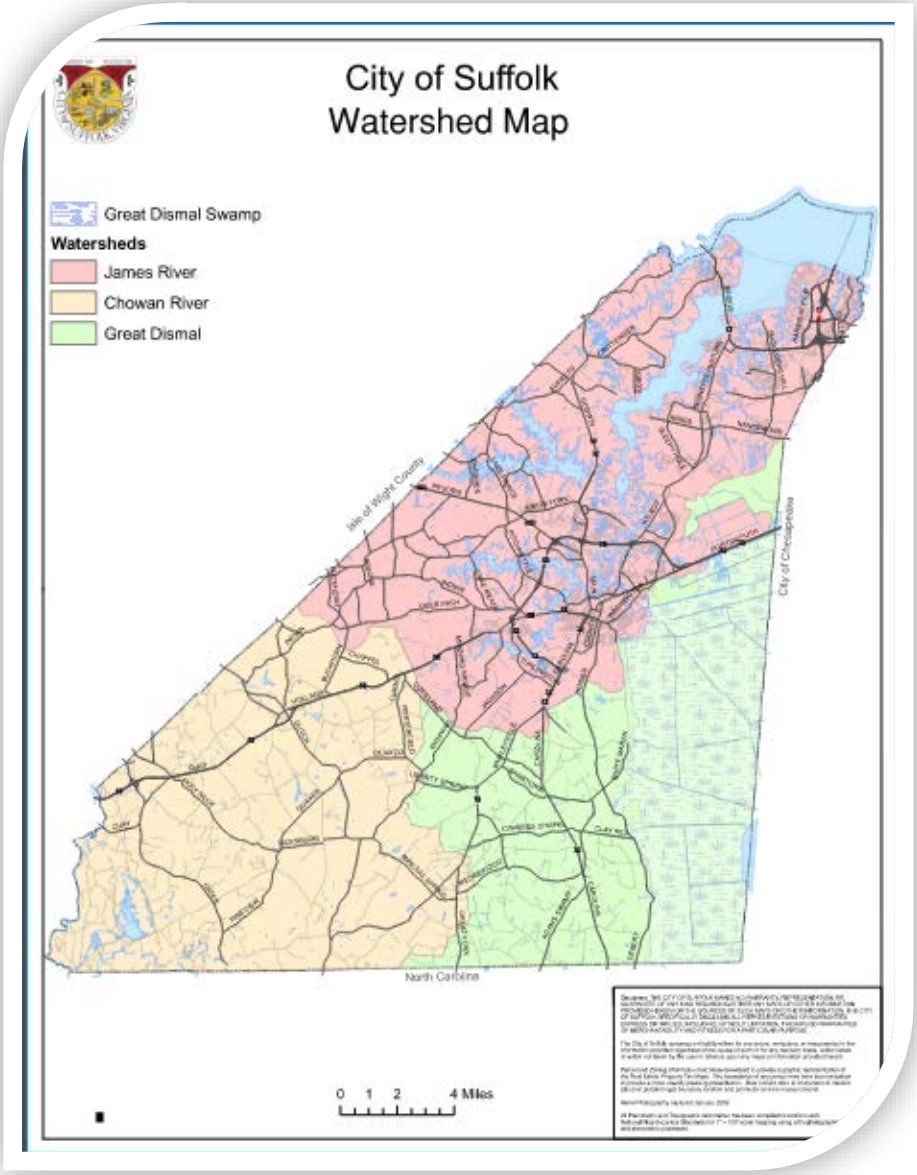


Figure 2: James River, Chowan River, and Dismal Swamp Watersheds

[7] (City of Suffolk, 2016)

The City has been avidly involved in stormwater management for roughly 20 years. Suffolk became a Municipal Separate Storm Sewer System (MS4) in the early 2000s through their Virginia Pollutant Discharge Elimination System (VPDES) program as well as following their Virginia Stormwater Management Program (VSMP). The City's Watershed Master Plans for specified regions and MS4 documents address the quality and quantity of our stormwater runoff while meeting state and federal regulations.

According to the Hampton Roads Mitigation Planning Committee, comprised of locality representatives to assist with Hampton Roads Hazard Mitigation Plan development, flooding and coastal storms are considered the most significant hazards that threaten the City of Suffolk. Because the community of Suffolk contains a significant number of critical facilities and infrastructure, it is important to prioritize hazard risks in order to delegate mitigation strategies and actions [c2][8].

[8] (Hampton Roads Planning District Commission, 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 Suffolk 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. Figure 3 reflects the two major development areas – the Central and North Growth areas – as presented in the Comprehensive Plan for 2026[9] and carried forward into the 2035 Comprehensive Plan[10]. See http://webmap.suffolk-va.net/FemaFloodMap/index.html for the entirety of the floodplain mapping.

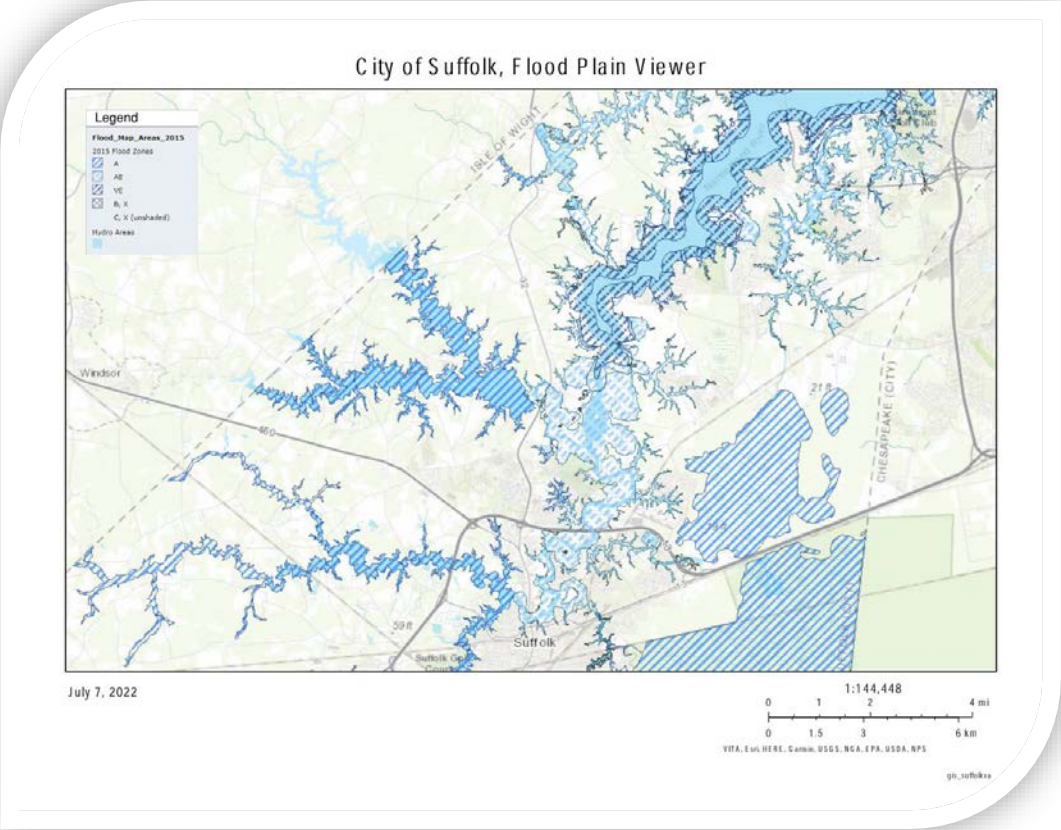


Figure 3: Floodplains in the City of Suffolk

[9] (Planning C. o., Comprehensive Plan for 2026, 2006)
[10] (Planning C. o., Comprehensive Plan for 2035, 2015)

- Zones A and AE shown are high flood risk areas, referred to as a 100-year (1% chance) floodplain
- Zone VE regions are high risk flood areas, referred to as a 100-year (1% chance) floodplain, when additional hazards due to storm-induced velocity wave action are present
- Zone X (shaded) regions pose a moderate flood risk and is referred to as a 500-year (0.2% chance) floodplain.

2.1.1 Precipitation Flooding

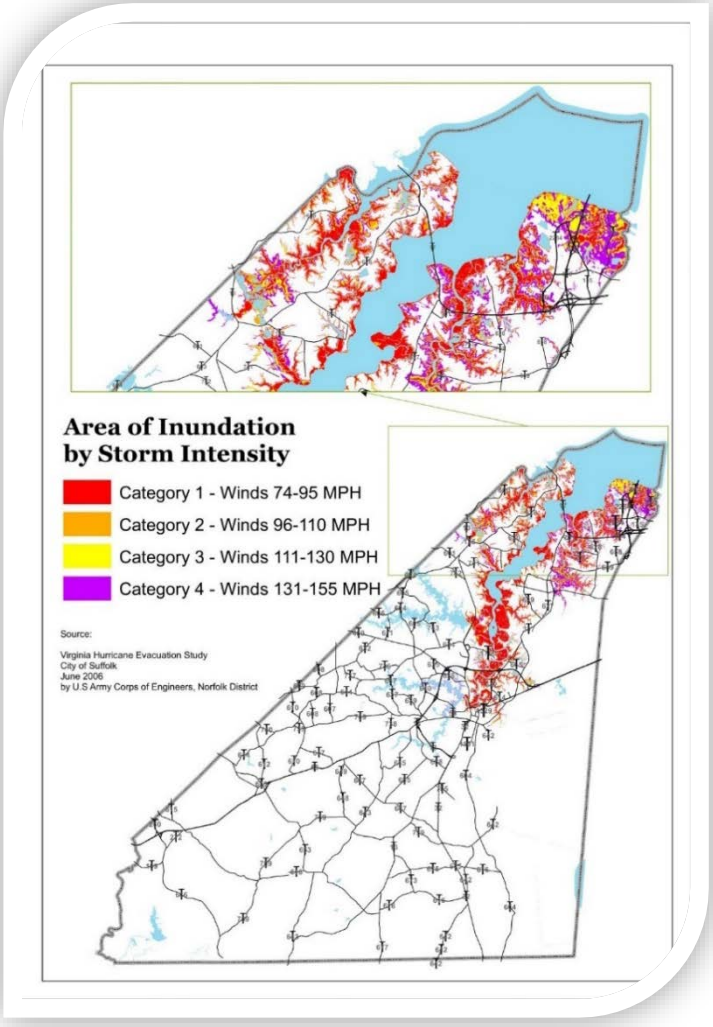
Old, undersized, stormwater infrastructure or lack thereof is a leading contributor to flooding issues; the capacity to which infrastructure is designed to convey relative quantities of water is essential to managing flooding. Policies and regulations pertaining to stormwater management requirements 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 mid 2000s, the City of Suffolk has worked to develop and update studies throughout the City to identify and recommend improvements for undersized infrastructure. 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.

2.1.3 Storm Events

Coastal regions, like Suffolk, are especially vulnerable to flooding from extreme weather events, including hurricanes and nor'easters. From a study done in 2006, Figure 4 shows the potential for flooding based off of storm intensity for developed areas in Suffolk.



Virginia Hurricane Evacuation Study Map-of-Hurricane-Flooding-potential-for-Suffolk-PDF (suffolkva.us)

Figure 4: Potential Hurricane Flooding for Suffolk

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. These various tropical cyclones have caused approximately 230 deaths and cost the Commonwealth more than one billion dollars in damages[11].

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[12]. 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[13].

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[14].

The probability of Suffolk 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[15].

Nor'easters are also a primary cause of coastal flooding as the wind's direction pushes water up into smaller creeks and tributaries, limiting their capacity for runoff. Due to the northeasterly orientation of the Nansemond River, wind-driven tidal events are responsible for much of the flooding experienced in Suffolk.

2.1.4 Shoreline Erosion

Shoreline erosion along the banks of the Nansemond River is a concerning natural hazard pressing Suffolk'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

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

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[16].

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.[17]

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[18] .

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[19].

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 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[20].

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

[16] (Hampton Roads Planning District Commission, 2017)
[17] (Hampton Roads Planning District Commission, 2017)
[18] (Hampton Roads Planning District Commission, 2017)
[19] (Hampton Roads Planning District Commission, 2017)
[20] (Hampton Roads Planning District Commission, 2017)

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[21].

2.2.3 Hazardous Material Incidents

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

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[22].

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. Critical facilities can be broken into six categories, which are:

- Government Facilities
- Essential Facilities
- Transportation Systems
- Lifeline Utility Systems
- High Potential Loss Facilities
- Hazardous Material Facilities

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

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 hospitals and 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
- 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

Below, Figure 5 shows all major highways, railroads, and gas lines in the City that can impact critical facilities. Detailed maps of all critical facilities for the City of Suffolk can be found in Appendix C. [c8]

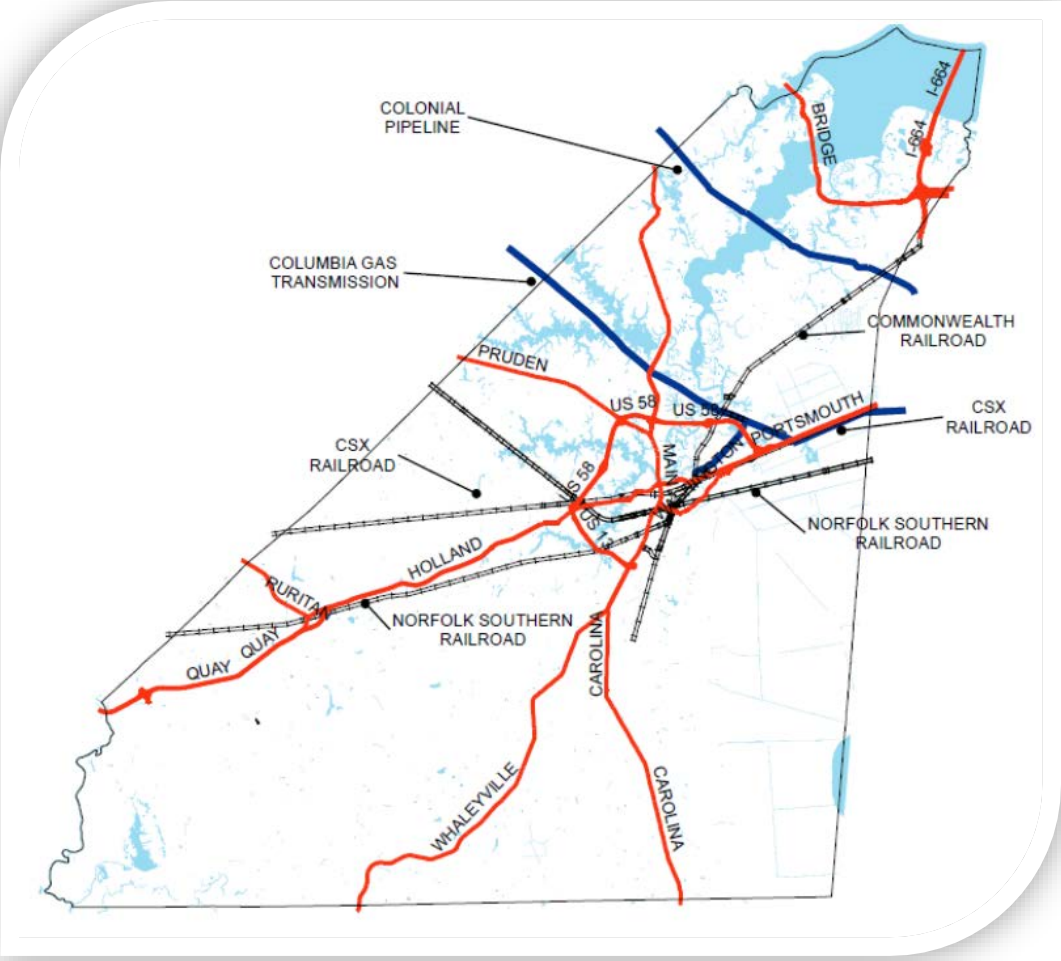
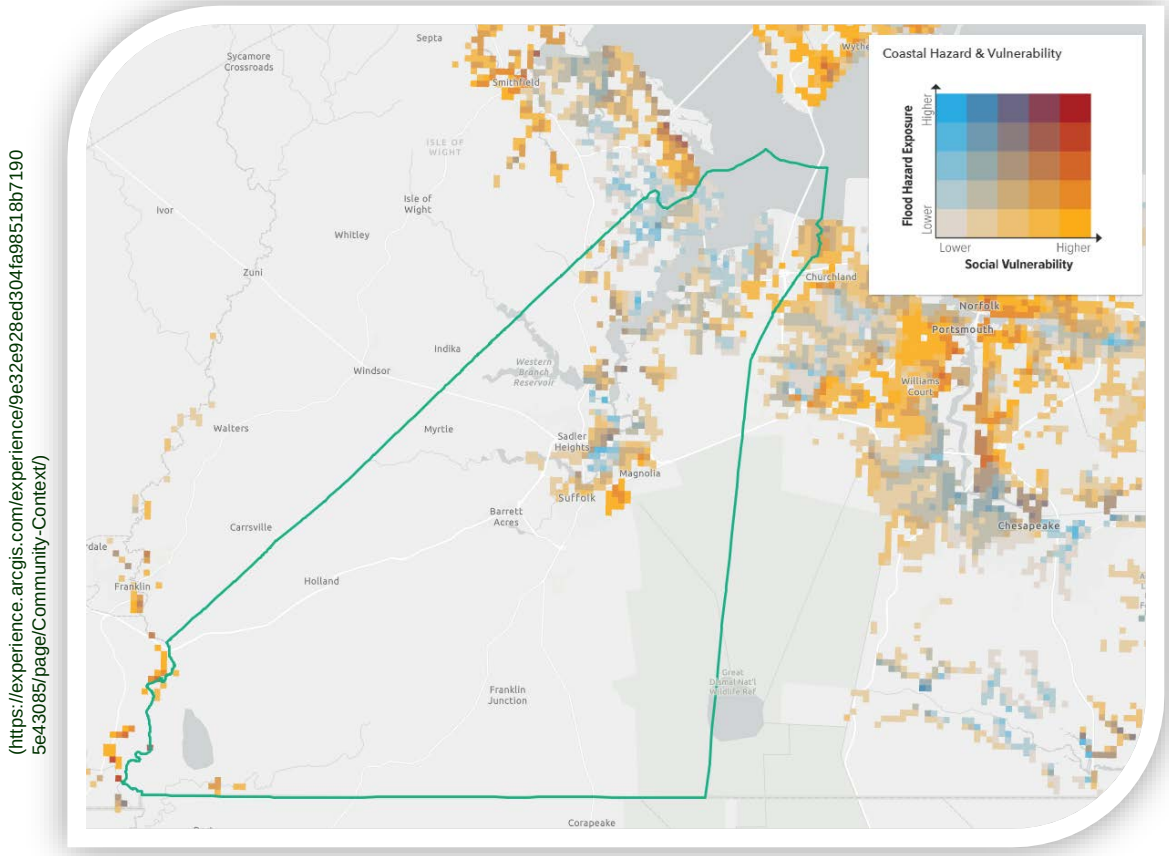


Figure 5: Networks Impacting Critical Facilities

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.

When addressing natural hazards, the communities facing the largest impending threats should be a focal point. The following graphic, Figure 6, borrowed from the Virginia Coastal Resilience Web Explorer, depicts the interaction of community socioeconomic vulnerability and coastal flood hazard exposure. Neighborhoods in yellow have a high level of social vulnerability (based on 2040 demographics) while those in blue have high level of exposure to coastal flood threats (based on all modeled 2080 flood scenarios). In Suffolk those areas most stressed in both categories appear as dark gray or muted gold [c3][23]



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

Figure 6: Social Vulnerability and Flood Hazard Exposure in Suffolk

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

3.0 Current Efforts to Reduce Flooding & Develop Resilience

The City of Suffolk 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 Suffolk 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]

One of the main goals for the City of Suffolk in the development of their Resilience Plan was that the community had direct input before and during the development of the plan. The City released a survey that was used to collect public input. The survey gave the community an opportunity to express what they believed some of the major stormwater-related issues are in the City.

The survey was provided as an online questionnaire with thirteen distinct questions that encapsulated the key components of how the Resilience Plan could have a direct impact on citizens. Questions included “How frequently are roads you travel on… impassable due to flooding” which asked for respondents to indicate specific streets that had issues, and “How often have you experience real estate property loss due to flooding – regardless of filing a claim, beyond minor low-cost cosmetic damage?” and allowed for five different response levels to help the City understand current and previous flood risks and potential financial impacts. The questionnaire was also used to develop forward looking efforts such as “How useful would roadway flooding sensors and physical warning devices be for your daily travels within the City of Suffolk?” and “Should the City consider purchasing a conservation or drainage easement on property you own in an effort to prepare for and reduce flooding?” which also allowed for participates to elaborate on their responses.

A total of 123 people participated in the survey that was open for the entire month of March 2022. In addition, the City will accept comments from the public on the Resilience Plan. Through these actions, the City was able to directly involve the community in efforts to reduce flooding and develop resilience.

The City coordinates several large community clean-ups every year (Nansemond River Clean-up, Clean the Bay Day, International Coastal Clean-up, etc), which ultimately improve drainage and water quality by keeping litter out of storm systems and waterways. In addition, the City loans clean-up equipment to citizens who wish to hold their own clean-ups. In fiscal year 2022, 21.82 tons of trash were collected during these clean-ups.

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

In addition, the City also holds several Recycling Drives every year where citizens can responsibly dispose of tires, household hazardous waste, and recyclables, among other things. In fiscal year 2022, 436 residents disposed of household hazardous waste, and 829 tires were disposed during these events.

The City of Suffolk offers several programs for the community to stay involved in environmentally friendly practices to protect local waterways. The Stormwater Medallion Program reminds the community how important it is to prevent pollution from entering storm systems. The "Become a Bay Star Home" program encourages residents to follow different practices that will help improve water quality as more residents join [c11]. More information about these programs can be found at:

https://www.suffolkva.us/274/Public-Involvement

The City encourages citizens to get involved by utilizing Pet Waste Stations in parks and neighborhoods. Through the "Scoop the Poop" campaign, the City distributes pet waste bag holders at public events to encourage citizens to pick up after their animals. By doing so, the City is involving the community in its effort to reduce a common source of bacteria pollution[25]. [c11]

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. 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 [c11,12].

Any employees who work in operations and maintenance of City or Public Schools are required to complete training on pollution prevention and illicit discharge identification and notification. This training is typically conducted annually and is an effort to educate the population about stormwater management[26]. [c4, c12]

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[27] [c11, c12]:

http://askhrgreen.org/

https://www.suffolkva.us/287/Public-Outreach

http://www.suffolkva.us/1025/Suffolk-Citizen-Connections

Report | Suffolk, VA (suffolkva.us)

[25] (City of Suffolk, 2016)
[26] (City of Suffolk, 2016)
[27] (City of Suffolk, 2016)

3.1.3 Notification

Suffolk Mass Notification System was developed to keep residents safe with quick, reliable emergency notifications and public service announcements. The system is used to inform residents about [c12]:

- Severe weather
- Unexpected road closures
- Emergencies

Information can be distributed across a variety of telecommunications paths. Messaging may be in voice or text-data forms, depending on the situation, capabilities of the receiving device(s), and choice(s) of the recipient[28]. The site where more information can be found is listed below.

https://member.everbridge.net/337829242601621/ov

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.

3.2.1 FEMA

FEMA's Hazard Mitigation grant funds hazard mitigation projects that include sea level rise estimates in an effort to protect infrastructure and structures that repetitively floods. These FEMA-funded Mitigation Reconstruction projects will assist rural and commercial areas that flood during most significant rainfalls [c1, c4, c15][29].

3.2.2 MS4

The City of Suffolk is a Phase II MS4 and was first permitted in the early 2000's 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. The City does have personnel that are DEQ certified and is currently working towards more certifications. Suffolk also manages various public outreach and education campaigns through the MS4 program [c4,c11,c12]. The program includes minimum control measures for the following areas:

- Public Outreach and Education
- Public Involvement
- Illicit Discharge Detection and Elimination
- Construction Site Storm Water Runoff Control
- Post Construction Storm Water Management in New Development and Redevelopment
- Pollution Prevention/Good Housekeeping for Facilities Owned and Operated by the Permittee

Through HRPDC, the Regional Stormwater Management Program assists in funding for technical and advisory assistance so that the City may meet any requirements issued by the MS4[30].

[28] (Suffolk Keeps Citizens Safe and Informed with Suffolk Mass Notification System, 2020)
[29] (Hampton Roads Planning District Commission, 2017)
[30] (Commission H. R., 2013)

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

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.

Suffolk has multiple policies and programs in place to benefit the community, as follows[31] [c3 , c12]:

- Building and Fire Code
- Capital Improvements Plan
- Comprehensive Land Use Plan
- Economic Development Program
- Emergency Operations Plan
- Evacuation Plan
- Flood Damage Prevention Ordinance (feet freeboard)
- Hazard Mitigation Plan
- Historic Preservation Plan
- Unified Development Ordinance
- National Flood Insurance Program
- Open Space Management Plan
- Radiological Emergency Plan
- SARA Title III Plan
- Stormwater Management Program
- Subdivision Ordinance
- Zoning Ordinance

3.3.1 Comprehensive Plan

The 2035 Comprehensive Plan, adopted in April 2015, is the second update to the 2018 Comprehensive Plan that established the City's desired growth strategy[32]. The Plan reiterates a set of principles and values, carried over from the 2026 Comprehensive Plan, that guide Plan development and represent the community vision.

1. Maintain an efficient transportation network with effective choices for mobility.
2. Define and enhance the various unique character types and development patterns within the City.
3. Promote a diverse housing stock, providing options in terms of type, location, and affordability
4. Protect the natural, cultural, and historical assets of the City.
5. Maintain high-quality services and facilities as growth occurs.
6. Preserve the agricultural heritage and character of the City.
7. Keep jobs and schools near population centers.

[31] (Hampton Roads Planning District Commission, 2017)
[32] (Planning C. o., Comprehensive Plan for 2035, 2015)

There are six overall plan themes reinforced in the 2035 Comprehensive Plan that were carried over from the 2026 and 2018 Comprehensive Plans. Those themes are listed below in Figure 7 [c4].

Overall, the 2035 Comprehensive Plan strives to protect irreplaceable natural resources and historical areas. [c2,c14]

Figure 7: 2026 Comprehensive Plan Themes

The City of Suffolk has two main Suburban/Urban Growth Areas, which can be seen below in Figure 8. As the growth levels continue to rise, concerns regarding increased traffic congestion, demand for new schools, and land costs may rise as well [c5]. To combat these potential challenges that can arise, the Comprehensive Plan includes a focused growth framework that anticipates a certain amount of growth in the following years with different actions to maintain the high quality of life that residents have come to expect. One of the goals of the focused growth framework aims to increase recreation for new residents. With a rich history dating back to the 1600's, the City feels it is important to preserve its history and celebrate its culture. The City plans to do so by developing a system of Parks and Recreation facilities that will provide equitable opportunities for all citizens while emphasizing the unique history and culture of the City [33][c6, c9].

[33] (Planning C. o., Comprehensive Plan for 2035, 2015)

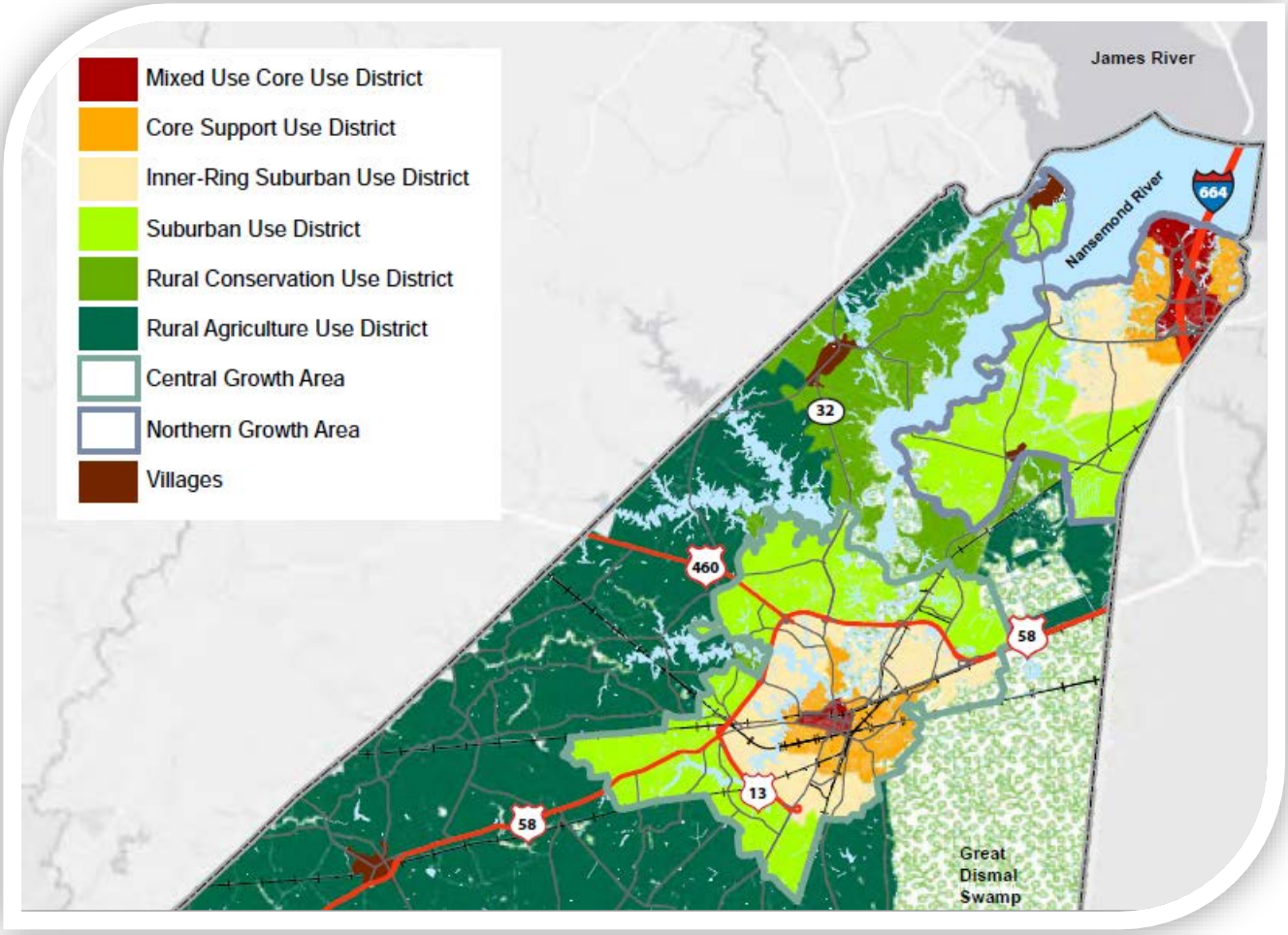


Figure 8: Focused Growth Areas in Suffolk

Part of the framework for protecting and preserving the abundance of unaltered natural areas that Suffolk has to offer falls under the comprehensive planning process. Policies and action statements were developed to maintain and protect the state of the City's natural resources, while the needs of continued development were balanced and maintained. In the 2026 Comprehensive Plan, the City has opted to examine different opportunities for conservation easements, which will ensure that some private land will be entirely safe from development[34] [c6, c9].

The 2035 Comprehensive Plan highlights the importance of water resources and water quality protection, with an emphasis on the Chesapeake Bay [35]. Though the City currently implements a variety of water quality protection programs, surface water quality in the City continues to show signs of impairment[36]. 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. Suffolk has also placed an emphasis on wetland protection and restoration as a means to improve water quality and reduce flood and storm

[34] (Planning C. o., Comprehensive Plan for 2026, 2006)
[35] (Planning C. o., Comprehensive Plan for 2035, 2015)
[36] (Planning C. o., Comprehensive Plan for 2026, 2006)

damage by regulating water levels [c9, c10]. Under the 2035 Comprehensive Plan theme of Environmental Protection, the City has developed a policy that will protect lakes, rivers, streams, and reservoirs from the negative impact of development[37]. Some of the actions under this policy include:

- Continue to implement and enforce the Chesapeake Bay Preservation Act
- Preserve tidal marshes along City shorelines
- Continue to enforce the provisions of the Floodplain Overlay District and associated Flood Insurance Rate Maps
- Continue to support the implementation of shoreline protection measures
- Promote coastal water quality improvement initiatives for the protection of spawning and nursery grounds
- Continue to explore and implement new and innovative techniques to apply water quality protection measures beyond those of the Chesapeake Bay Preservation Act and Regulations.
- Continue to identify, adopt, and implement appropriate measures to protect water quality in the Great Dismal Swamp Wildlife Refuge.
- Continue to work with the health department to update septic system regulations to better protect water quality.
- Continue to work closely with neighboring jurisdictions in efforts to improve the effectiveness of the region's watershed management program.
- Continue to implement and enforce stormwater regulations related to pre and post-development activities.
- Continue promote development activities that implement TMDL action plan requirements.

3.3.2 Code of Ordinances and Unified Development Ordinance

The Code of Ordinances and Unified Development Ordinances have a multitude of actions that can assist the City of Suffolk with reducing vulnerabilities relating to flooding. Some examples of topics include flood mitigation, wetland restoration, creation of open space, emergency response, and property buyout for frequently flooded areas. Below, Table 1 lists different sections that discuss wetland restoration, wetland buffer requirements, and property buyout for frequently flooded areas[38] [39] [c7, c9, c10].

Sec. 31-409	Incentive Zoning
Sec. 31-415	Chesapeake Bay Preservation Overlay District (CB)
Sec. 31-603	Landscaping Standards
Sec. 31-607	Parks and Open Space
Sec. 31-615	Water Quality Stream Buffers
Sec. 90-510	Establishment of Stormwater Management Utility

Table 1: Ordinances Relating to Wetland Restoration, Buffer Requirements, and Property Buyouts

[37] (Planning C. o., Comprehensive Plan for 2035, 2015)
[38] (Council, Code of Ordinances, 2022)
[39] (Council, Unified Development Ordiance , 2021)

The Chesapeake Bay Preservation Area (CBPA) of the City was created and then adopted by city council on September 19, 1990, 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. The City's RPA is more stringent than other localities that are a part of the CPBA[40] [c5]. The following figure presents the City CBPA as depicted in the 2035 Comprehensive Plan.

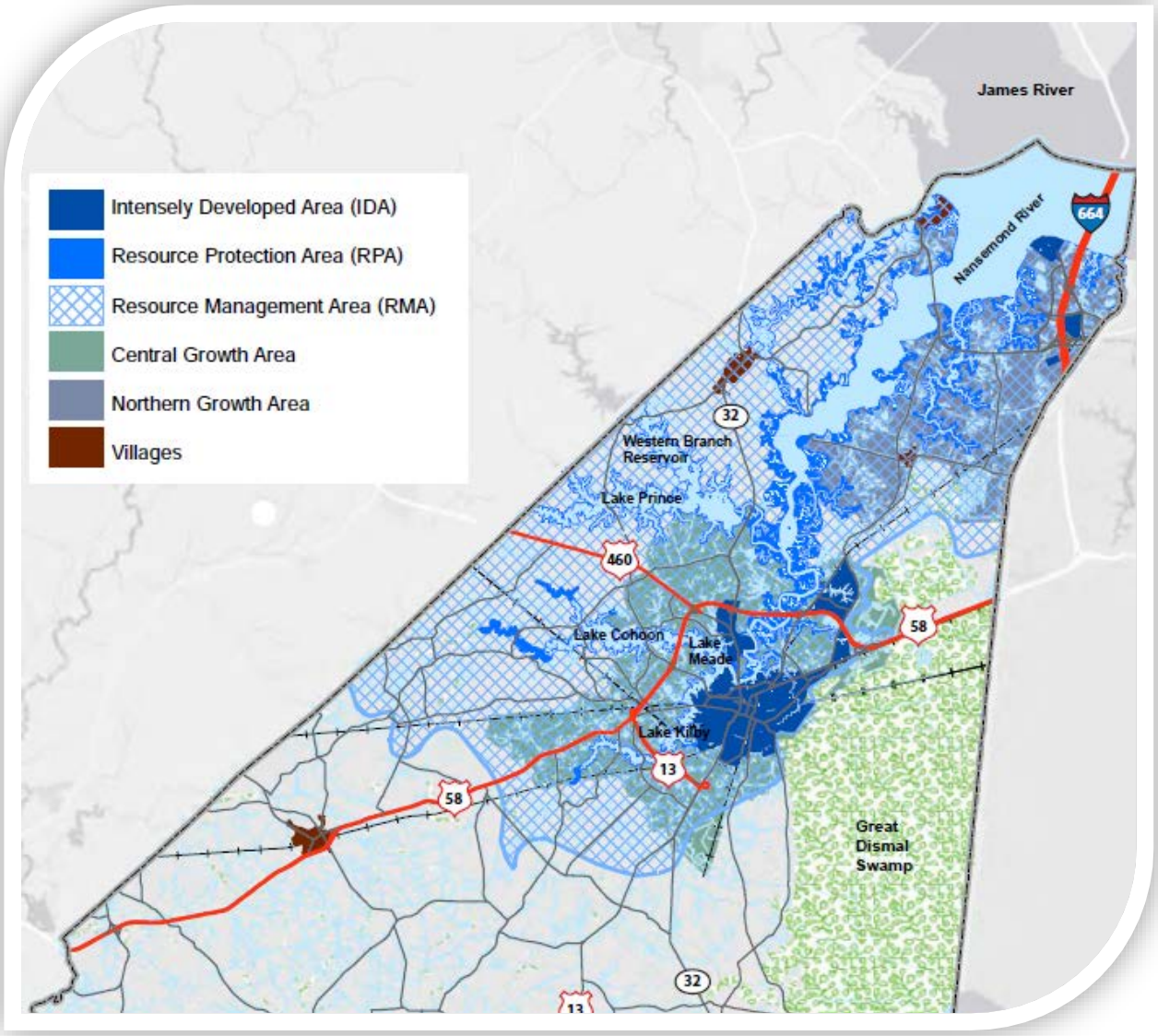


Figure 9: City of Suffolk Chesapeake Bay Preservation Area

[40] (Council, Unified Development Ordiance , 2021)

The City is able to fund some stormwater infrastructure improvements through the Pro Rata program which is defined in the City Unified Development Ordinance as responsibility of cost in development of suitable stormwater infrastructure is shared by the City and developers. The developer pays into a fund based on the amount of impervious cover and major watershed location of the development. He is still required to meet all City and Virginia Stormwater Management Program requirements for the development or redevelopment site.

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 total maximum daily load requirements to be addressed. The design storm for system capacity also increases with increased contributory drainage area. [c1]

The PFM addresses Dam Safety and summarizes the Virginia Dam Safety Act that is regulated by the Virginia Department of Conservation and Recreation (DCR). Dams are not subject to the Virginia Dam Safety Act if they follow specific criteria as provided in the PFM. This information is readily available to the public [41]. The City has developed a community dam safety inventory and has conducted a risk assessment for their one high risk dam – Godwin Millpond Dam in the Chuckatuck area. [c13]

3.3.4 City-wide Watershed Master Plans and Other Focused Studies

Much of Suffolk has been studied as part of a Watershed Master Plan or other focused study. The goal of these plans is to assist the City in making stormwater decisions to accommodate future development for projected 2026 landuse while assessing existing conditions. The City started preparing MDPs in the mid 2000s and several more focused studies have been developed more recently. The three major watersheds for master planning are the James River, Chowan River, and Great Dismal Swamp watersheds. [c1]

In addition to the Watershed Master Plans, the City has also developed 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 plans 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 plans 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 Suffolk has developed several TMDL Action Plans as follows:

- Chesapeake Bay TMDL Action Plan (2019)
- City of Suffolk TMDL Action Plan for Bacteria Reduction (2020)

[41] (City of Suffolk Public Facilities Manual, 2014)

Figure 10 below from the City of Suffolk TMDL Action Plan shows all impaired watersheds that are present within city boundaries.

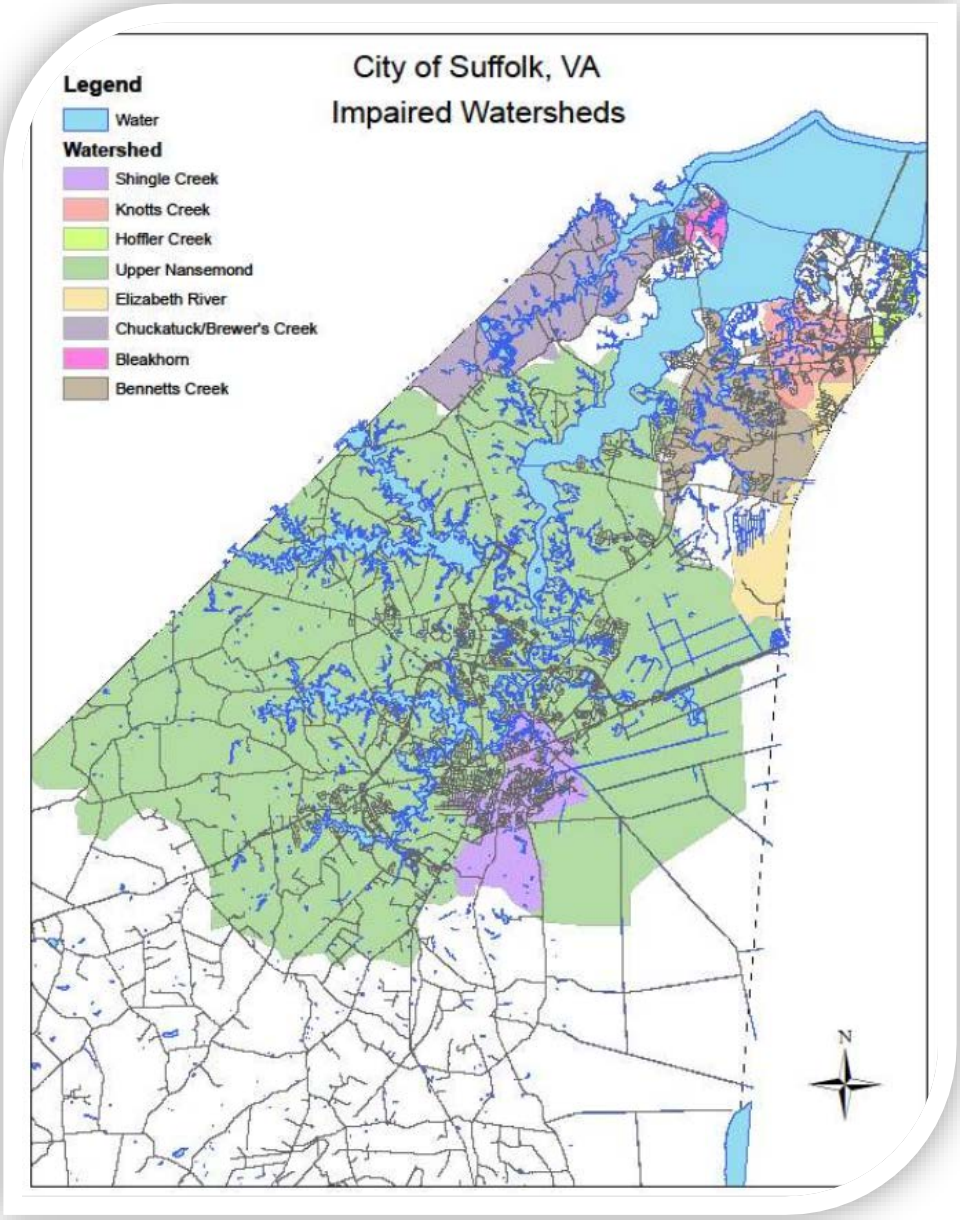


Figure 10: Impaired Watersheds for the City of Suffolk

3.4 Regional Efforts

3.4.1 Hampton Roads Hazard Mitigation Plan (2017 with staff updates for 2022)

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 while incentivizing growth in non-sensitive regions is ideal from a quality-of-life standpoint and an environmental one. [c5]

The City will continue to devote available and applicable resources to implementing the identified Hazard Mitigation Actions. Of the Suffolk Mitigation Action Items listed below, 1, 4, 5, and 7 involve efforts to mitigate flooding damage[42] [c15]:

1. Infrastructure that is repetitively flooded will be protected through elevation, acquisition, relocation, retrofitting or repurposing, and any other structural means, including Mitigation Reconstruction projects.
2. During extended power outages, emergency power will be provided to critical infrastructure, facilities, and roadway intersections. Emergency generator capabilities will be increased at schools that are used as shelters.
3. Flood protection information will be made available to business travelers and tourists by providing hurricane and flood outreach and education materials to hotels and motels located within the City.
4. Improve stormwater management and control flooding by continuing to implement capital improvements. Such actions may include Climate Resilient Mitigation Activities (CRMA).
5. Develop a stormwater drainage plan that addresses issues in flood-prone areas, and then prioritize and implement recommendations from drainage plan. Actions may include Climate Resilient Mitigation Activities (CRMA).
6. Strengthen the City's Floodplain Management by doing the following:

   - Review and adopt a State Model Floodplain Ordinance
   - Incorporate floodplain requirements into permit process with available information online, require BFE on the building permit application, and create/post online standardized forms
   - Provide specialized training and support CFM training for plan reviewers, inspectors, and permit processors
   - Prepare educational materials about flood insurance and freeboard and NFIP compliance to be provided in the permit's office
   - Continue participation in the Severe Repetitive Loss Program

7. Verify the geographic location of each NFIP repetitive loss property, and if the property has been mitigated and by what means.
8. Retrofit primary shelters to conform to the Ultimate Design Wind Speed for Risk Category 3 structures as referenced in the Uniform Statewide Building Code.
9. Install markers indicating the flood water depth along streets or roads subject to tidal, riverine, or urban flooding.
10. Retrofit the East Suffolk Recreation Center with an emergency generator to support shelter operations.
11. Rehabilitate Godwin's Millpond Dam

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

There are other regional mitigation actions that the area of Hampton Roads is involved in that will include Suffolk as well[43].

3.4.2 Other HRPDC Efforts

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

- Get Flood Fluent Program
- Hampton Roads All Hazards Advisory Committee (AHAC)
- Regional Environmental Committee
- Water Quality Technical Workgroup
- Watershed Roundtable
- Coastal Resiliency Committee and Working Group
- Regional Stormwater Management Workgroup

3.5 Preparation for Severe Weather Events

3.5.1 Emergency Management Disaster Training and Operations

The City of Suffolk's Office of Emergency Management (OEM), conducts all hazards training for City leadership to include severe weather events. The OEM provides annual training for the City Manager's office personnel and all department heads, with a focus on the City's Emergency Operations Plan. The City participates in the National Tornado Drill and the National Earthquake Drill which are held annually. Suffolk Fire & Rescue is fully trained to handle hazards associated with severe storms that may impact the City. They prepare for, respond to, and perform mitigation measures for winter storms, as well as severe rain events. Department members are required to complete ICS 100, ICS 200, ICS 700, and ICS 800 and implement the Incident Management System on a daily basis. The City's Public Works and Public Utilities departments utilize a multi-step process for dealing with Severe Weather Events that includes actions pre-storm, during the storm, and post-storm. For winter storms, all operations employees are trained to properly use equipment and materials to lessen the negative effects of winter storms for the community. For severe rain events, all operations employees are trained to address hazards associated with flooding and debris that can prevent travel or cause injury. All employees in the Department participate in Incident Management Training to make emergency response quick and as safe as it can be. Additionally, all office staff is trained in FEMA documentation. [c11]

3.5.2 Power Franchisees

Because Suffolk is a coastal community, severe storms are prevalent in the area. Unfortunately, power surges and outages are usually a byproduct of severe storms. The City of Suffolk's mitigation action 2 addresses that the City should provide emergency power to critical infrastructure, critical facilities, and critical roadway intersections during extended power outages. Designated hurricane shelters, which are typically schools, are supplied with increased emergency power capabilities. Providing emergency power to critical facilities and shelters and maintaining basic city function is important to the safety of the citizens of Suffolk.[44] [c15]

[43] (Hampton Roads Planning District Commission, 2017)
[44] (Hampton Roads Planning District Commission, 2017)

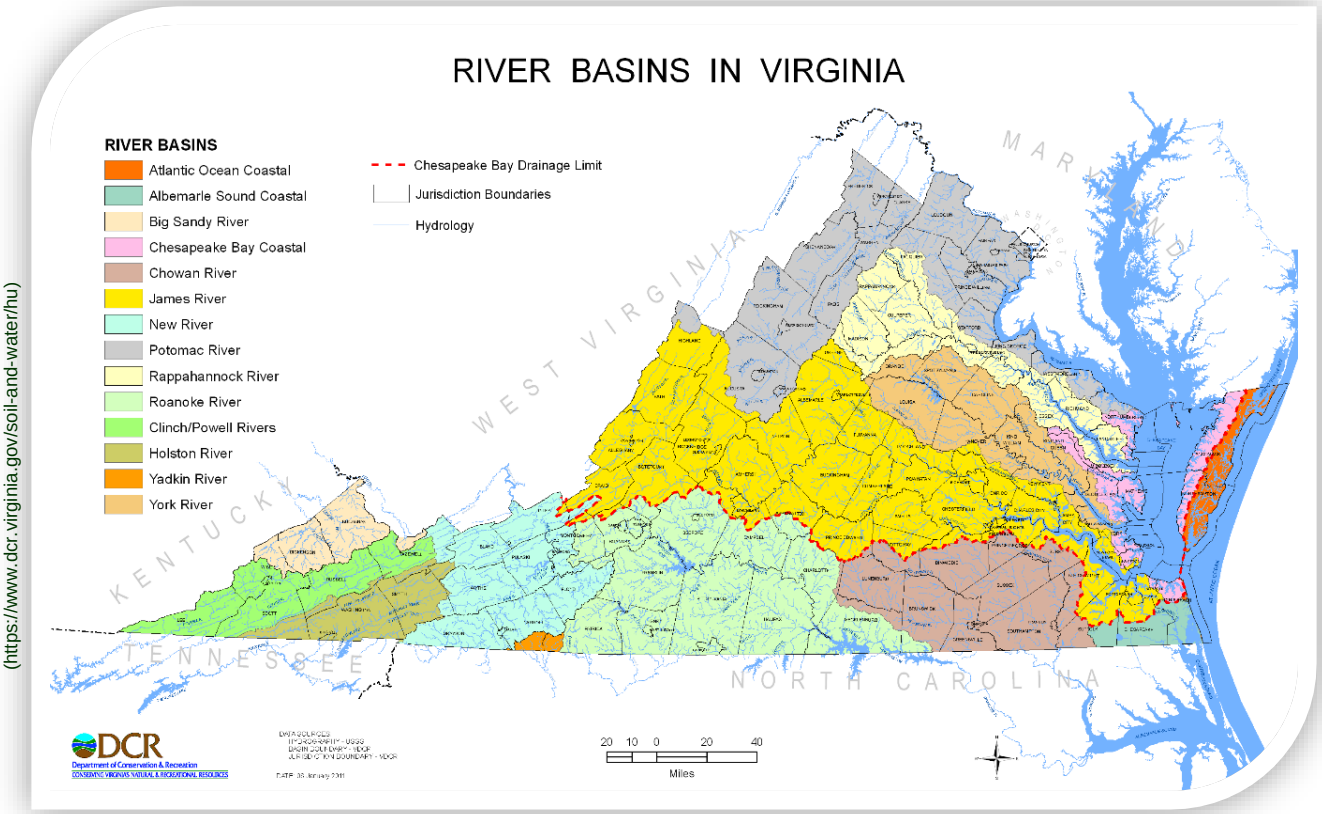
4.0 A Plan for Resilience

The City of Suffolk is committed to continuing those efforts already underway to improve resilience as described in the previous section. Additionally, there are planning and capacity building 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 Suffolk'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 11, 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 11: 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 Suffolk is committing to building, maintaining, and strengthening its relationships with other entities as it works toward greater community resilience. [45][c3, c12]

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."[46] 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 purposes. Each had an associated future planning horizon, summarized below and shown in Figure 12[47] [c11].

- 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

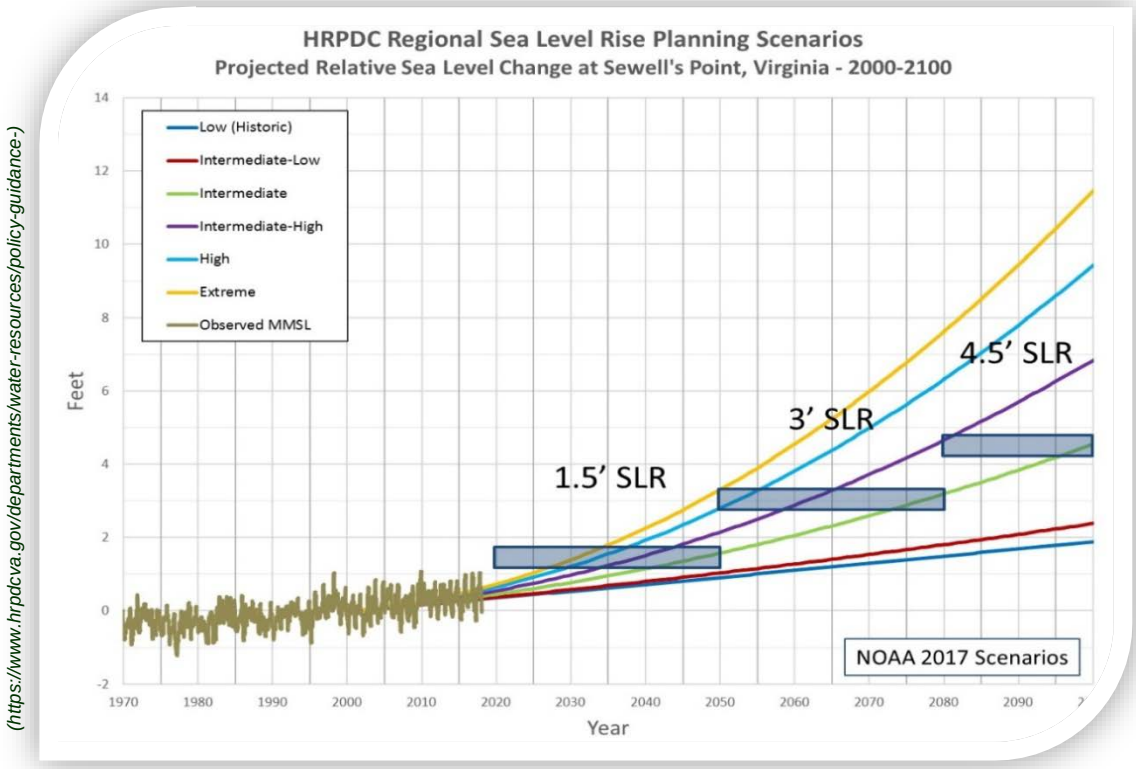


Figure 12: Projected SLR

[45] (Hampton Roads Planning District Commission, 2017)
[46] (Commonwealth of Virginia Department of Conservation and Recreation, 2022)
[47] (HRPDC, 2018)

Rationale behind this study can be seen in Figure 13. Recommendations from the HRPDC SLR are as follows [c4]:

- 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)

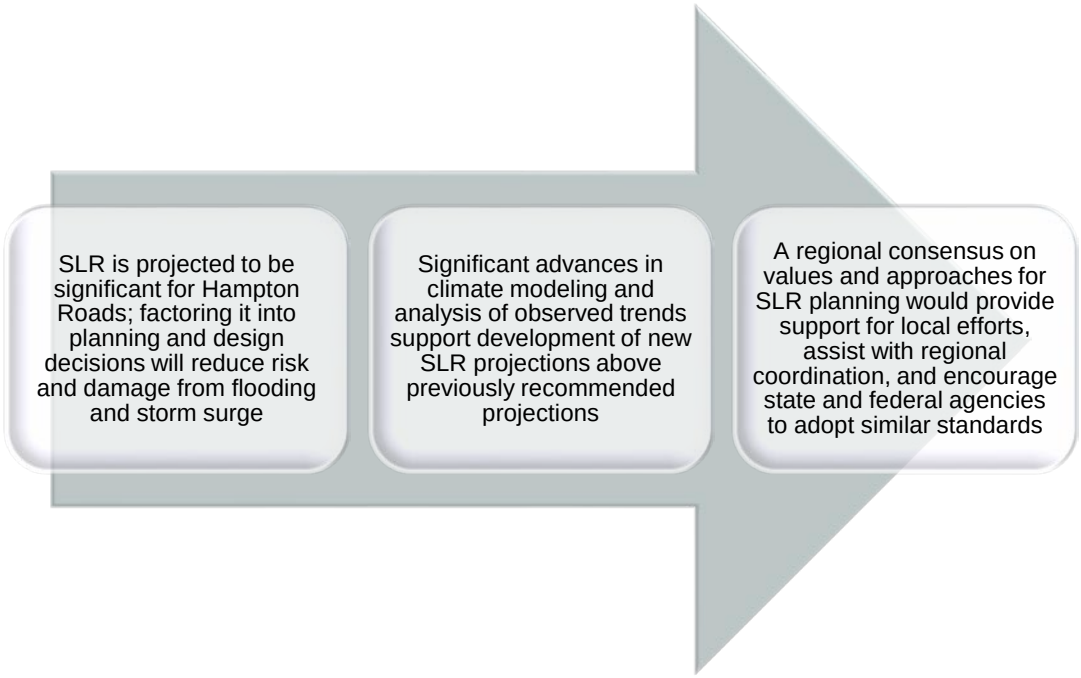


Figure 13: Rationale Behind HRPDC SLR

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[48].

[48] (HRPDC, 2018)

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[49].

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[50].

In an effort to bolster resilience in Hampton Roads, the Hampton Roads Planning District Commission is developing design tidal elevations and rainfall depths for Hampton Roads communities that incorporate future sea level rise. Each locality's standards were calculated based on varying storm surge elevations for a set of combined SLR and return period scenarios. Several notes on those tidal elevations from the draft Resilient Stormwater Design Standards are as follows:[51] [c1]

Notes:

1. Sea level rise scenarios are based on HRPDC Sea Level Rise Planning Policy and Approach (2018).

2. Except where noted, all elevations sourced from statistical analysis of the distribution of water elevations in each watershed from the FEMA Region III Storm Surge Study conducted by the U.S. Army Corps of Engineers Engineer Research and Development Center (2013).

3. Conditions related to the 3-ft and 4.5-ft sea level rise design levels include non-linear increases derived from numerical modeling completed by the U.S. Army Corps of Engineers as part of the North Atlantic Coast Comprehensive Study.

Proposed design rainfall depths were developed based on two (2) resources – the current City of Virginia Beach public facilities manual and the RAND/MARISA project. The latter program developed a tool for the Chesapeake Bay Watershed to generate rainfall for individual counties by applying change factors to NOAA Atlas 14 data. A table of rainfall depths has been developed for each Hampton Roads locality providing increased rainfall depth values accounting for a 20% increase in depth as well as to correspond to the various MARISA scenarios.

Currently, the Resilient Stormwater Design Standards are in draft form. Localities will have the option of adopting these standards in whole or in part.

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

[49] (HRPDC, 2018)
[50] (HRPDC, 2018)
[51] (Commission H. R., 2021)

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 plans. 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 entail:

- 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

If the opportunity occurs and resources are available, Suffolk has identified these planned studies to incorporate flooding and resilience:

- Holland Drainage Study
- Whaleyville Village Drainage Study
- Kimberly Bridge Feasibility Study
- Finney Outfall to Nansemond River Drainage Study
- Stormwater Master Plan Update

Both the Holland and Whaleyville Drainage studies seek to identify any potential additions, replacements, and upgrades to drainage infrastructure and ditch maintenance within the Whaleyville and Holland villages to address drainage concerns.

The City may be interested in adopting all or part of the regional Resilient Stormwater Design Standards. To help make that determination, if a funding source is identified, Suffolk is interested in performing a study to evaluate the impact of those standards on City and development projects.

The City of Suffolk will continue to plan for and conduct studies in the future. As opportunities are identified and vetted, the City plans to seek grant funding though the CFPF program.

4.4 Planning and Capacity Building 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.

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 helpful in planning future needs such as staff capacity, on-call contracts, and training. As an example, the City recently supported Certified Floodplain Manager (CFM) training and certification for several staff with assistance from the CFPF program. . The City welcomes additional opportunities to fund additional floodplain management training to increase the knowledge and abilities of staff.

[52] (Commonwealth of Virginia Department of Conservation and Recreation, 2022)

The City offers a multitude of training opportunities to staff and the public. All City personnel who work in operations and maintenance are trained annually on pollution prevention, illicit discharge detection and elimination, and notification of issues[53]. Emergency Response personnel are also trained as such.[54]. The City is also providing public education outreach on litter and bacteria reduction for the public[55]. Citizens can then identify stormwater problems and report them through the Report link on the City's website. [c4,c11,c12]

http://www.suffolkva.us/1037/Report

The City seeks to create a system of focused growth development areas within the two main urban and suburban growth areas in the City. By focusing growth in two different areas, the City is balancing the state of its natural resources and the needs of continued development. Thus, allowing for a meaningful and sustainable balance. [c4]

According to the Hampton Roads Hazard Mitigation Plan, the City of Suffolk does have an Open Space Management Plan. This program allows the City to purchase development rights from willing landowners in exchange for conservation easement on their property [c6]. Details pertaining to this program are found in the Unified Development Ordinance. The City highly encourages the conservation of open space and cluster development [c5]. [56]

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[57]:

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

In an effort to lower pollutant levels in local waterways, Suffolk is recommending forested buffers on conserved properties, providing stormwater filtering to receiving waters[58]. For instance, Suffolk converted two plots of land from crop land to forested land at Lonestar Lakes between 2014 and 2015. Approximately 440 seedlings were planted per acre. It was estimated

[53] (City of Suffolk, 2016)
[54] (Hampton Roads Planning District Commission, 2017)
[55] (Engineering, 2012)
[56] (Council, Unified Development Ordiance , 2021)
[57] (Hampton Roads Planning District Commission, 2017)
[58] (Planning C. o., Comprehensive Plan for 2026, 2006)

that 36.83 pounds of phosphorus per year would be removed from the water system as a result of changing land-use from crop to forest.[59]

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 that involve design, construction, or installation of facilities[60]. As opportunities are identified and vetted, the City plans to seek grant funding though the CFPF program.

The City of Suffolk is blessed with ample water access, this critical resource needs to be protected from man-made 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 Suffolk has developed Watershed Master Plans that cover the entirety of the locality. Through a review of approximately 33 of these studies and other documents, approximately 100 discrete projects were identified. The City has selected the following 18 projects to include in the Resilience Plan, listed by implementation horizon and contingent on available funding. Project details can be found in Appendix D.

Short-term
- Pughsville Neighborhood Drainage Improvements
- Jefferson Street Drainage
- Constant's North Park – Phase I & II
- Cedar Hill Slope Stabilization
- Train Station Hydrodynamic Separator BMP

Mid-term
- Oldetown Drainage Improvements (Phased)
- Driver Drainage
- Woodrow South Suffolk Drainage
- First Avenue Drainage
- Sadler Heights Drainage
- Godwin Millpond Dam Rehabilitation

Long-term
- Installation of Flood Depth Markers
- Kimberly Bridge AKA North Main Street (Route 10/32)
- Towne Point Road between Pughsville and Route 17
- Phased
- James River Watershed Drainage Infrastructure Improvements
- Chowan River Watershed Drainage Infrastructure Improvements
- Great Dismal Swamp Watershed Drainage Infrastructure Improvements

[59] (Chesapeake Bay TMDL Action Plan, 22)
[60] (Commonwealth of Virginia Department of Conservation and Recreation, 2022)

The City also has a study underway for the Oakland Drainage project. Some funding has already been allocated however the implementation horizon is yet to be determined.

The City continues to explore different strategies of flood mitigation, including tidal flooding, such as protecting structures and properties subject to repetitive losses from flooding, in part by exploring methods of protection and funding. The City will continue to implement capital improvements to improve/control flooding.[61] [c1, c4, c15]

Suffolk will endeavor to keep this Plan up to date with projects as they are developed. To that end, the following criteria have been established that lay out the requirements for future projects such that they can be then considered incorporated by reference into this Plan.

Projects shall:

(1) consider climate change and forward-looking conditions.
(2) include a provision for equity-based decision making
(3) consider a level of protection beyond the regulatory design standard
(4) incorporate nature-based infrastructure to the maximum extent practical
(5) analyze at least three (3) alternatives to address the issue – recommended, an alternate, and no action – if the project proposed does not employ a nature-based or hybrid solution and the total project cost is anticipated to be greater than $3 million (if planning to apply for CFPF project grant funding)
(6) be broken into phases that can be accomplished in a 3-year timeframe (if planning to apply for CFPF project grant funding)
(7) include a maintenance plan for structural improvements

[61] (Planning C. o., Comprehensive Plan for 2026, 2006)

Works Cited

Chesapeake Bay TMDL Action Plan. (22, September 2016). Suffolk, Virginia, United States.
City of Suffolk Public Facilities Manual. (2014). Suffolk, Virginia, United States.
City of Suffolk, V. (2016, June 25). City of Suffolk TMDL Action Plan for Bacteria Reduction. Suffolk, Virginia, United States.
Commission, H. R. (2013, June). Hampton Roads Regional Stormwater Management Program Memorandum of Agreement. Virginia, United States.
Commission, H. R. (2021, November 17). HRPDC Resilient Stormwater Design Standards. Virginia, United States.
Commonwealth of Virginia Department of Conservation and Recreation. (2021). *Virginia Coastal Resilience Master Plan.*
Commonwealth of Virginia Department of Conservation and Recreation. (2022). *2022 Grant Manual for the Virginia Community Flood Preparedness Fund.*
Council, O. o. (2021, October 12). Unified Development Ordiance . Suffolk, Virginia, United States.
Council, O. o. (2022, June 22). Code of Ordinances. Suffolk, Virginia, United States.
Engineering, D. o. (2012, May). City of Suffolk MS4 Permit Program Plan. Suffolk, Virginia, United States.
Hampton Roads Planning District Comission. (2017). *Integrating Coastal Resilience Into Local Plans, Policies, and Ordinances.*
Hampton Roads Planning District Commission. (2017). *2017 Hampton Roads Hazard Mitigation Plan.* Hampton.
HRPDC. (2018). *HRPDC Sea Level Rise Planning Policy and Approach.*
Planning, B. (2018, June 20). Suffolk Downtown Master Plan. Suffolk, Virginia, United States.
Planning, C. o. (2006, April 5). Comprehensive Plan for 2026. Suffolk, Virginia, United States.
Planning, C. o. (2015, April 1). Comprehensive Plan for 2035. Suffolk, Virginia, United States.
Suffolk Keeps Citizens Safe and Informed with Suffolk Mass Notification System. (2020, March 2). Retrieved from Suffolk VA: https://www.suffolkva.us/CivicAlerts.aspx?AID=240
Suffolk, Virginia. (2005, June). Retrieved from Advisory Council on Historic Preservation: https://www.achp.gov/preserve-america/community/suffolk-virginia

Appendices

Appendix A: Plan Criteria Matrix

Appendix B: Plan and Program Inventory

Appendix C: Elevated Risk Facilities

Appendix D: Resilience Plan Project Table

Appendix A
Plan Criteria Matrix

	Document Name	Hampton Roads Hazard Mitigation Plan	City of Suffolk TMDL Action Plan for Bacteria Reduction	Chesapeake Bay TMDL Action Plan	Chesapeake Bay TMDL Action Plan Phase II	TMDL Implementation Plan for Hoffler Creek	Suffolk Parks and Recreation Strategic Plan 2021- 2024
	URL	https://www.hrpdcva.gov/uploads/docs/2017%20Hampton%20Roads%20Hazard%20Mitigation%20Plan%20Update%20FINAL.pdf	https://www.suffolkva.us/DocumentCenter/View/4957/Action-Plan-for-Bacteria-Reduction	https://www.suffolkva.us/DocumentCenter/View/1773/Chesapeake-Bay-Action-Plan-PDF	https://www.suffolkva.us/264/Total-Maximum-Daily-Load-TMDL	https://www.suffolkva.us/DocumentCenter/View/217/Implementation-Plan-for-Hoffler-Creek-PDF?bidId=	https://www.suffolkva.us/DocumentCenter/View/5490/Parks-and-Recreation-Strategic-Plan?bidId=
	Published date	Jan-17	Apr-20	Sep-16	Oct-19	Apr-12	Mar-21
Criterion	Amended/Revised date	Jan-17					
1	Equity based strategic polices for local government wide flood protection and prevention.	page 357-366	Legal Authorities, page 12-13	Section 1, page 5 Section 2, page 5 Section 3, page 5 Attachment A, page 9-14	Attachment A, page 8-13	Section 1.0, page 5 Section 1.2, page 8-10 Section 2.1, page 11 Section 2.2, page 11-12	
2	Documentation of existing social, economic, natural, and other conditions present in the local government.	page 21-46, 78, 156, 205, 357-366	Background, page 3-8	Background, page 3-4 Section 4, page 5-6	Background, page 3-4	Section 1.1, page 5-7 Figure 1-1, page 7 Section 3.1, page 14-16 Table 3-1, page 14 Figure 3-1, page 15 Section 7.2, page 46-50	
3	Review of the vulnerabilities and stressors, both natural and social in the local government.	page 209-230					
4	- Forward looking goals, actionable strategies, and priorities through as seen through an equity based lens.	page 357-366	Practices to Reduce Bacteria, page 8-11 Interim Milestones and Assessment of Effectiveness, page 13 Measurable Goals, page 14	Section 5, page 7	Section d, page 6	Section 5.0, page 26 Section 5.2, page 28 Section 7.0-7.3, page 46-50	Goals & Objectives, page 3-6
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.		Figure 1, page 5	City Code Ref, page 11-12		Section 3.1, page 14-16	
7	Identification of areas suitable for property buyouts in frequently flooded areas.						
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.						
9	Identified ecosystems/wetlands/floodplains suitable for permanent protection.		Figure 1, page 5	City Code Ref, page 11-12		Figure 1-1, page 7 Section 3.1, page 14-16 Table 3-1, page 14 Figure 3-1, page 15 Section 7.1, page 46	
10	Identified incentives for restoring riparian and wetland vegetation.					Section 7.1, page 46	
11	A framework for implementation, capacity building and community engagement.		Public Education and Outreach Initiatives, page 9-10		Section f, page 7	Section 4.0, page 24	
12	Strategies for creating knowledgeable, inclusive community leaders and networks.	page 209-222	Employee Training Enhancements, page 9			Section 5.2, page 28-30 Section 7.2, page 46-48	
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.	page 357-366			Section C, page 6		

Criterion	Document Name	City of Suffolk Public Facilities Manual	Capital Improvements Program & Plan FY 2021-30	The Virginia Coastal Resilience Master Plan	City of Suffolk Code of Ordinances	Unified Development Ordinance	The Comprehensive Plan for 2026 - Volume 1
	URL	https://www.suffolkva.us/DocumentCenter/View/114/Public-Works-Facilities-Manual-?bidId=	https://www.suffolkva.us/DocumentCenter/View/4286/CIP-Presentation-to-City-Council---Feb-5-2020-v1?bidId=	https://www.dcr.virginia.gov/crmp/plan	https://library.municode.com/va/suffolk/codes/code_of_ordinances	https://library.municode.com/va/suffolk/codes/unified_development_ordinance	https://www.suffolkva.us/DocumentCenter/View/890/2026-Comprehensive-Plan-PDF
	Published date	2014	Feb-20	Dec-21	Jun-21	Dec-21	Apr-06
	Amended/Revised date				Sep-21		
1	Equity based strategic polices for local government wide flood protection and prevention.	pg. 156 pg. 159 pg. 178	Yes, page 16				
2	Documentation of existing social, economic, natural, and other conditions present in the local government.		Yes, page 5-8	pg. 1			Page 1-1 - 1-3, 2-1, 2-3, 2-5, 2-10, 5-2
3	Review of the vulnerabilities and stressors, both natural and social in the local government.		Yes, page 5-8 & 51-52 & 64-66	pg. 1			Page 2-2
4	Forward looking goals, actionable strategies, and priorities through as seen through an equity based lens.		Overview, page 4	Chapter 3, 4, 5			Page 1-3 - 1-7, 2-8 - 2-10
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.					Sec. 31-415	Page 3-1 - 3-21
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 5-37, 7-5 & 7-42
7	Identification of areas suitable for property buyouts in frequently flooded areas.				Sec. 90-510		
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.		Yes, slide 2			Sec. 31-615	Page 5-11, Chapter 7
9	Identified ecosystems/wetlands/floodplains suitable for permanent protection.	pg. 179			Article VII Wetlands (pg 36-42)	Sec. 31-615	Page 5-1, 7-5, & 7-42
10	Identified incentives for restoring riparian and wetland vegetation.				Article IV Removal of weeds, Excessive Growth of Vegetation, Trash and Debris (pg 24-26)	Sec. 31-409 Sec. 31-415 Sec. 31-603 Sec. 31-607 Sec. 31-615	
11	A framework for implementation, capacity building and community engagement.	pg.26 pg.29	page 75	pg. 1			Chapter 8, table 8-1
12	Strategies for creating knowledgeable, inclusive community leaders and networks.		Yes, slide 3				Chapter 8, table 8-1
13	A community dam safety inventory and risk assessment posed by the location and condition of dams.	pg. 173					
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. 2			Page 1-1 - 1-10
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.		Yes, haz mat		Sec 30-103 (page 17)		

	Document Name	2035 Comprehensive Plan	Downtown Suffolk Master Plan	City of Suffolk MS4 Permit Program Plan	HRPDC Sea Level Rise Planning Policy and Approach	HRPDC Integrating Coastal Resilience into Local Plans, Policies, and Ordinances
	URL	http://www.suffolkva.us/DocumentCenter/View/941/2035-Comprehensive-Plan-PDF?bidId=	Not Available	https://www.suffolkva.us/DocumentCenter/View/3748/2018-2023-MS4-Permit-Program-Plan	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
	Published date	Apr-15	Jun-18	Nov-18	Oct-18	Aug-17
Criterion	Amended/Revised date					
1	Equity based strategic polices for local government wide flood protection and prevention.					
2	Documentation of existing social, economic, natural, and other conditions present in the local government.	Page 1-3, 5, 11-13, 15-18, 119-120, 141-142, 151-157, 159-178	Page 12 & 37			Chapter 7 of Comprehensive Plan Page 117 - 118
3	Review of the vulnerabilities and stressors, both natural and social in the local government.	Page 1-3, 5, 11-13, 15-18, 119-120, 141-142, 151-157, 159-178				
4	- Forward looking goals, actionable strategies, and priorities through as seen through an equity based lens.	Page 7, 9, 108, 143, 157, 194	Page 62	Page 4	pg. 1 and 2	Section 7 Page 117 - 118
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.	Page 19-29, 160-164				
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 159-195				
7	Identification of areas suitable for property buyouts in frequently flooded areas.					
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.	Page 74-82, 121-128, 134-143				Page 117
9	Identified ecosystems/wetlands/floodplains suitable for permanent protection.	Page 159-195				
10	Identified incentives for restoring riparian and wetland vegetation.	Page 167-169				
11	A framework for implementation, capacity building and community engagement.	Page 4	Section 4	Page 12, 23, 24, 91, 92		
12	Strategies for creating knowledgeable, inclusive community leaders and networks.			Pg. 29-56		
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 1-3, 5, 11-13, 15-18, 119-120, 141-142, 151-157, 159-178	Page 28-29			Chapter 7 of Comprehensive Plan Page 117 - 118
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.				Pg. 3	

Appendix B
Plan and Program Inventory

Documents reviewed for Plan requirements

- Chesapeake Bay TMDL FAQ Sheet
- City of Suffolk 2013 General Assembly Legislation Summary (2013)
- City of Suffolk MS4 Permit Program Plan (2018)
- Elevated Risk Facilities (2020)
- Green Infrastructure in the Nansemond River Watershed (2021)
- HRPDC Integrating Coastal Resilience (2017)
- HRPDC Joint Land Use Study (2005)
- HRPDC Resilient Stormwater Design Standards (2021)
- HRPDC Sea Level Rise Planning Policy (2018)
- Public Facilities Manual Volume I (2014)
- Public Facilities Manual Volume II (2014)
- Suffolk City Ordinances (2021)
- 2026 Suffolk Comprehensive Plan (2006)
- Suffolk Downtown Master Plan (2018)
- "Suffolk Keeps Citizens Safe and Informed with Suffolk Mass Notification System" from https://www.suffolkva.us/CivicAlerts.aspx?AID=240 as of July 11, 2022
- "Suffolk, Virginia" from https://www.achp.gov/preserve-america/community/suffolk-virginia as of July 6, 2022
- Unified Development Code (2021)
- Virginia Coastal Resilience Master Plan (2020)
- 2035 Suffolk Comprehensive Plan (2015)

Documents reviewed for Projects and Plan Requirements

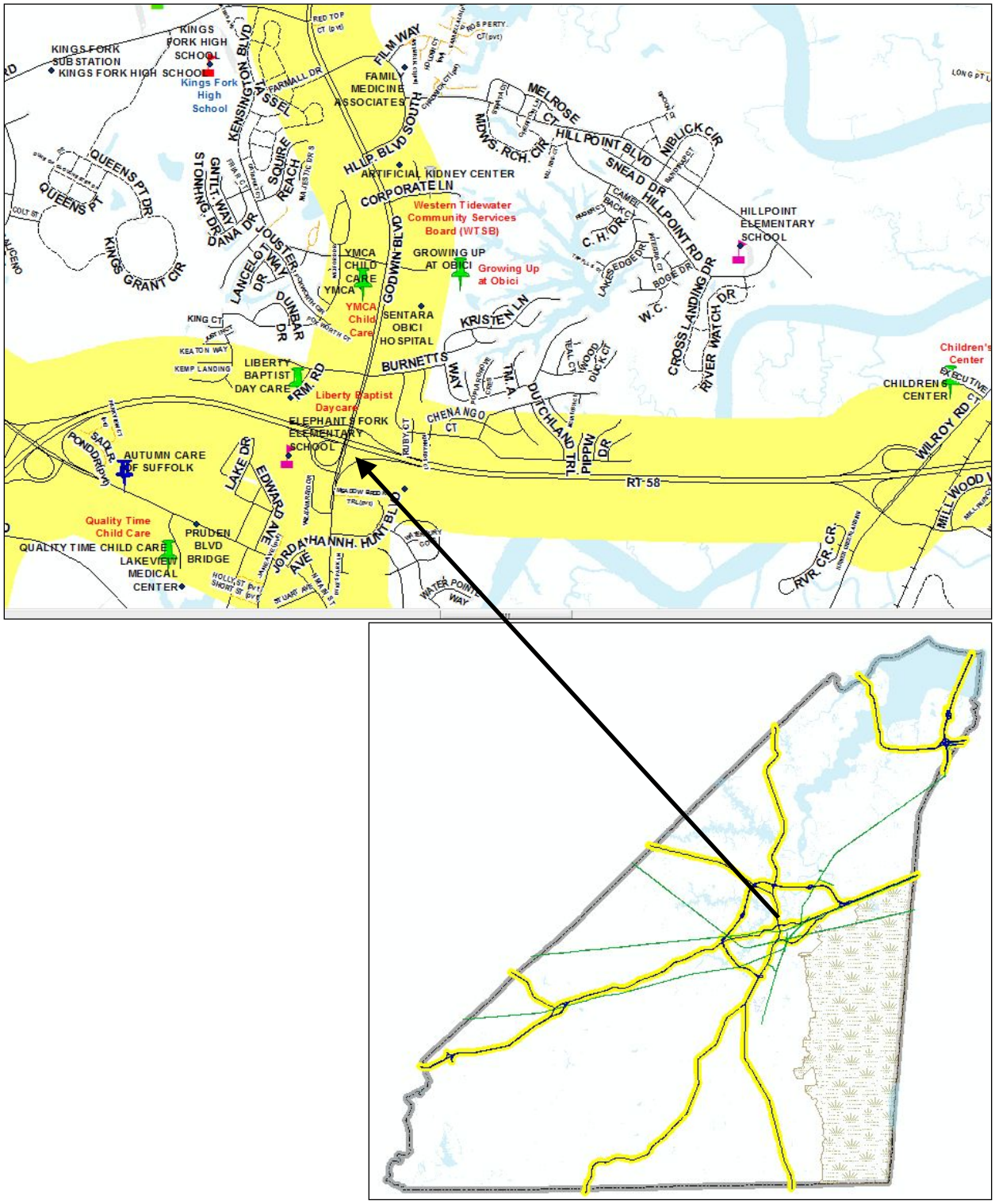
- Capital Improvement Projects List (2022)
- Capital Improvements Programs FY 2022-31 (2020)
- Chesapeake Bay TMDL Action Plan (2016)
- Chesapeake Bay TMDL Action Plan Phase II (2019)
- Chowan River Watershed Master Plan (2008)
- Driver Lane Drainage Study (2021)
- Great Dismal Swamp Watershed Master Plan (2008)
- Hampton Roads Hazard Mitigation Plan (2017)
- James River Watershed Master Plan (Date Unavailable)
- Oakland Drainage Study (2022)
- Oldetown [Finney Outfall] Drainage Master Plan (2018)
- Parks and Recreation Master Plan Update (2016)
- Pughsville Area Drainage Study (2012)
- Saddlebrook Drainage Study (2019)
- Steeple Drive Drainage Study (2019)

- Storm Water Master Plan City of Suffolk, Virginia (2004)
- Suffolk Parks and Recreation Strategic Plan 2021- 2024 (2021)
- TMDL Action Plan for Bacteria Reduction (2020)
- TMDL Implementation Plan for Hoffler Creek (2012)
- Wilkins Concept Plan (2021)
- Wilkins Road Photo Log Map (2021)
- Wilkins Drive Outfall Study Memo (2021)

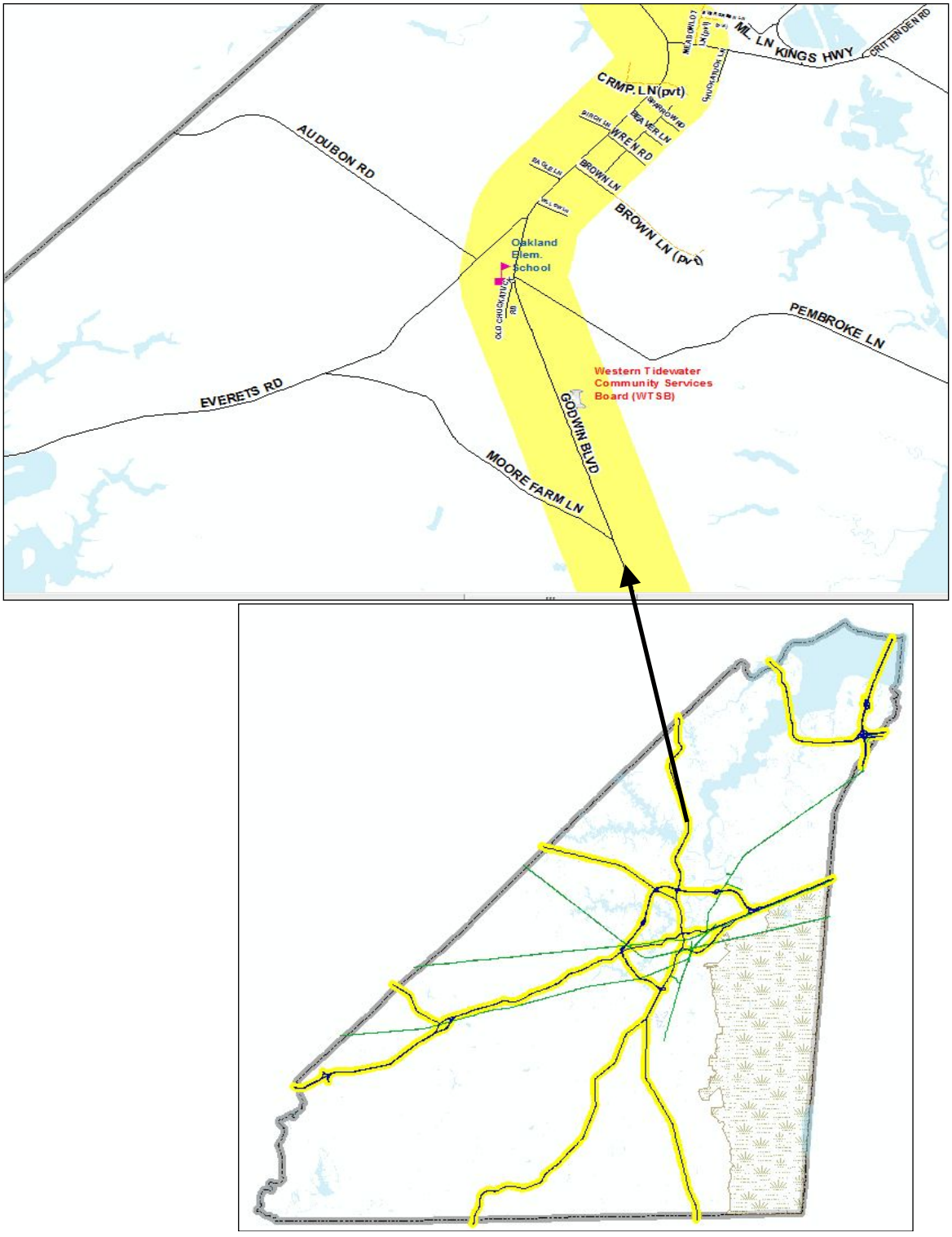
Appendix C
Elevated Risk Facilities

1. ELEVATED RISK FACILITIES WITHIN 1000 FEET OF MAJOR HIGHWAYS
Attachment 1

ELEVATED RISK FACILITIES WITHIN 1000 FEET OF MAJOR HIGHWAYS
Attachment 2



ELEVATED RISK FACILITIES WITHIN 1000 FEET OF MAJOR HIGHWAYS
Attachment 3



ELEVATED RISK FACILITIES WITHIN 1000 FEET OF MAJOR HIGHWAYS
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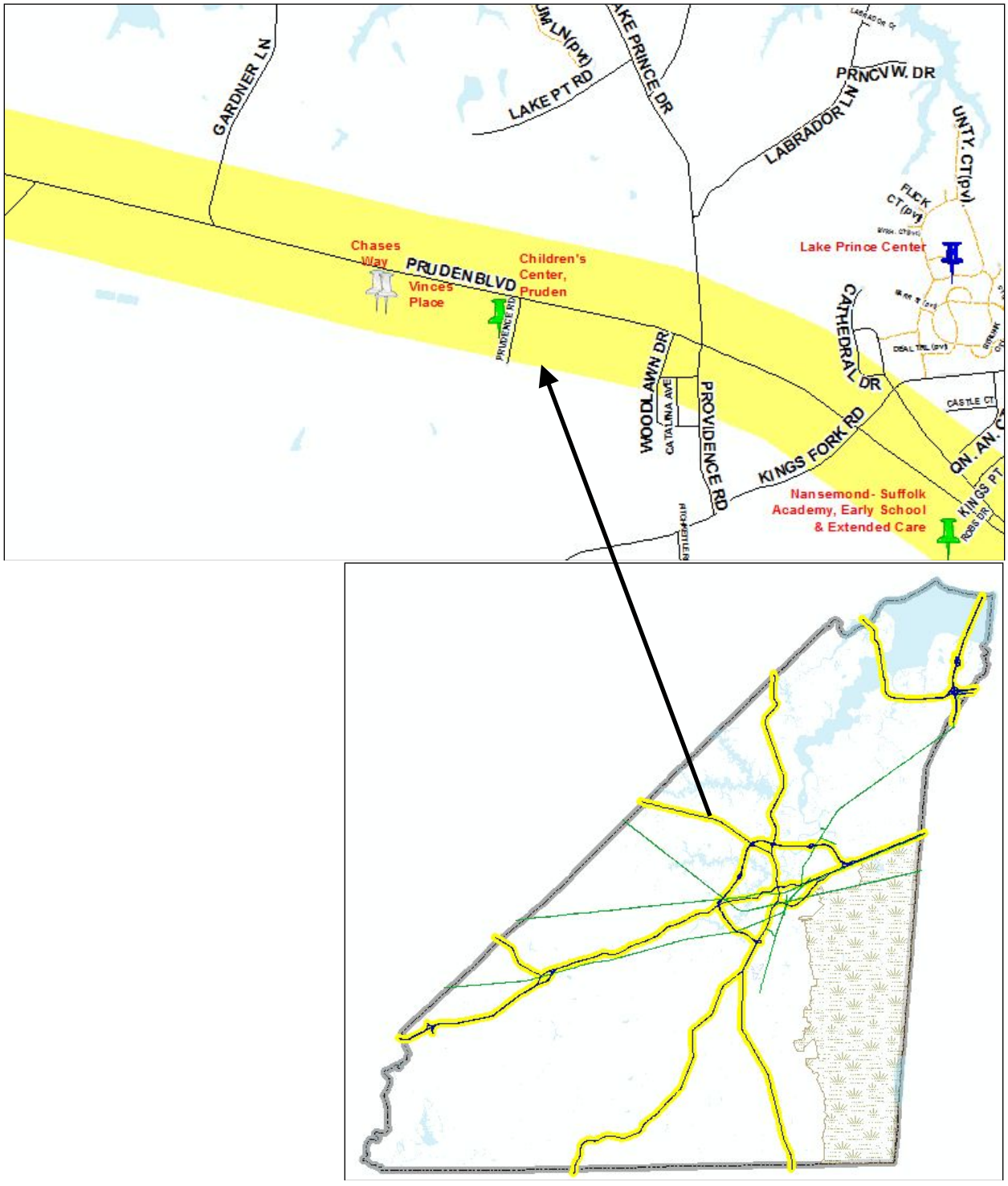

ELEVATED RISK FACILITIES WITHIN 1000 FEET OF MAJOR HIGHWAYS
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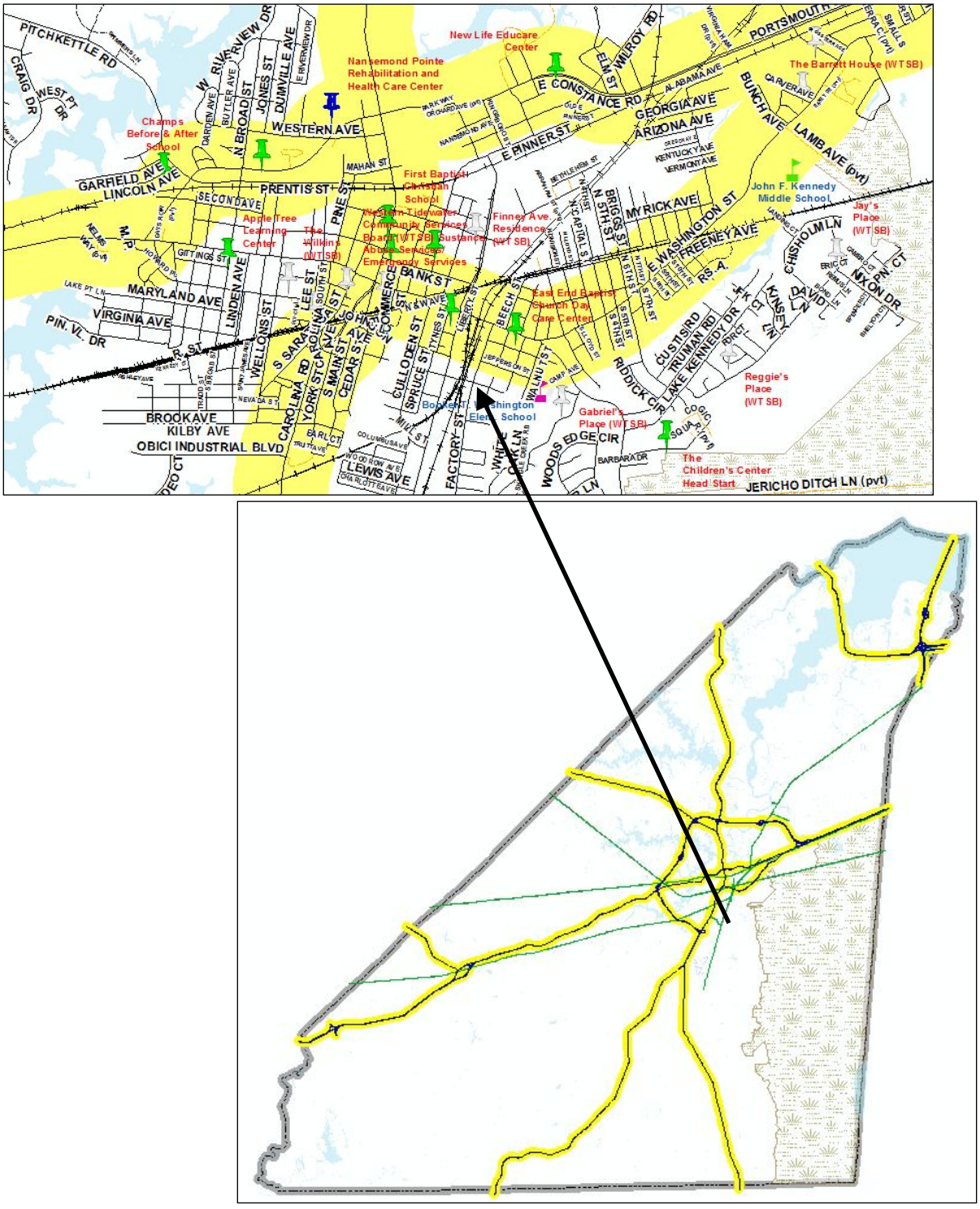

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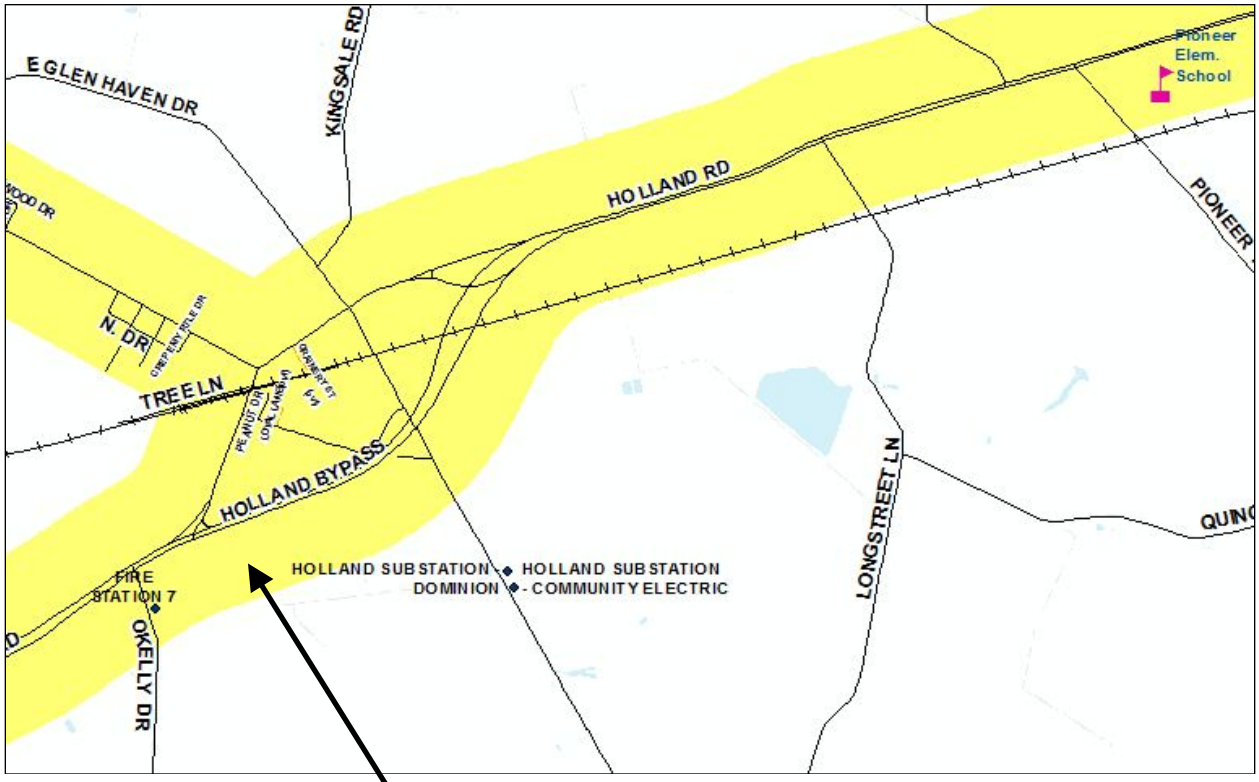
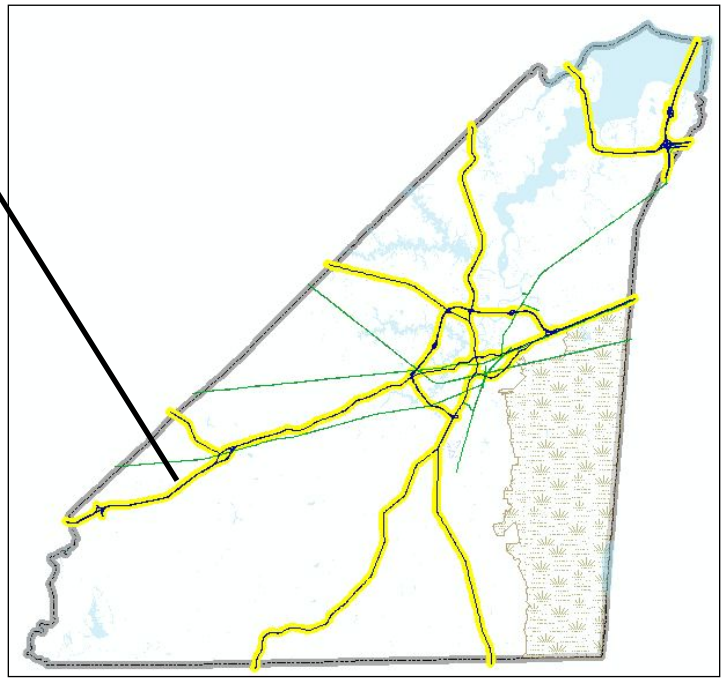
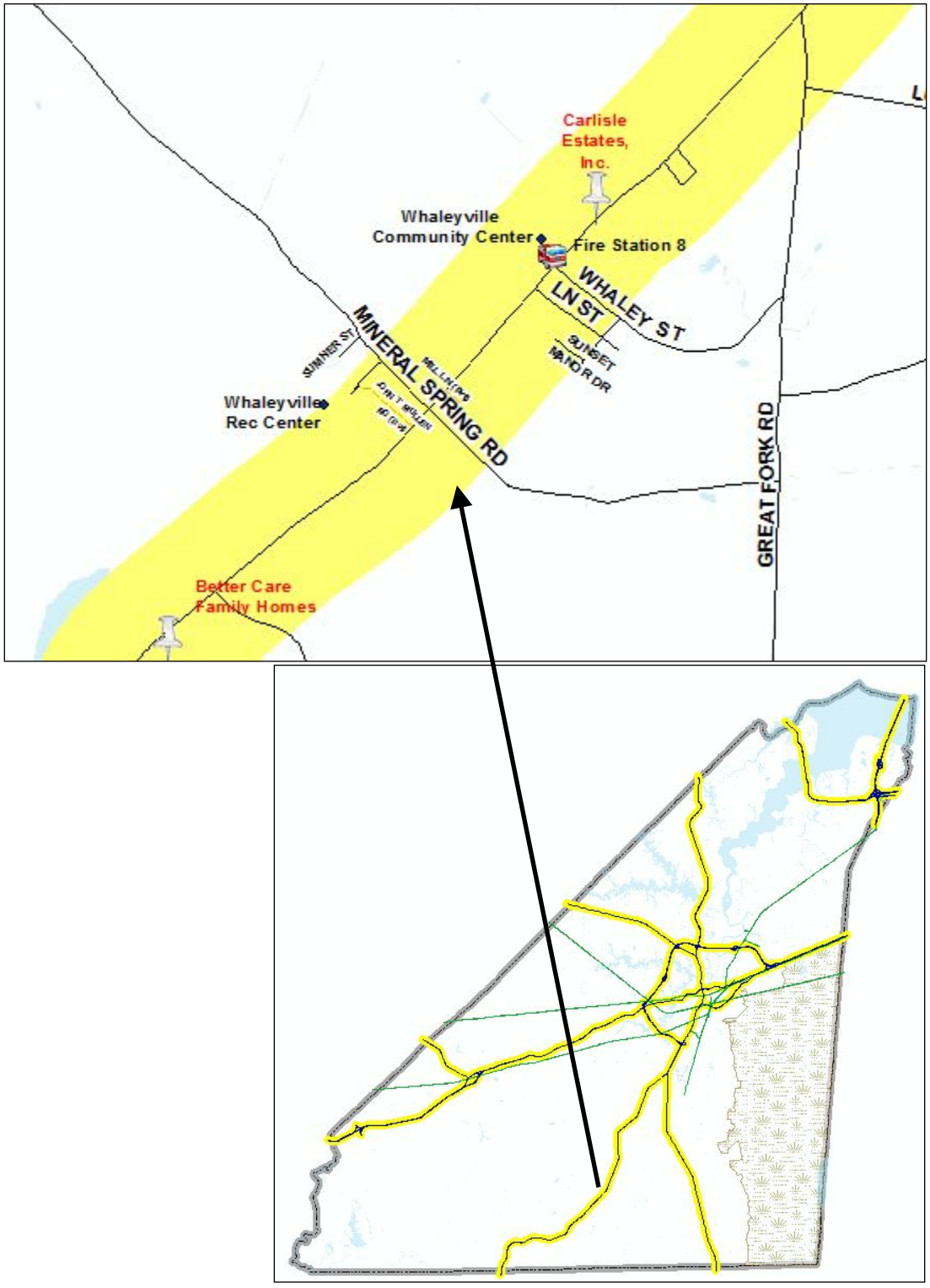




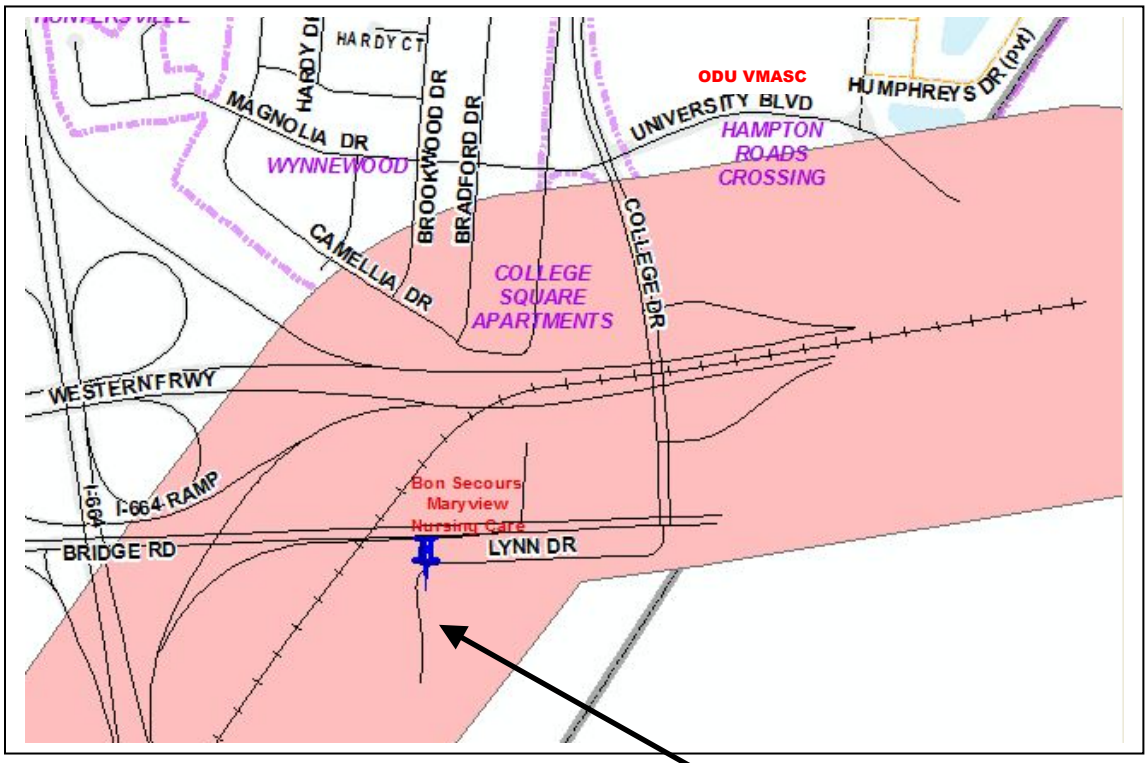
ELEVATED RISK FACILITIES WITHIN 1000 FEET OF MAJOR HIGHWAYS
Attachment 7

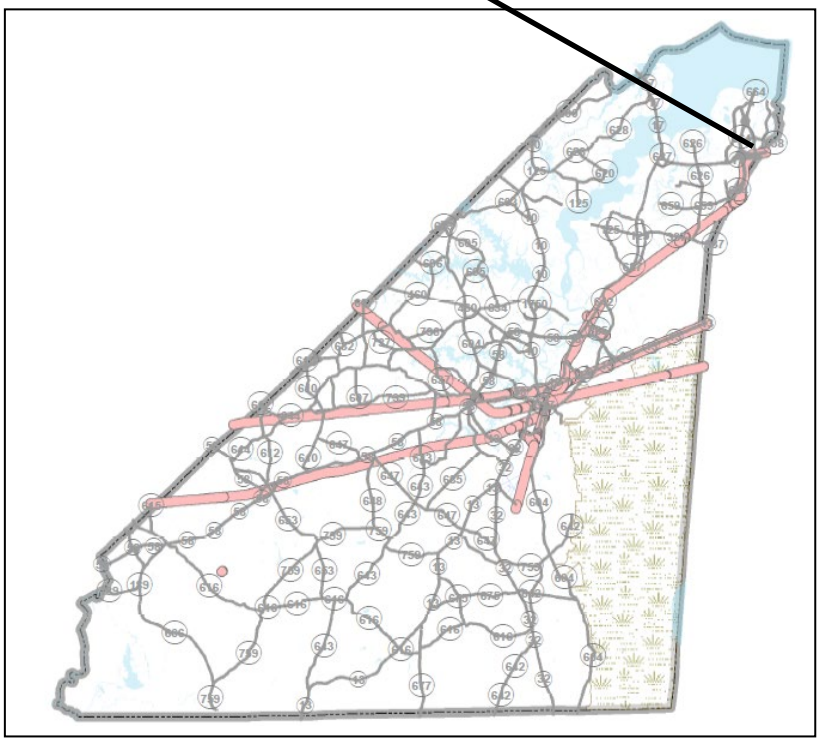
ELEVATED RISK FACILITIES WITHIN 1000 FEET OF MAJOR HIGHWAYS
Attachment 8



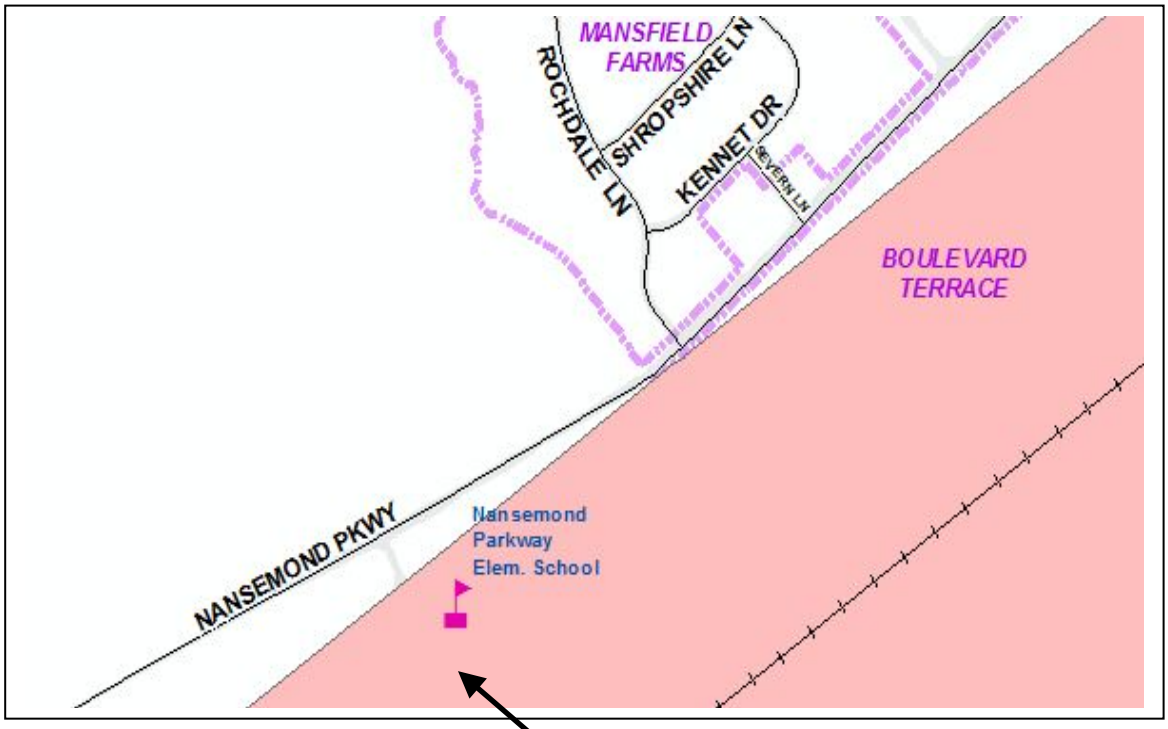
ELEVATED RISK FACILITIES WITHIN 1000 FEET OF RAILROADS

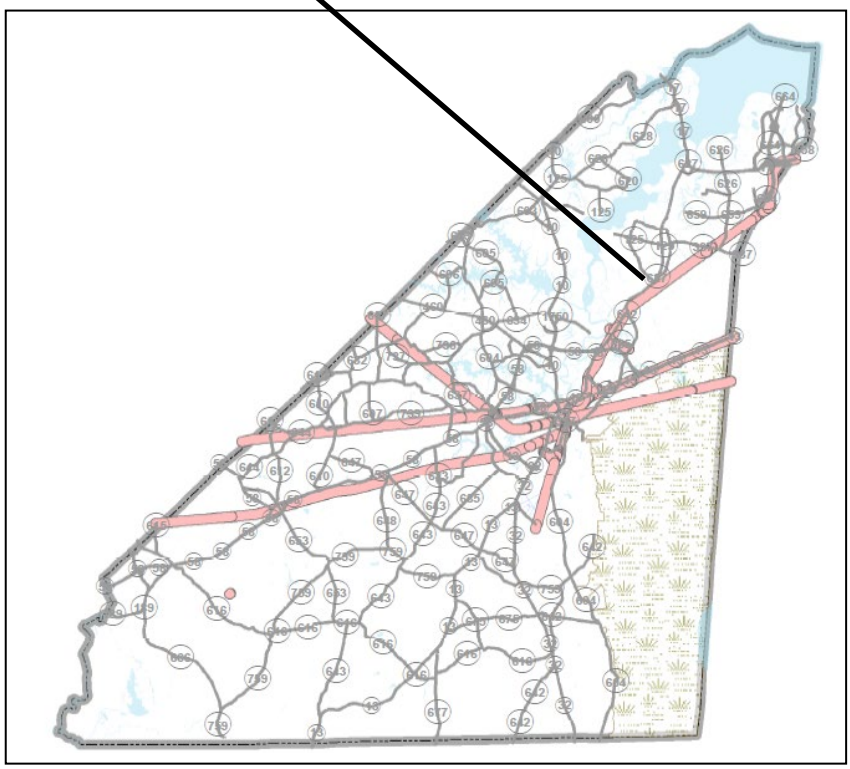
Attachment 1





ELEVATED RISK FACILITIES WITHIN 1000 FEET OF RAILROADS
Attachment 2





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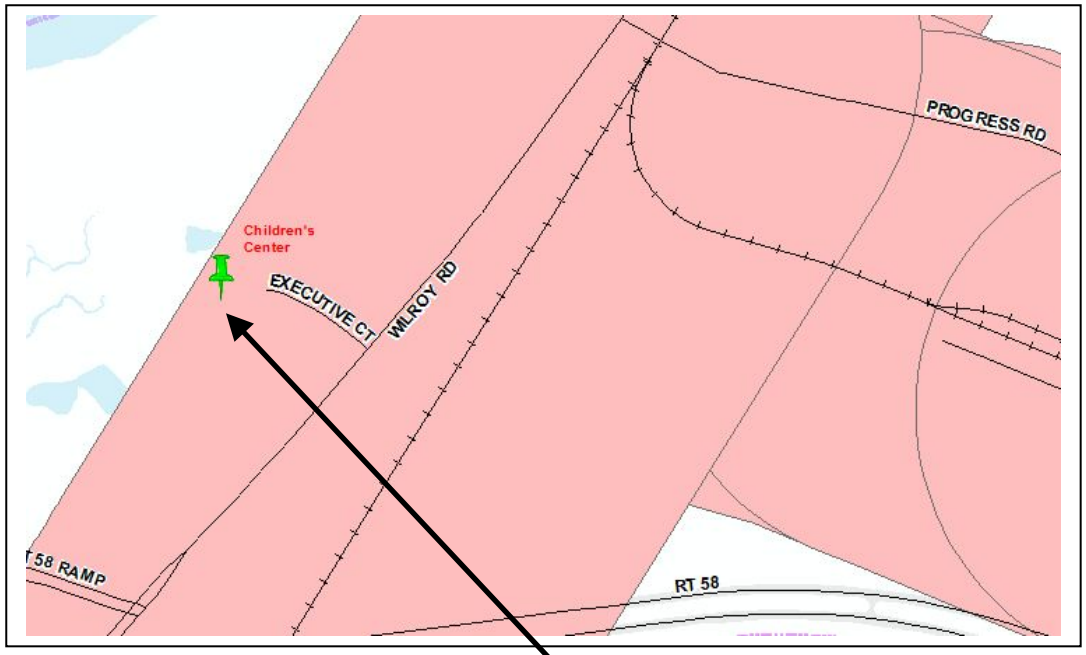
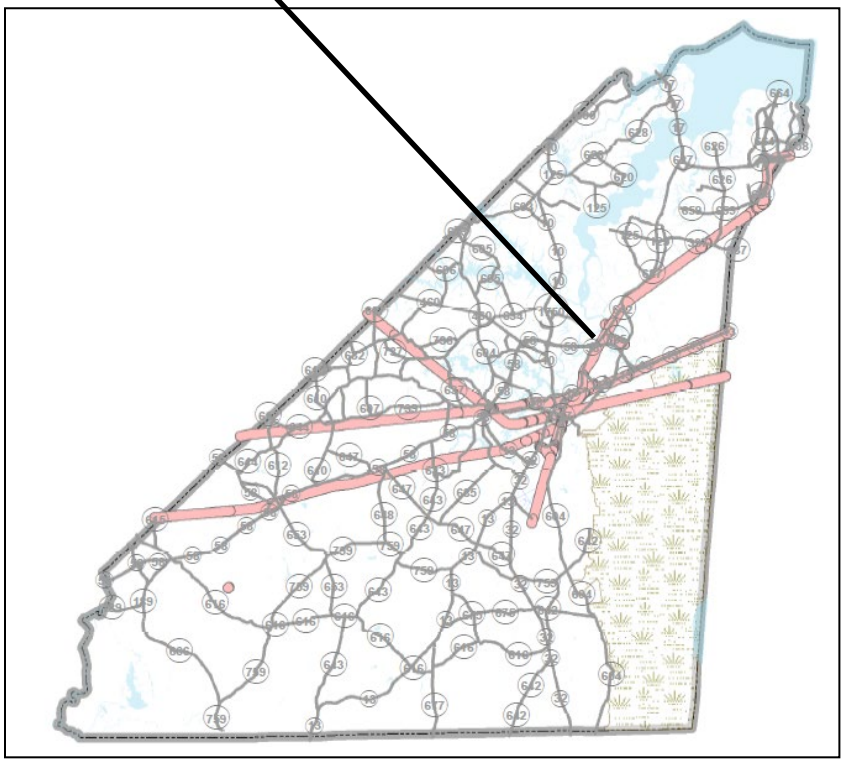
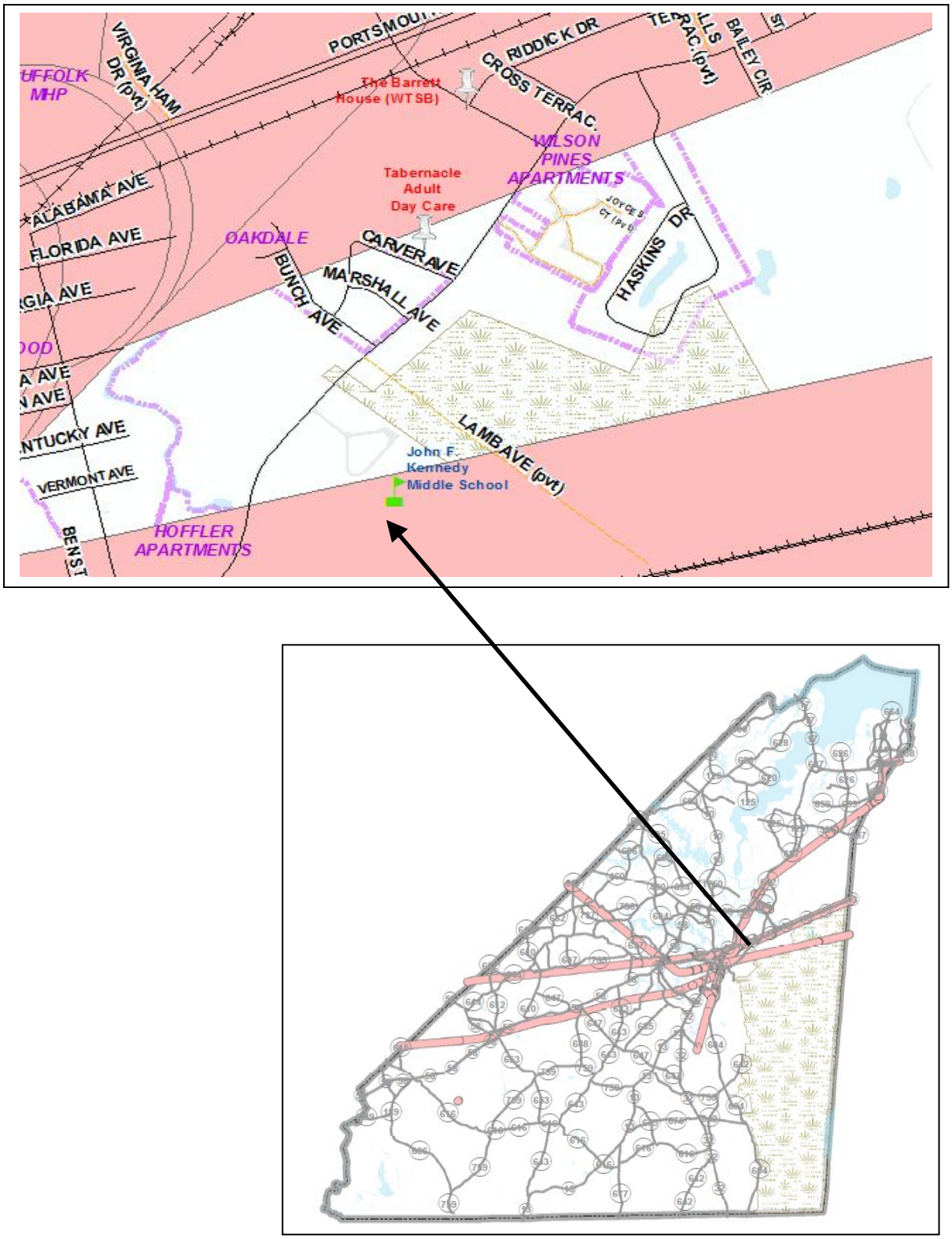
Attachment 3



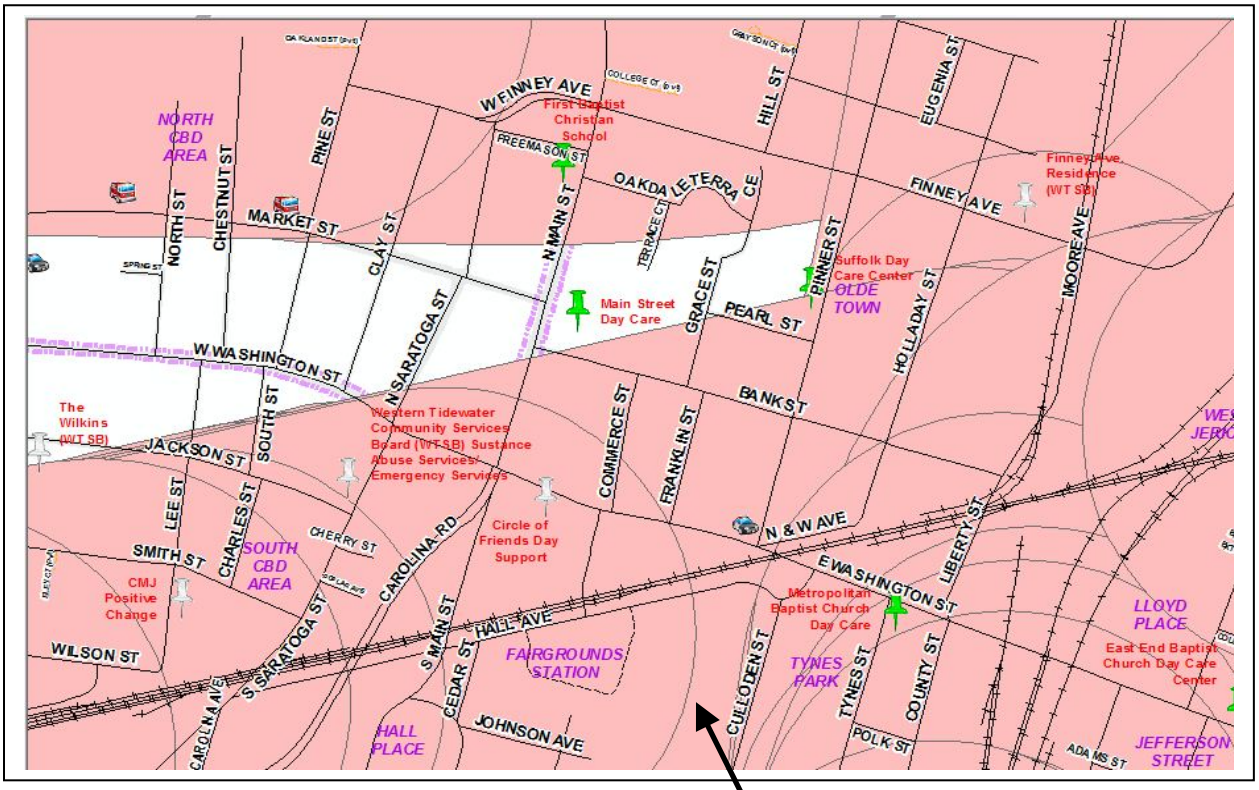


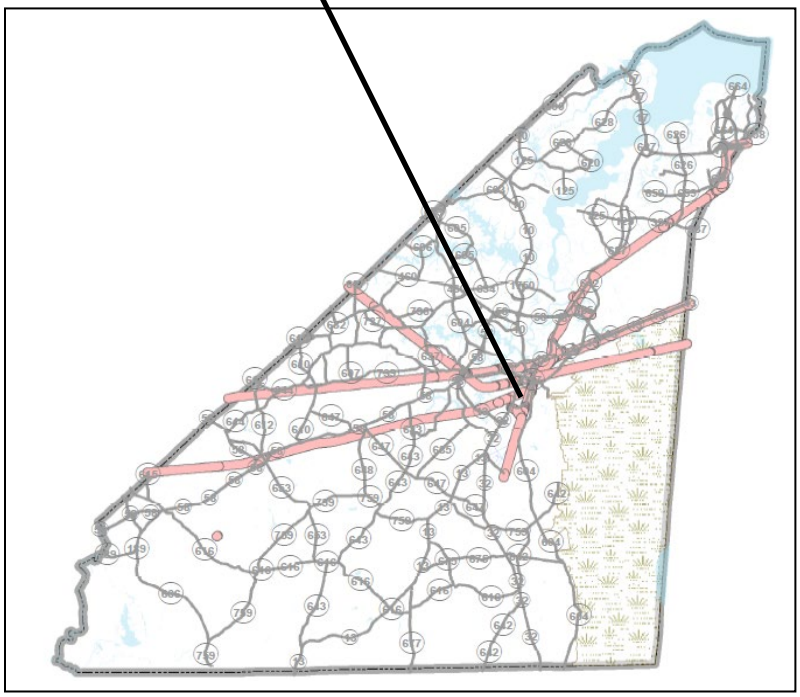
ELEVATED RISK FACILITIES WITHIN 1000 FEET OF RAILROADS
Attachment 4



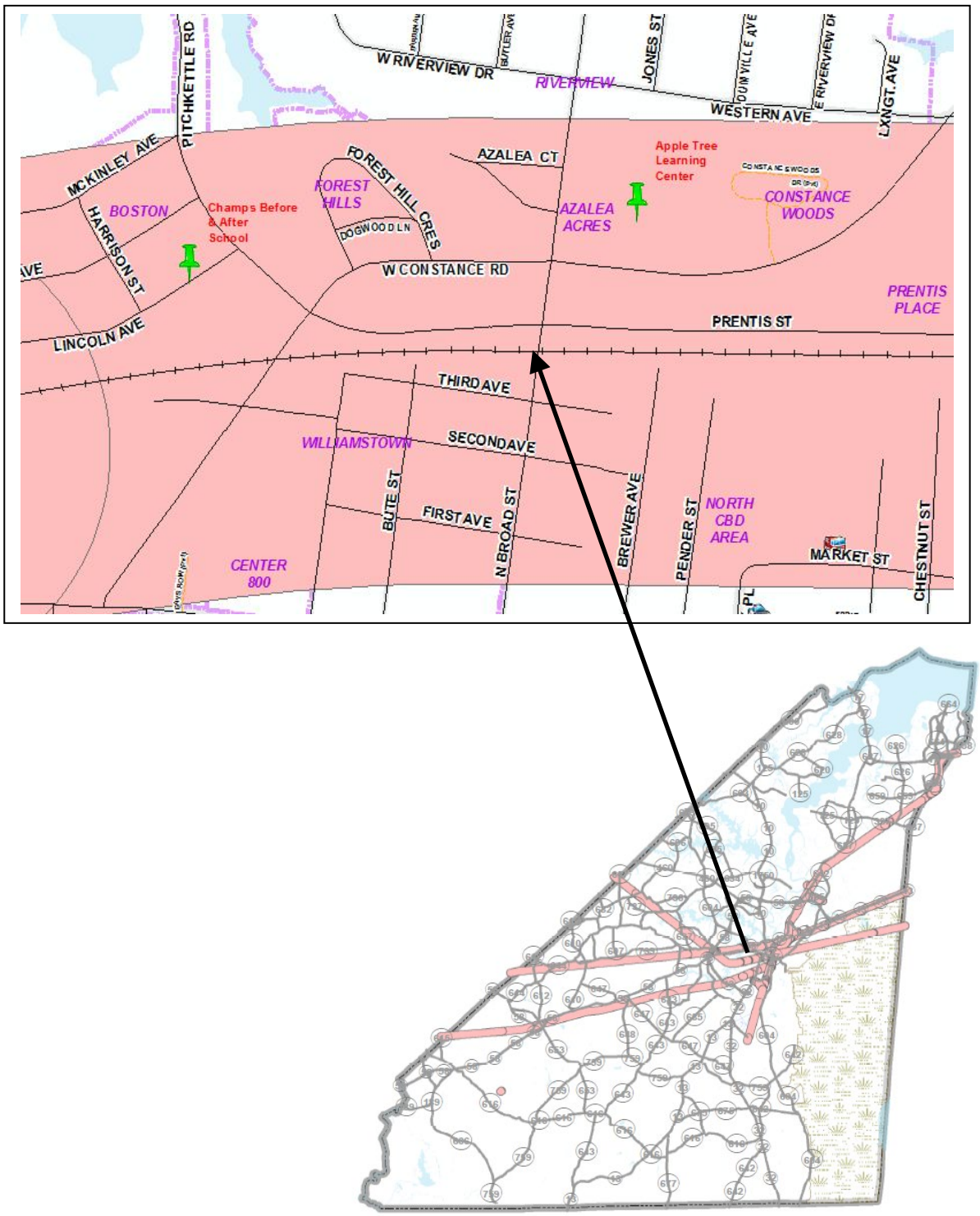
ELEVATED RISK FACILITIES WITHIN 1000 FEET OF RAILROADS

Attachment 5



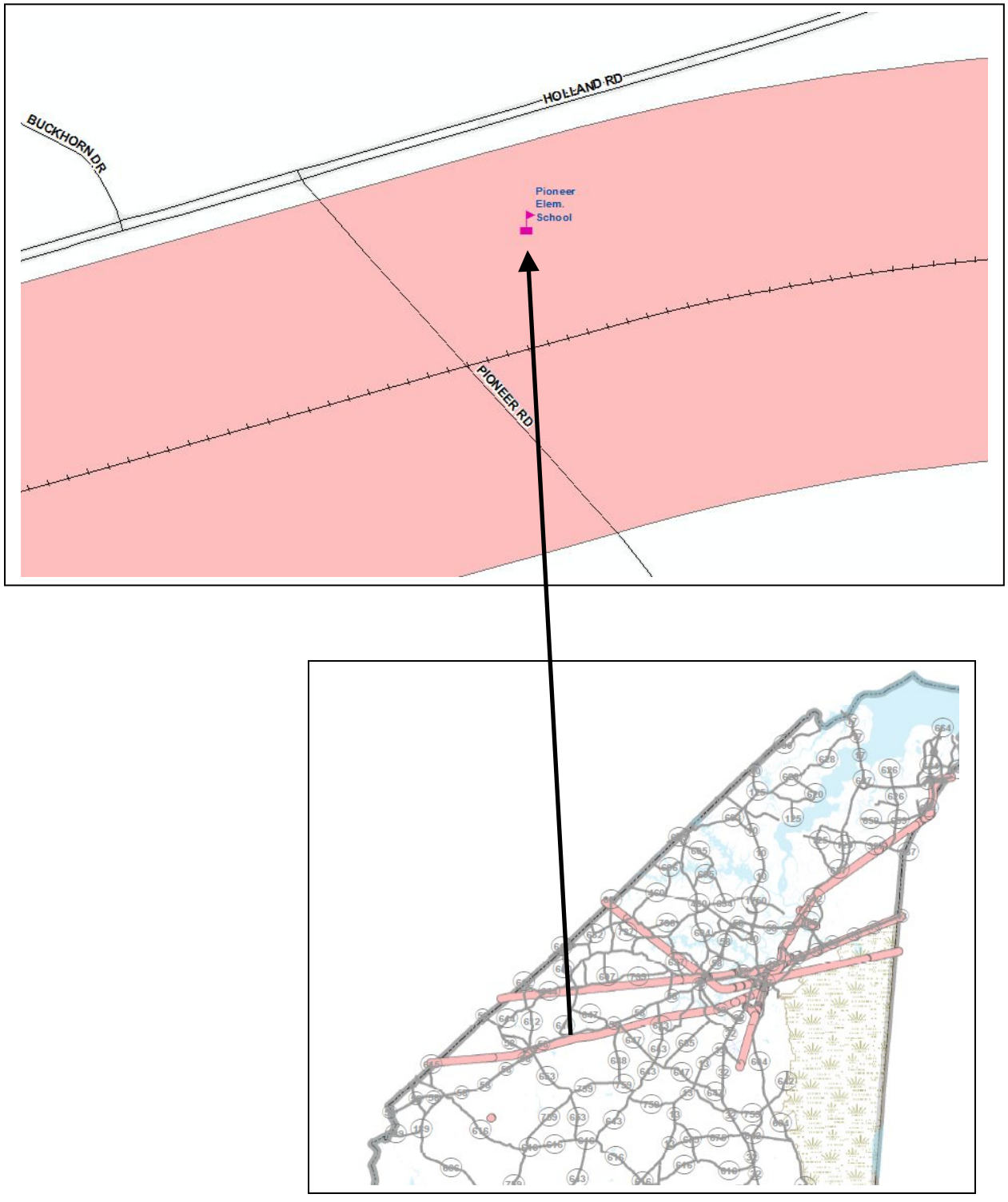


ELEVATED RISK FACILITIES WITHIN 1000 FEET OF RAILROADS
Attachment 6



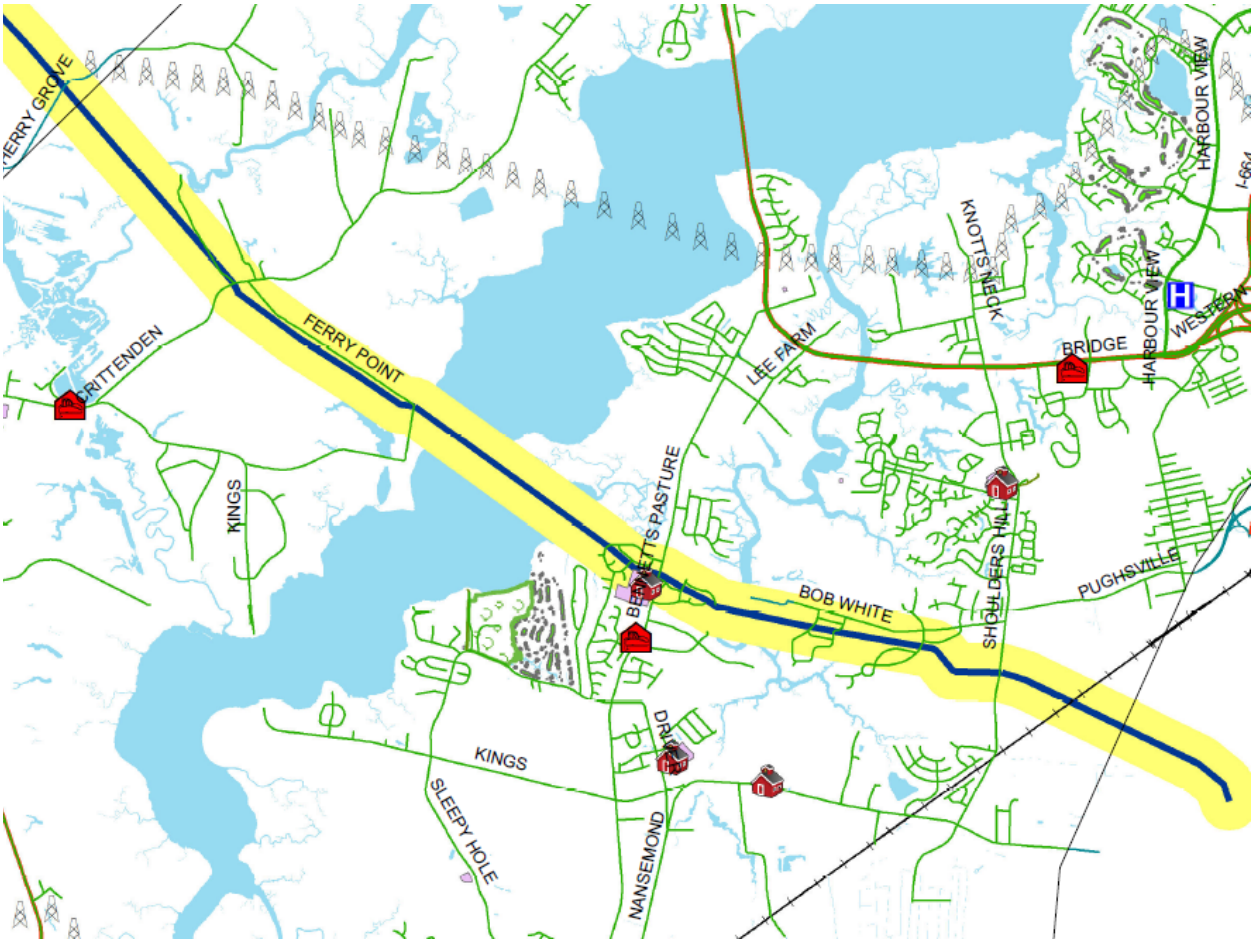
ELEVATED RISK FACILITIES WITHIN 1000 FEET OF RAILROADS

Attachment 7



ELEVATED RISK FACILITIES & NEIGHBORHOODS LOCATIONS

Colonial Pipeline Company



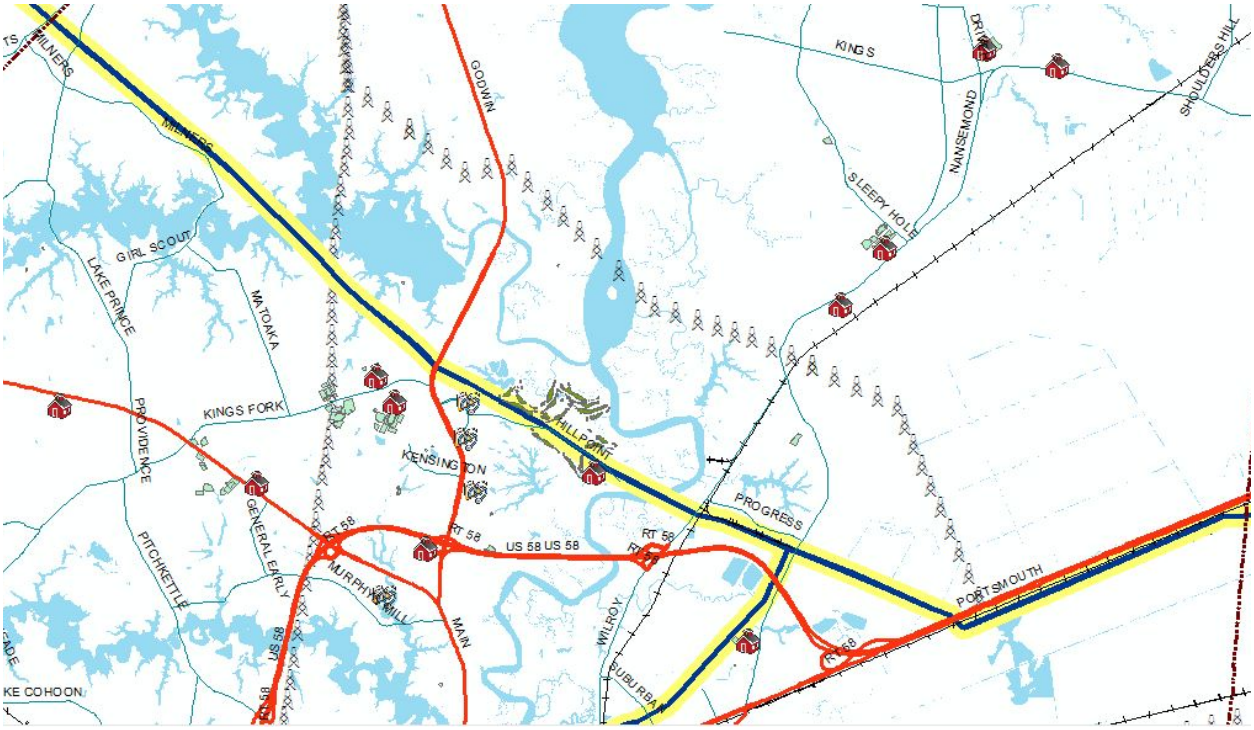
Note: The yellow highlighted area indicates a 500 foot buffer on each side of the pipeline.

At Risk Facility: John Yeates Middle School and Athletic Field, 4901 Bennetts Pasture Rd.

At Risk Neighbor hoods: Sandy Bottom, Point Harbor, Creekview, Quaker Neck, River Club, Bobwhite Landing, Glen Forest.

ELEVATED RISK FACILITIES & NEIGHBORHOODS LOCATIONS

Columbia Gas Transmission



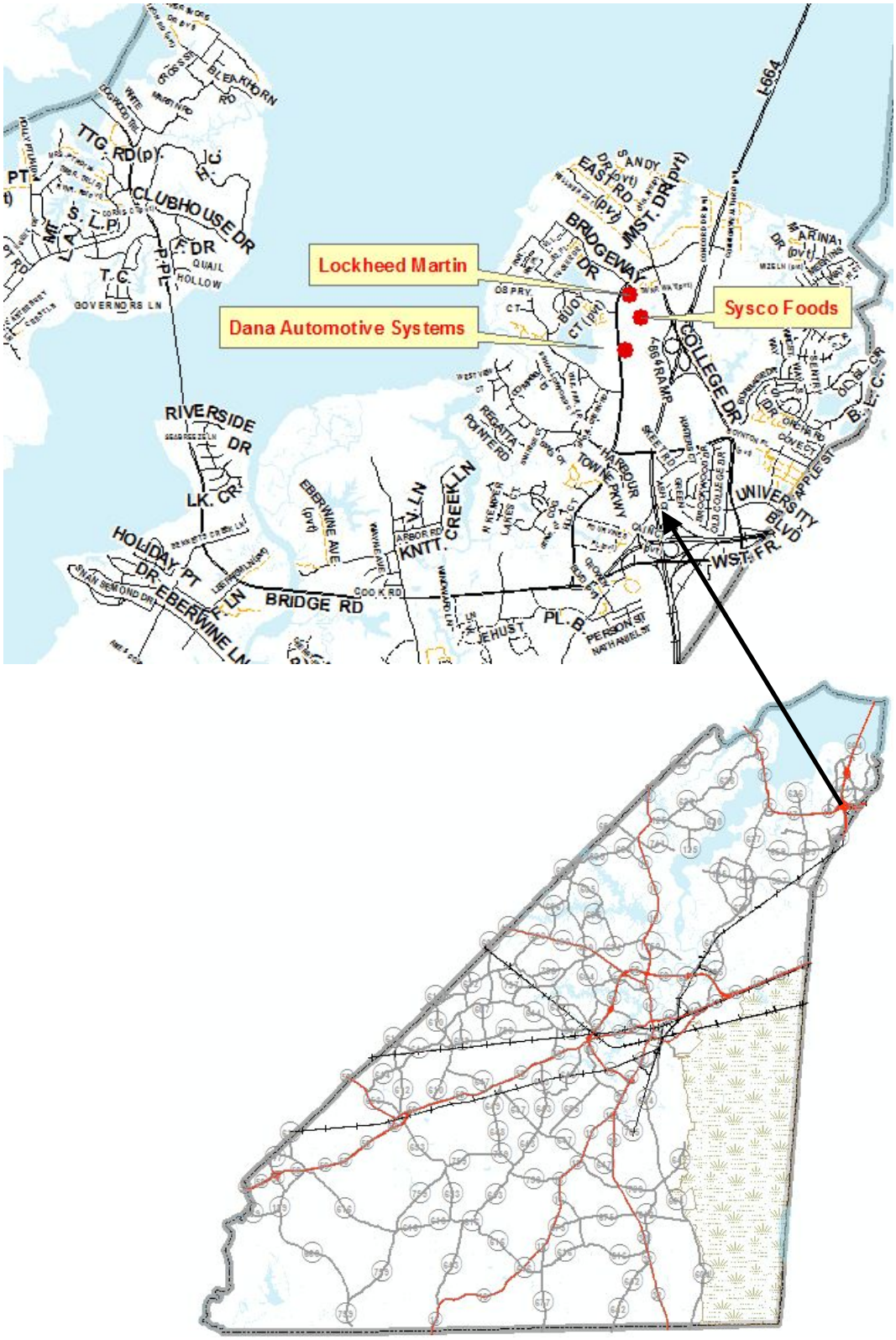
Note: The yellow highlighted area indicates a 500 foot buffer on each side of the pipeline.

At risk facilities: Nansemond River Golf and Country Club, 1000 Hillpoint Blvd.; Hillpoint Elementary School, 1101 Hillpoint Blvd.

At risk neighborhoods: Eastover, Suburban Woods, Magnolia Lakes Mobil Home Park, Patriot's Walk, Nelms Ridge, Mill Creek Close, Nansemond Crossing, Fairways Crossing, Hillpoint Greens, Hillpoint Commons, Russell Point.

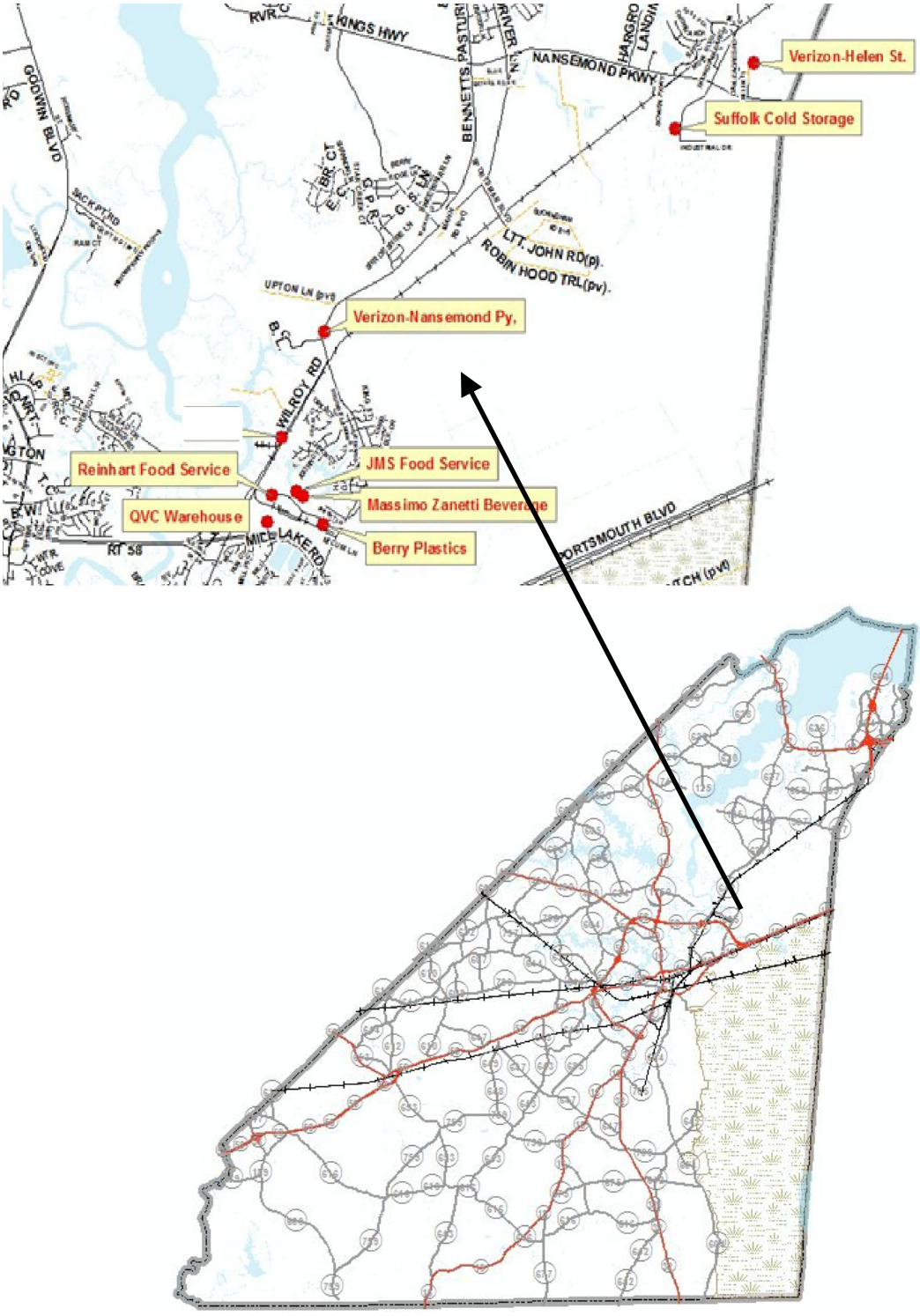
EXTREMELY HAZARDOUS SUBSTANCES FACILITIES

Attachment 1



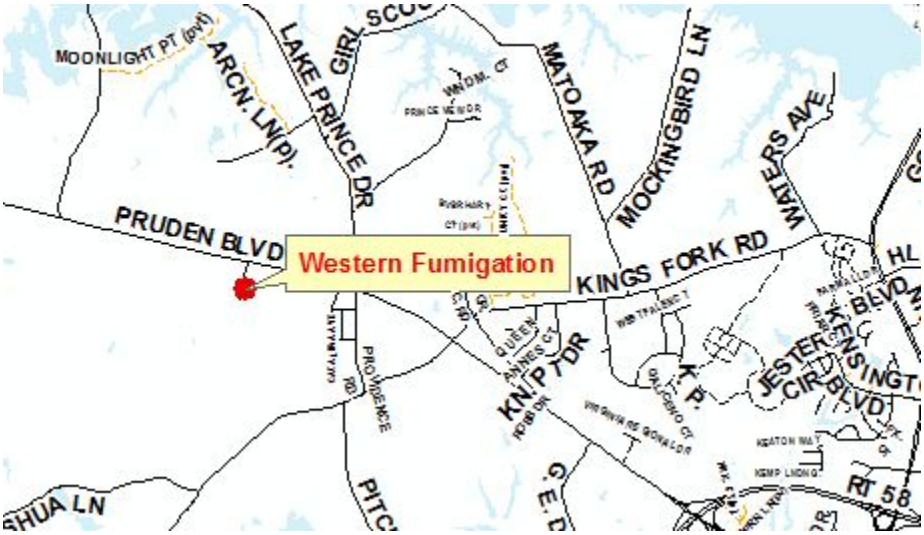
EXTREMELY HAZARDOUS SUBSTANCES FACILITIES

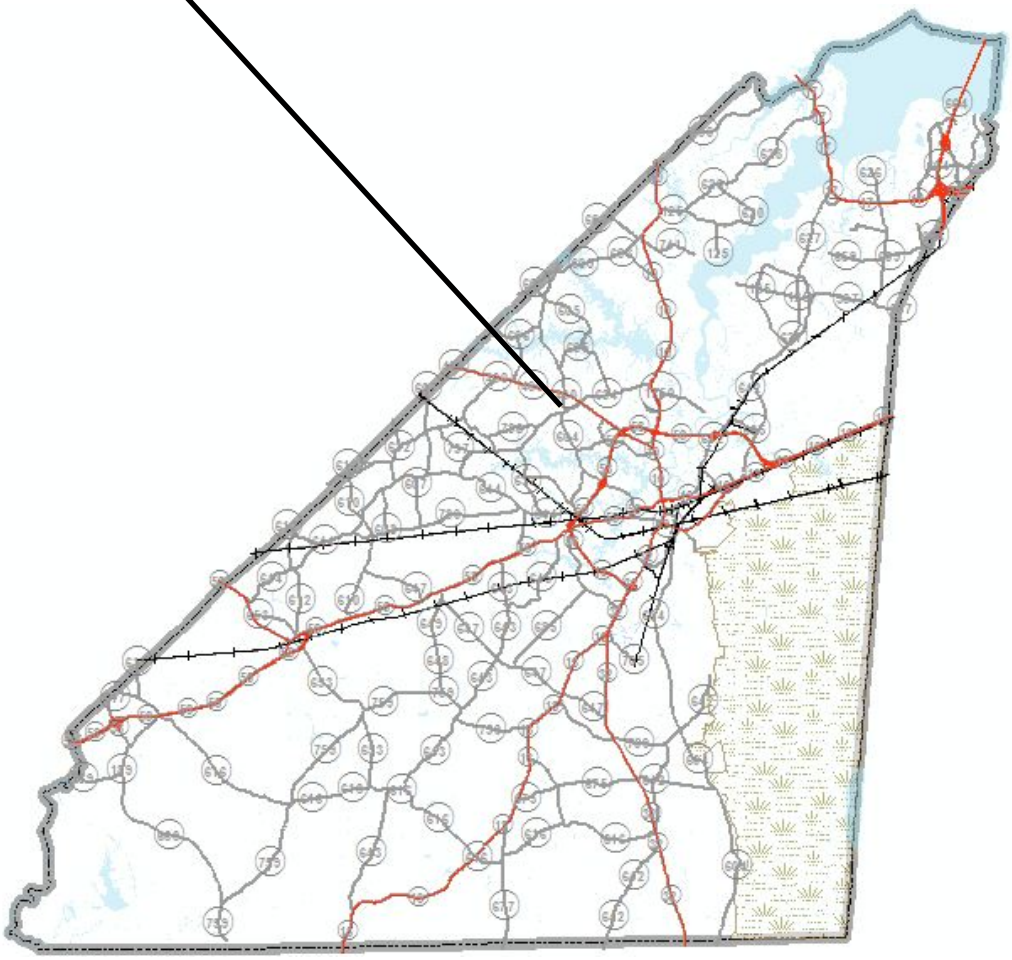
Attachment 2



EXTREMELY HAZARDOUS SUBSTANCES FACILITIES

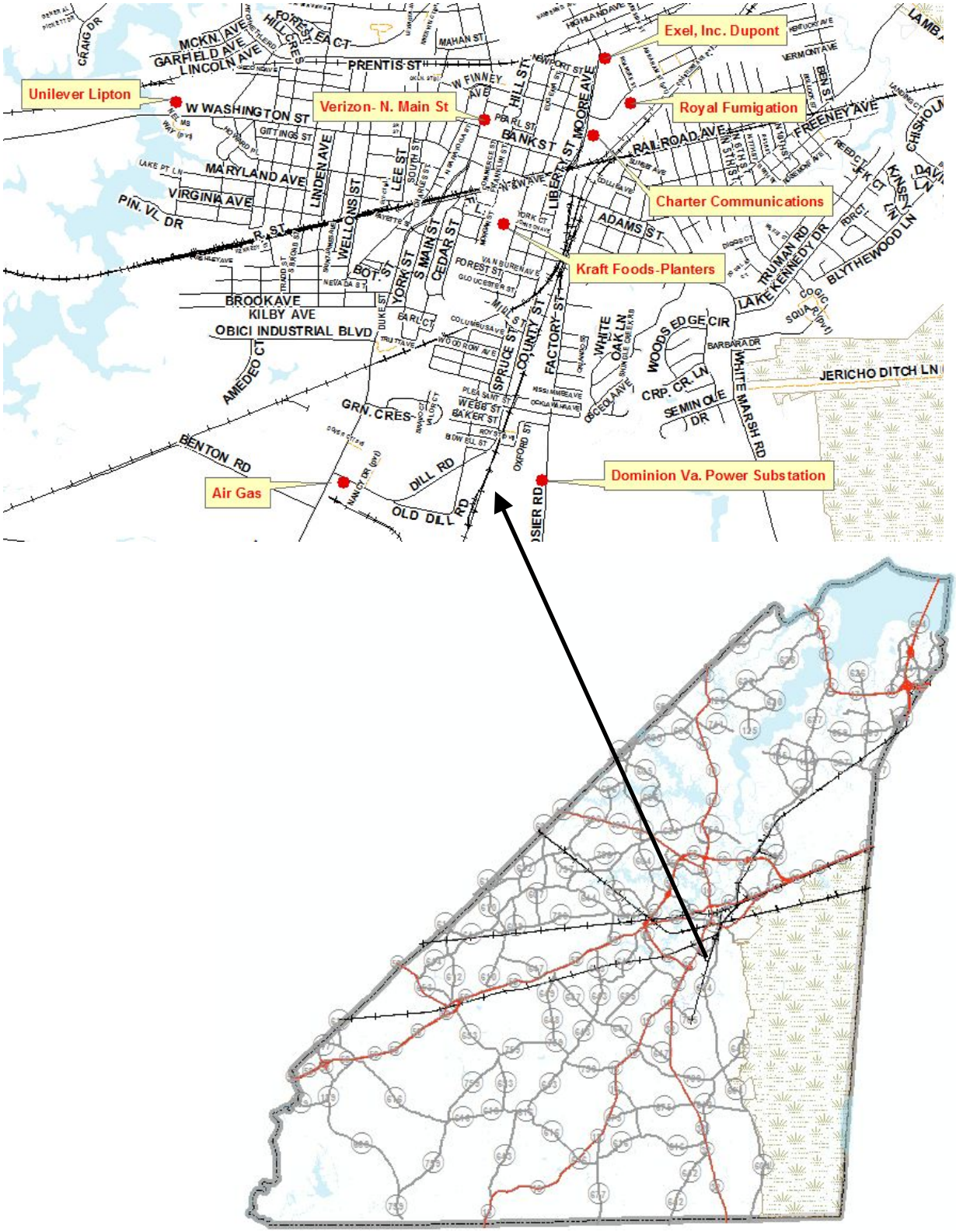
Attachment 3





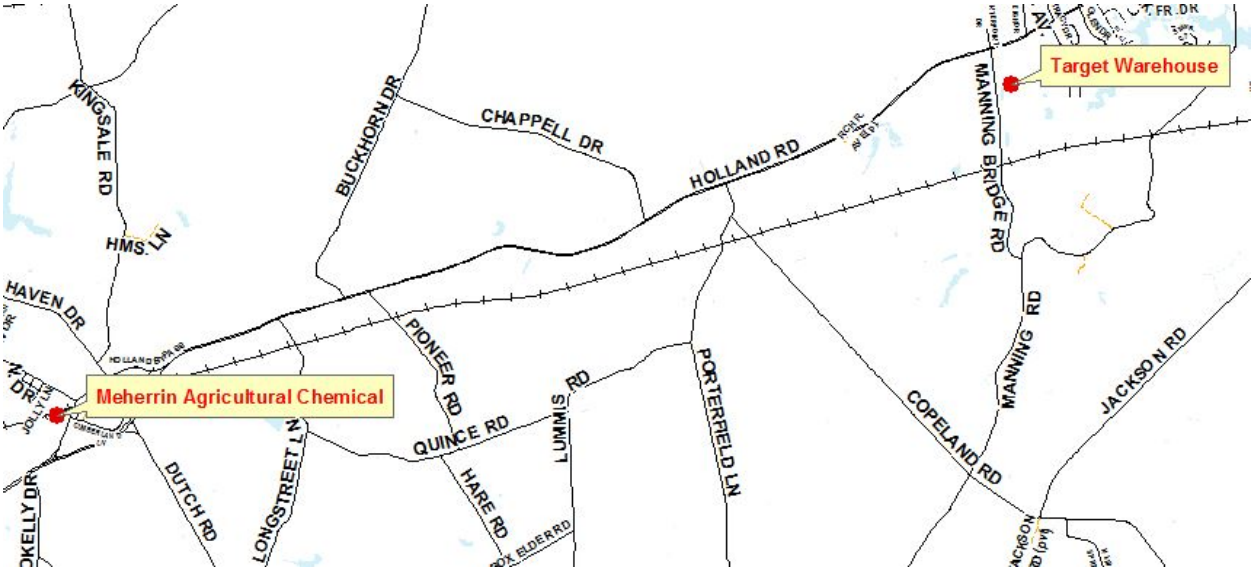
EXTREMELY HAZARDOUS MATERIALS FACILITIES

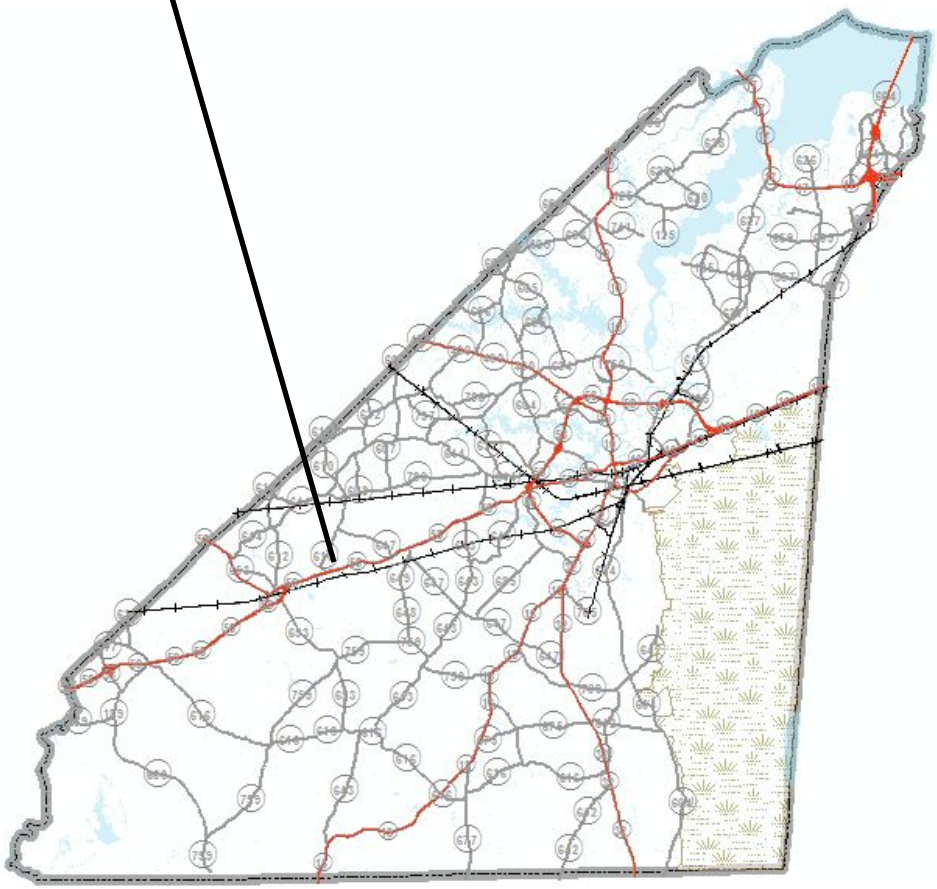
Attachment 4



EXTREMELY HAZARDOUS SUBSTANCES FACILITIES

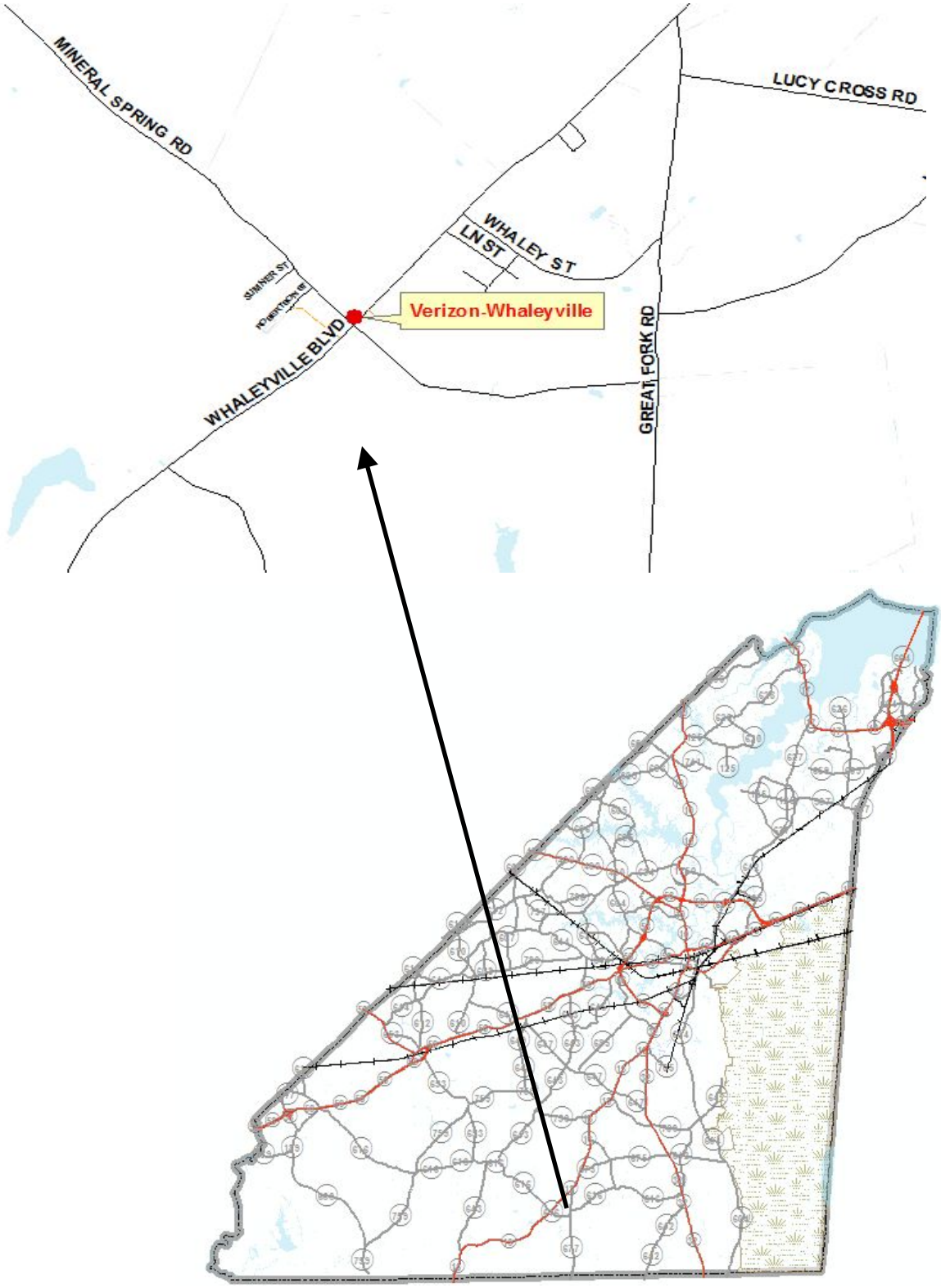
Attachment 5





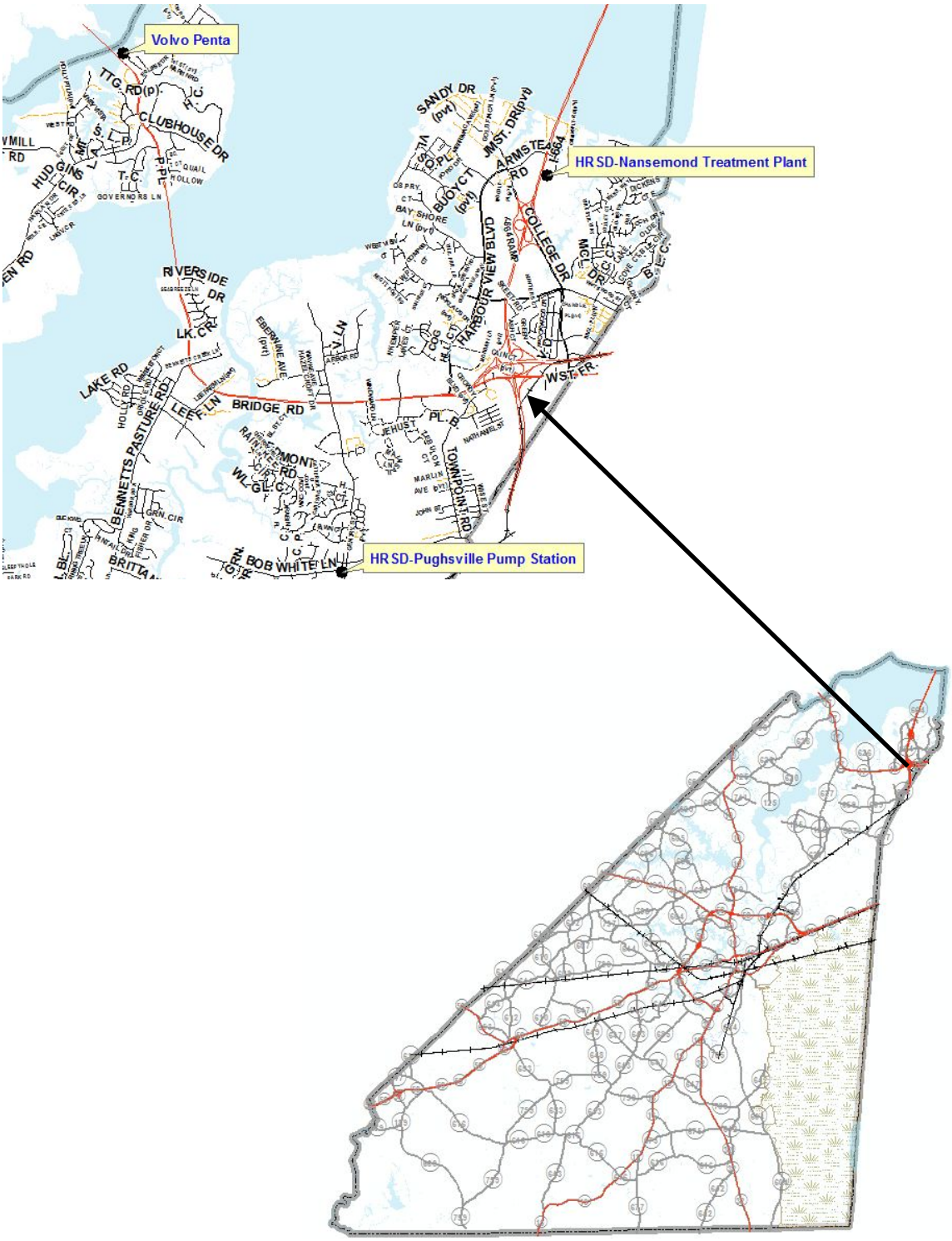
EXTREMELY HAZARDOUS SUBSTANCES FACILITIES

Attachment 6



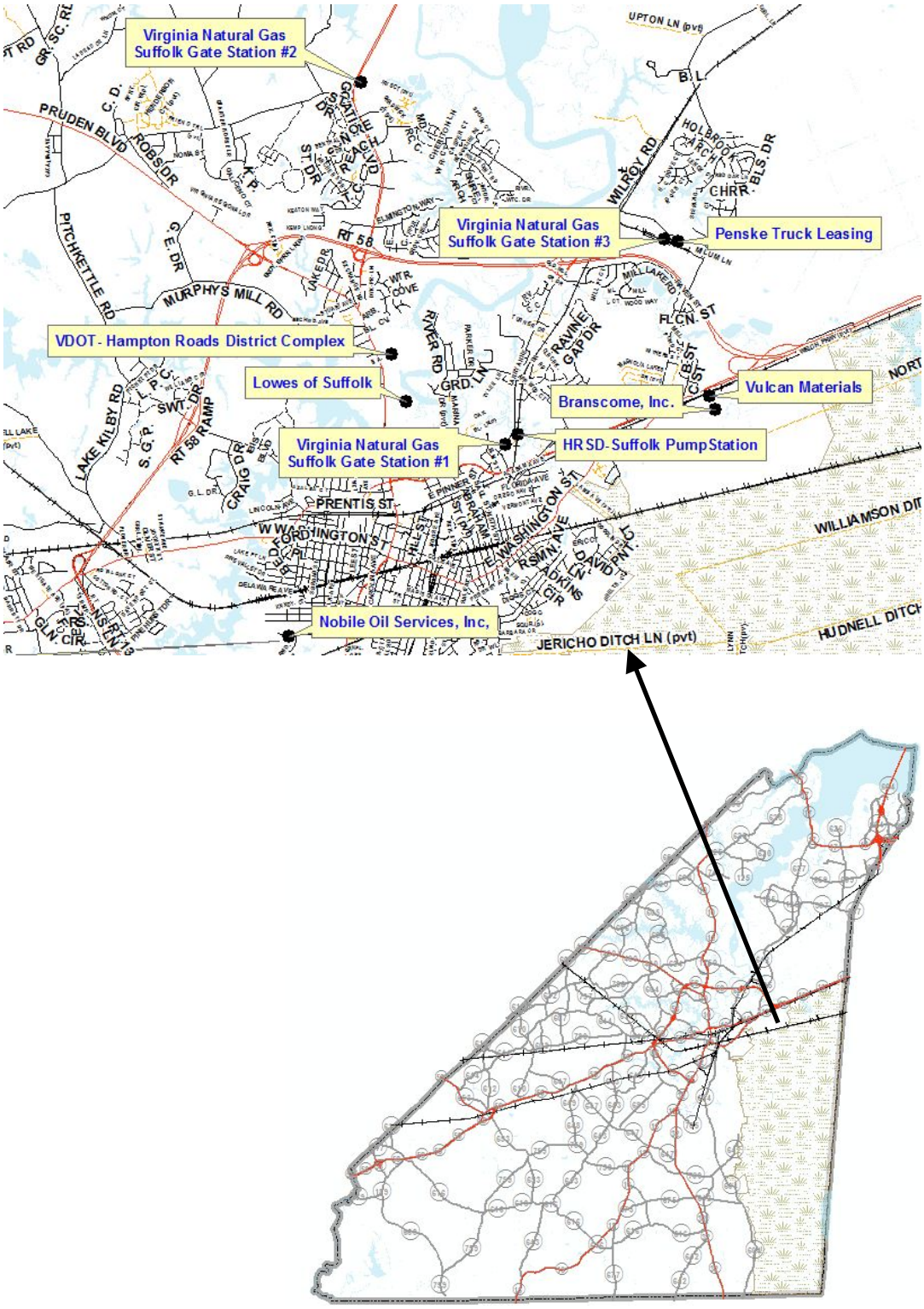
TOXIC CHEMICALS & CERCLA HAZARDOUS SUBSTANCES FACILITIES

Attachment-1



TOXIC CHEMICALS & CERCLA HAZARDOUS SUBSTANCES FACILITIES

Attachment-2



Appendix D
Resilience Plan Project Table

Resilience Plan Project Table					
Parameter	Name of Project:	Installation of Flood Depth Markers	Oldetown Drainage Improvements	Driver Drainage	Pughsville Neighborhood Drainage Improvements
On Virginia Coastal Resilience Web Explorer?			Yes	No	No
Name of the Document the Project is included in:		Hampton Roads Hazard Mitigation Plan	Oldetown (Finney Outfall) Drainage Master Plan	Driver Lane Drainage Study	Pughsville Area Drainage Study
Date the Document was published:		Janurary 2017	Submitted July 2018 Revised November 2018	April 2021	August 2012
Name of the Watershed the Project is located in:			James River Finney Sub-Watershed 1	James River (Bennett Creek)	James River (Drum Point Creek)
Rain Fall Events (for 24hr storms) Analyzed:		UNK	2-, 5-, and 10-year	5- and 10-year	2-, 10-, 25- and 100-year
Tailwater Analyzed:		UNK	19.91' (0.8D)	UNK	6.84'
Short Summary of Project (I.E. Storm System Upgrades, Detention Basin, Channel/Channel widening):		Install markers indicating the flood water depth along streets or roads subject to tidal, riverine or urban flooding	Realignmnet and capacity improvements	1. Alternative I: Intersection Improvements and southern Driver Improvements 2. Alternative III: Driver south Connection Potential Alignment 3. Alternative II: Seaboard Trail Potential Alignment	Neighborhood drainage improvements in the Pughsville area that include a drainage trunkline down John Street and a stormwater pond south of Queen St (Phase 2). A future Phase 3 will be needed to improve drainage in areas north of John St.
Is the Project Nature-based?		No	No	No	Yes
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
Level of Protection / Design Storm		100-yr	10 yr.	10 yr.	10 yr.
Size of the Drainage Area related to the Project if listed:		UNK	109 ac	688 ac	408 ac
How many alternatives were developed/analyzed for the issues being solved:		1	1	3	1
Does this Project require future maintenance		Yes	Yes	Yes	Yes
Cost Range		$	$$$$	$$$	$$$
Does the Project have funding available at present?		UNK	No	UNK	UNK
Timing for implementation (contingent on funding availability)		UNK	FY23 - FY26	FY27 - FY31	FY23-FY24
What other project(s) must be completed prior to installation of this Project?		None	See phasing sequence in Oldetown Drainage Study	None	This is a compilation of multiple projects
Implementation Horizon		Long-Term	Mid-Term	Mid-Term	Short-Term

Resilience Plan Project Table				
Parameter — Name of Project:	Woodrow South Suffolk Drainage	Jefferson Street Drainage	First Avenue Drainage	Sadler Heights Drainage
On Virginia Coastal Resilience Web Explorer?	Yes	Yes	Yes	Yes
Name of the Document the Project is included in:	Capital Improvement Plan FY22-31	Capital Improvement Plan FY22-31	Capital Improvement Plan FY22-31	Capital Improvement Plan FY22-31
Date the Document was published:	July 2021	July 2021	July 2021	July 2021
Name of the Watershed the Project is located in:	James River	James River	James River	James River
Rain Fall Events (for 24hr storms) Analyzed:				
Tailwater Analyzed:				
Short Summary of Project (I.E. Storm System Upgrades, Detention Basin, Channel/Channel widening):	The project will provide for the design, right of way and construction of drainage improvements to relieve flooding in the South Suffolk neighborhood and section of the City.	The project will provide for the design, right of way and construction of drainage infrastructure to upgrade and relocate the stormwater system along Jefferson Street.	The project will provide for the design, right of way and construction of drainage infrastructure to relieve flooding in the Broad Street section of the City.	The project will provide for the design, right of way and construction of drainage infrastructure to relieve flooding in the Sadler Heights neighborhood
Is the Project Nature-based?	UNK	UNK	UNK	UNK
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
Level of Protection / Design Storm	UNK	UNK	UNK	UNK
Size of the Drainage Area related to the Project if listed:	No	No	No	No
How many alternatives were developed/analyzed for the issues being solved:	1	1	1	1
Does this Project require future maintenance	Yes	Yes	Yes	Yes
Cost Range	$$$	$	$$$$	$$
Does the Project have funding available at present?	UNK	UNK	UNK	UNK
Timing for implementation (contingent on funding availability)	FY23 - FY26	FY22 - FY24	FY23 - FY31	FY24 - FY25
What other project(s) must be completed prior to installation of this Project?				
Implementation Horizon	Mid-Term	Short-Term	Mid-Term	Mid-Term

Resilience Plan Project Table				
Parameter Name of Project:	Kimberly Bridge AKA North Main Street (Route 10/32)	Towne Point Road between Pughsville and Route 17	Constant's North Park - Phase I	Constant's North Park - Phase II
On Virginia Coastal Resilience Web Explorer?	No	No	No	No
Name of the Document the Project is included in:	Stormwater Master Plan City of Suffolk, Virginia	Stormwater Master Plan City of Suffolk, Virginia	Constant's North Park - Phase I 90% Design, 90% Plan, and Capital Improvement Projects List	Constant's North Park - Phase II 90% Design, 90% Plan, and Capital Improvement Projects List
Date the Document was published:	May 2004	May 2004	November 2020	November 2020
Name of the Watershed the Project is located in:	James River (Nansemond River & Lake Meade Dam)	James River (Western Branch of the Elizabeth River Knotts Creek and Drum Point Creek)	James River (Nansemond River)	James River (Nansemond River)
Rain Fall Events (for 24hr storms) Analyzed:	100-, 500-yr	No	25-yr	25-yr
Tailwater Analyzed:	No	No	No	No
Short Summary of Project (I.E. Storm System Upgrades, Detention Basin, Channel/Channel widening):	Based on potential for significant property damage, it is recommended the City consider the viability of acquiring properties in the defined region, restoring the natural 100-yr flood plain, and the replacement of the Withers Bridge with a new bridge at a higher roadway surface elevation	Improvements to reduce likelihood of flooding along Towne point road include increasing drainage capacity, regional retention basins, and targeted public education programs are recommended	This plan is for the creation of a passive recreation park, which is located along north main St. adjacent to the Nansemond river in the city of Suffolk, Virginia. phase I involves the establishment of approximately 400 linear feet of living shoreline, site grading and stormwater drainage improvements.	This plan is for the creation of a passive recreation park, which is located along north main St. adjacent to the Nansemond river in the city of Suffolk, Virginia. phase II involves the creation of a passive recreation park with vehicular parking and paved trails.
Is the Project Nature-based?	Yes	Yes	Yes	No
What issues or problems are being addressed by the project?	Flooding	Flooding	Flooding	
Does the proposed Project enable communities to adapt to and thrive through natural or human hazards?	Yes	Yes	Yes	Yes
Level of Protection / Design Storm	500-yr	No	25-yr	25-yr
Size of the Drainage Area related to the Project if listed:	41280 ac	522 ac	No	No
How many alternatives were developed/analyzed for the issues being solved:	1	1	1	1
Does this Project require future maintenance	Yes	Yes	Yes	No
Cost Range	UNK	$	$	$
Does the Project have funding available at present?	UNK	UNK	Yes (Partial)	Yes (Partial)
Timing for implementation (contingent on funding availability)	UNK	UNK	FY23 - FY24	FY23 - FY24
What other project(s) must be completed prior to installation of this Project?				Phase I
Implementation Horizon	Long-Term	Long-Term	Short-Term	Short-Term

Resilience Plan Project Table				
Parameter — Name of Project:	Cedar Hill Slope Stabilization	Train Station Hydrodynamic Seperator BMP	Oakland Drainage Improvements	James River Watershed Drainage Infrastructure Improvements
On Virginia Coastal Resilience Web Explorer?	No	No	No	No
Name of the Document the Project is included in:	Cedar Hill Cemetery Slope Stabilization Phase I, Cedar Hill Cemetery Slope Stabilization Phase II, and Cedar Hill Cemetery Slope Stabilization Phase I 60% design	Train Station Basin BMP Conceptual Design for SLAF	Oakland Drainage Study	James River Watershed Stormwater Master Plan
Date the Document was published:	8/1/2021 and 9/1/2021	July 2021	Study underway	2005? (based on description of costs)
Name of the Watershed the Project is located in:	James River (Nansemond River)	James River	James River	James River
Rain Fall Events (for 24hr storms) Analyzed:	1.5-, 2-, 10-yr	N/A	TBD	2-yr, 10-yr, 25-yr, 100-yr
Tailwater Analyzed:	N/A	TBD	TBD	2-yr tide, 3.83 up to 25-yr storm
Short Summary of Project (I.E. Storm System Upgrades, Detention Basin, Channel/Channel widening):	This plan is for the stabilization of approximately 210 linear feet of slope along the eastern boundary of cedar hill cemetery.	Sized and located a hydrodynamic separator (HDS) to provide water quality improvement to the system along with the safety and resiliency improvements as part of the stormwater structure replacement. The pipe and structure configuration replaces pipes and structures that were failing and makes connections to new, sound structures that can be installed and maintained – located out of proximity of other existing utilities	Drainage relief to one of four potential outfalls	Assorted additions, replacements, and/or upgrades to drainage infrastructure within the watershed study area.
Is the Project Nature-based?	Yes	No	TBD	No
What issues or problems are being addressed by the project?	Water Quality	Flooding	Flooding and Drainage	Flooding
Does the proposed Project enable communities to adapt to and thrive through natural or human hazards?	Yes	Yes	Yes	Yes
Level of Protection / Design Storm	10-yr	N/A	TBD	Based on indivudal culvert project
Size of the Drainage Area related to the Project if listed:	No	109 ac	UNK	61440 ac
How many alternatives were developed/analyzed for the issues being solved:	1	1	3	1
Does this Project require future maintenance	Yes	Yes	Yes	Yes
Cost Range	$$	$	$$$	$$$
Does the Project have funding available at present?	Yes	Yes (Partial)	Yes (Partial)	UNK
Timing for implementation (contingent on funding availability)	FY22	UNK	UNK	UNK
What other project(s) must be completed prior to installation of this Project?			None	Part of the James River Watershed Projects
Implementation Horizon	Short-Term	Short-Term	TBD	Phased

Resilience Plan Project Table			
Parameter / Name of Project:	Chowan River Watershed Drainage Infrastructure Improvements	Great Dismal Swamp Watershed Drainage Infrastructure Improvements	Godwin Millpond Dam Rehabilitation
On Virginia Coastal Resilience Web Explorer?	No	No	No
Name of the Document the Project is included in:	Chowan River Watershed Master Plan	Great Dismal Swap Watershed Stormwater Master Plan	N/A
Date the Document was published:	10/1/2008	10/1/2008	N/A
Name of the Watershed the Project is located in:	Chowan River	Great Dismal Swap Watershed	James River
Rain Fall Events (for 24hr storms) Analyzed:	2-, 10-, 25-, and 100-yr	2-, 10-, 25-, and 100-yr	TBD
Tailwater Analyzed:	3.0 (up to 25-yr) and 6.70	0.8 x D	TBD
Short Summary of Project (I.E. Storm System Upgrades, Detention Basin, Channel/Channel widening):	Assorted additions, replacements, and/or upgrades to drainage infrastructure within the watershed study area.	Assorted additions, replacements, and/or upgrades to drainage infrastructure within the watershed study area.	The Godwin Millpond is equipped with a high hazard dam that is part of the City of Suffolk's water supply. The dam is in need of rehabilitation by means of either reconstuction by means of rip rap reinforcement or sheet pile construction. The existing spillway will be reconstructed. The rehabiliation of this dam will serve to protect the water supply contained in the millpond and also protect Route 10 from damage during extreme storm events. Route 10 is an existing evacuation route.
Is the Project Nature-based?	No	No	No
What issues or problems are being addressed by the project?	Flooding	Flooding	Flooding
Does the proposed Project enable communities to adapt to and thrive through natural or human hazards?	Yes	Yes	Yes
Level of Protection / Design Storm	Based on indivudal culvert project	Based on indivudal culvert project	TBD
Size of the Drainage Area related to the Project if listed:	148 sqmi	72 sqmi	UNK
How many alternatives were developed/analyzed for the issues being solved:	2	2	anticipate 4
Does this Project require future maintenance	Yes	Yes	Yes
Cost Range	$$$$	$$$	$$$$
Does the Project have funding available at present?	UNK	UNK	No
Timing for implementation (contingent on funding availability)	UNK	UNK	FY24 - FY27
What other project(s) must be completed prior to installation of this Project?	Part of the Chowan River Projects	Part of the Great Dismal Projects	None
Implementation Horizon	Phased	Phased	Mid-Term

Cost Range Legend	
Symbol	Cost Opinion (2022)
$	$0 - $500,000
$$	$500,000 - $1,000,000
$$$	$1,000,000 - $5,000,000
$$$$	$5,000,000 +

Link to current hazard mitigation plan

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)

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)

N/A. Total project cost is less than $2 million.

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:

Unified Development Ordinance Article 4- Sec. 31-416.2- Floodplain Overlay District
https://library.municode.com/va/suffolk/codes/unified_development_ordinance?nodeId=SUFFOLK_UNIFIED_DEVELOPMENT_ORDINANCE_ART4ZO_S31-416.2FLOVDIF

Unified Development Ordinance Appendix B- B-15- Flood Prevention Plan
https://library.municode.com/va/suffolk/codes/unified_development_ordinance?nodeId=SUFFOLK_UNIFIED_DEVELOPMENT_ORDINANCE_APXBSURE_B-15FLPRPL

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.

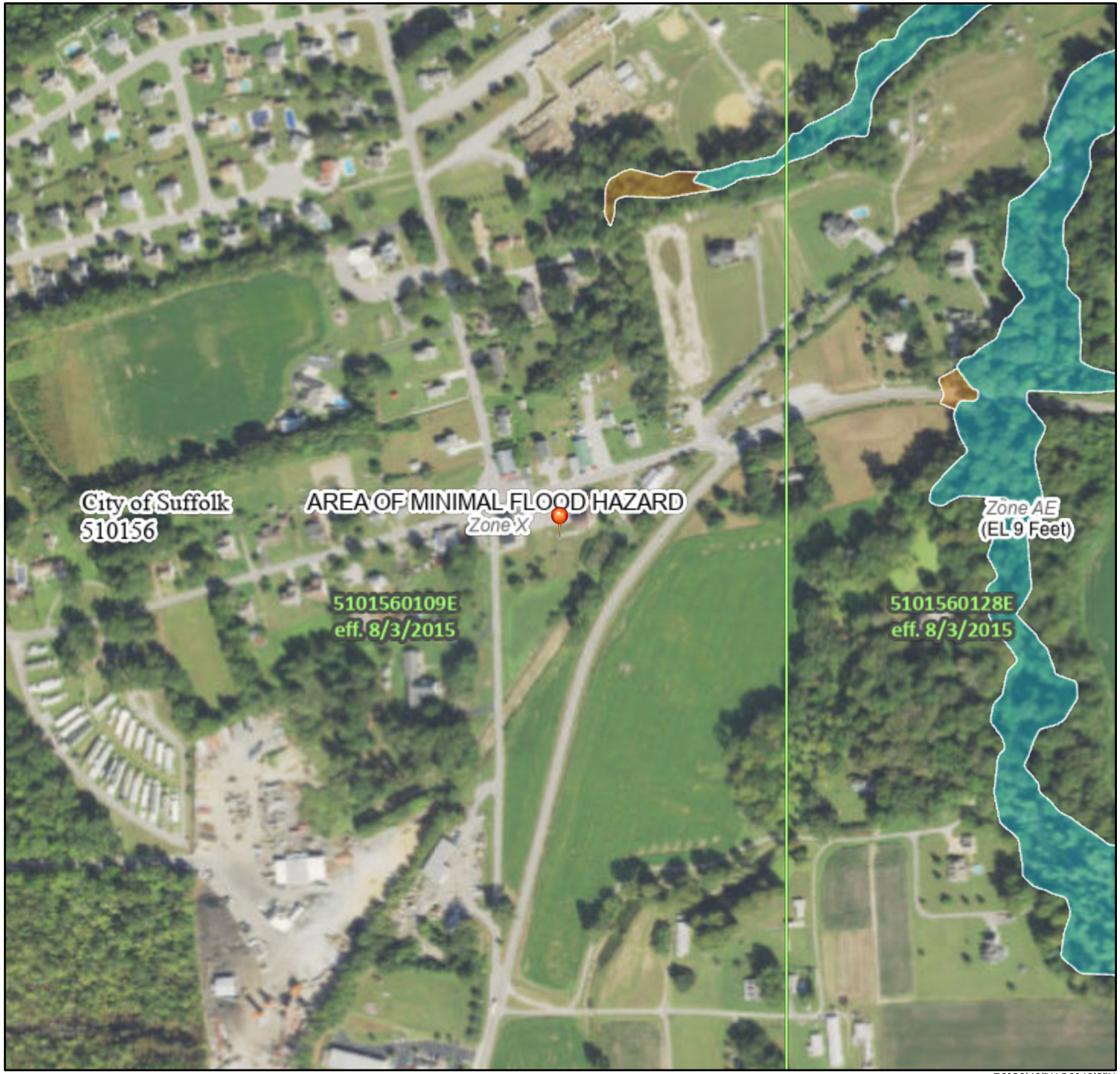
Once constructed, this infrastructure will be part of the City's Road and Storm Drainage system. As such, it will be maintained by the Road Maintenance division. The Road Maintenance division completes maintenance of closed and open stormwater management systems throughout the City. The division is equipped with maintenance equipment such as vactor trucks, CCTV equipment, ditching maintenance tractors as well as equipment for replacement of structures and pipes. The City also maintains a contract for these maintenance services when assistance from a contractor is necessary. The City has staff that respond to drainage complaints and 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 necessary repairs. Should any portion of the project fail under normal operating conditions within 50 years of project completion, the City will utilize funds in the road maintenance fund and/or the stormwater utility fund to repair or replace the system that is failing.

The total project cost as identified in the application is for design and construction and related costs only. Funding for maintenance is non-fund financed.

National Flood Hazard Layer FIRMette

FEMA

76°30'26"W 36°49'37"N



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

1:6,000

76°29'49"W 36°49'8"N

Basemap Imagery Source: USGS National Map 2023

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

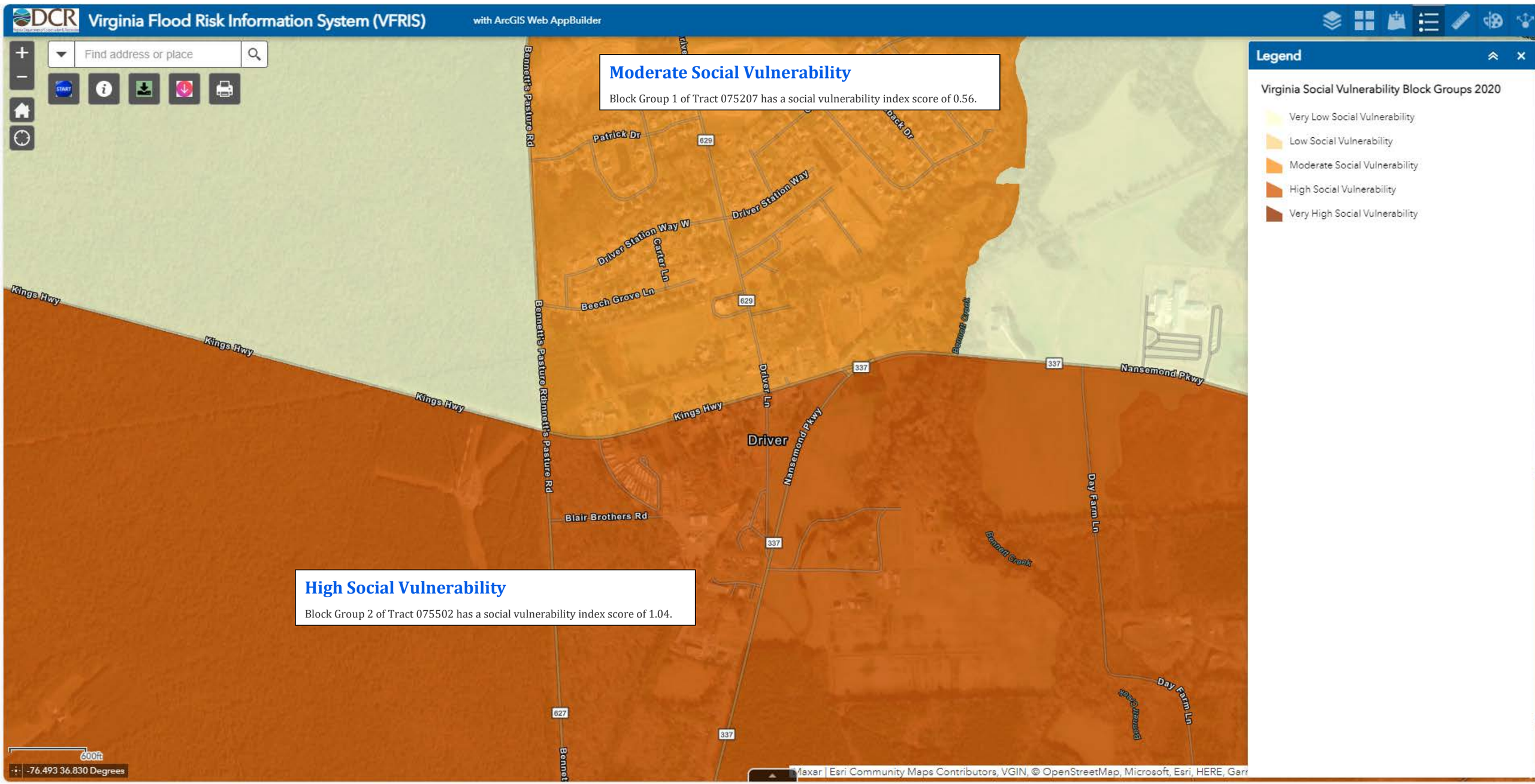
The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 10/31/2023 at 11:03 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by 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.

Link to current Comprehensive Plan for Suffolk:

City of Suffolk, Virginia 2026 Comprehensive Plan

https://www.suffolkva.us/DocumentCenter/View/890/2026-Comprehensive-Plan-PDF


Virginia Flood Risk Information System (VFRIS)
with ArcGIS Web AppBuilder
Find address or place
Moderate Social Vulnerability
Block Group 1 of Tract 075207 has a social vulnerability index score of 0.56.
High Social Vulnerability
Block Group 2 of Tract 075502 has a social vulnerability index score of 1.04.
Legend
Virginia Social Vulnerability Block Groups 2020
Very Low Social Vulnerability
Low Social Vulnerability
Moderate Social Vulnerability
High Social Vulnerability
Very High Social Vulnerability
Bennett's Pasture Rd
Patrick Dr
629
Driver Station Way
Driver Station Way W
Carter Ln
Beech Grove Ln
Kings Hwy
337
Nansemond Pkwy
Driver Ln
Driver
Blair Brothers Rd
Bennett Creek
Day Farm Ln
627
600ft
-76.493 36.830 Degrees
Maxar | Esri Community Maps Contributors, VGIN, © OpenStreetMap, Microsoft, Esri, HERE, Garr

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.

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DRIVER LANE DRAINAGE STUDY
SUFFOLK, VIRGINIA

RECOMMENDED MITIGATION MEASURES

APRIL 2021

PREPARED FOR:

CITY OF SUFFOLK
DEPARTMENT OF PUBLIC WORKS

PREPARED BY:

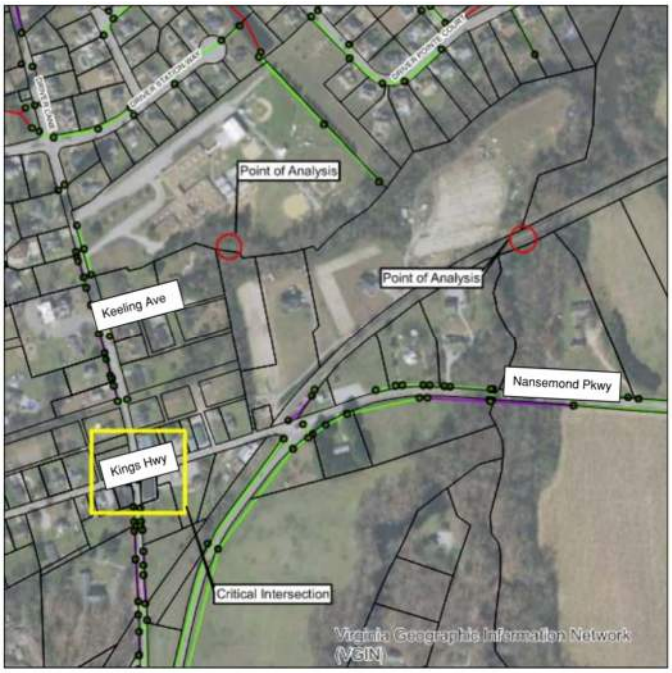
TIMMONS GROUP
YOUR VISION ACHIEVED THROUGH OURS.

2901 S Lynnhaven Road, Suite 200
Virginia Beach, Virginia 23452
757.213.6679
www.timmons.com

Project Description

Timmons Group was tasked to analyze the Driver Ln area for flooding concerns. The primary focus was the area around the Driver Ln and Kings Hwy intersection which has seen flooding after several intense rain events in recent years, particularly after the rainfall on November 12, 2020. The City has received several complaints on the flooding in this area and throughout portions of Driver Ln and Kings Hwy. After water ponds to a depth of several inches, this intersection drains overland to the north and connects to a pipe under Driver Ln which outfalls into a ditch east of Driver Ln between 4224 and 4216 Driver Ln. This ditch also receives drainage from several systems to the west and northwest of Driver Ln. In addition, water from the intersection can flow into a drainage structure on the southeast corner of the intersection that drains to east and north through 12" to 18" pipes into the same ditch. The ditch flows to the east and discharges into Bennett Creek.

Figure I: Critical Intersection and Analysis Points



The City provided photos and video of site flooding, a set of field data markups identifying locations and relative depths of the system missing from GIS, and the Seaboard trail plans, as well as GIS data for use to analyze the existing stormwater system to determine problems and potential solutions. Timmons Group completed the site investigation, observations, and developed an existing conditions model per information measured in the field, GIS information, and field data markups of the system missing from GIS confirmed in the field. The existing conditions model was analyzed for the 5- and 10-yr 24-hr design storms.

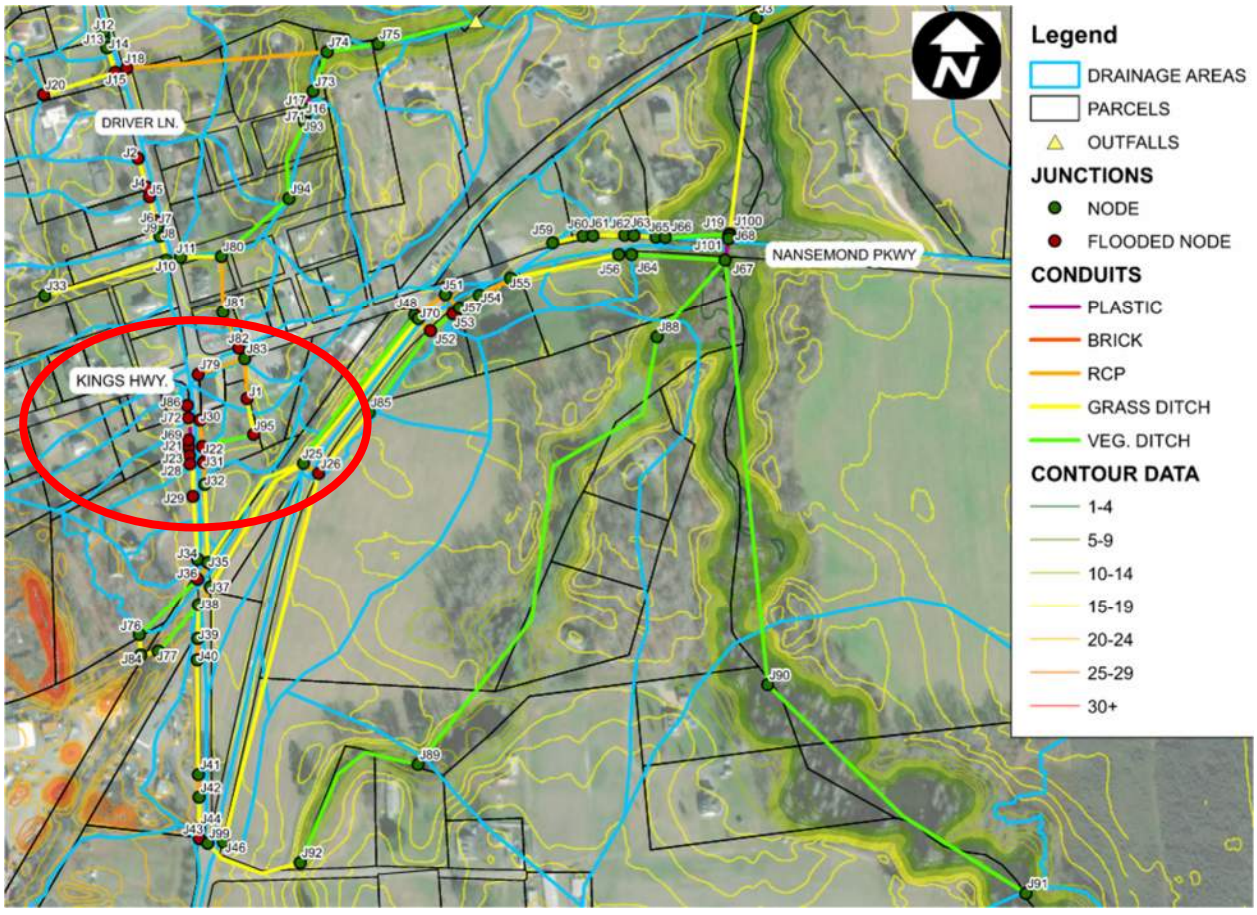
After completing the steps above, Timmons Group met and followed up with the City to confirm the desired intersection approach. Timmons Group defined the intersection work and reviewed two additional potential alignment alternatives to determine their feasibility, resulting in the City selecting Alternative I: Intersection Improvements and southern Driver Improvements, which is included in this report. The following sections describe the analysis and recommendations.

Existing Conditions Drainage Analysis Methodology, Assumptions, and Results

The existing drainage analysis included everything upstream of the two analysis points located on the downstream end of the Suffolk Seaboard Coastline Trail crossing of Bennett Creek and to the west in the smaller leg of Bennett Creek as shown in Figure I. The area within and adjacent to the critical intersection and along Nansemond Pkwy was detailed in the analysis to include several pipe and ditch networks. The drainage areas were determined using GIS data including LiDAR and field observations about system connectivity. The drainage area totaled to approximately 688 acres to the two outfall locations.

Ditch dimensions were approximated from observations and measurements during the site investigation. These were rough cross sections and may not explicitly express the ditch hydraulics, but they do provide a representative section for stormwater analysis. Storm system rim and invert elevations were determined from City provided downs, GIS, and checked against the LiDAR ground elevations and measured relative depths from the site visit. Based on field observations, the pipe and ditch network connectivity and sizes were updated from the GIS data provided. The existing system connectivity is shown in the figure below (Figure II: Driver Ln Existing Conditions 10-yr Storm). As noted in the figure, the red nodes are locations where flooding is observed, and the green nodes signify no flooding in the analyzed storm. This model was analyzed using the 10-yr storm model, which was developed using NOAA Atlas 14 data. Additionally, this model was run assuming no maintenance issues such as overgrown, filled in, or obstructed ditches and pipes.

Figure II: Driver Ln Existing Conditions 10-yr Storm



Timmons Group approached the existing conditions by modeling all stormwater systems within the critical area and along potential improvement alignments surrounding the intersection and analyzed the system using the 5- and 10-yr 24-hr design storms to examine flooding concerns in the neighborhood to use as a base for improvement recommendations. The 10-yr storm showed junction nodes flooding within the vicinity of the intersection (Figure II). The southern nodes along Driver Ln (circled in red on the figure above) indicates that there would need to be system improvements to alleviate the flooding. While the nodes north of the intersection showed some flooding, it did not contribute to the flooding impacting the intersection. In both the 5- and 10-yr storms, the flooded nodes (circled in red) indicated that no work completed in the northern systems alone would help mitigate flooding in the intersection. See Appendix A for maps of the existing system and existing drainage areas in the analysis. Appendix B includes Junction and Outfall model results within the drainage area for the existing model prepared by Timmons Group for the 5- and 10-yr storms.

The two outfall points for the model are located on the downstream end of the Suffolk Seaboard Coastline Trail crossing of Bennett Creek and to the west in the smaller leg of Bennett Creek that extends into the drainage area. The 5- and 10-yr results for both the outfalls and the junction (nodes) are also shown on maps in Appendix A.

The field investigation did find two exposed utility pipes crossing stormwater ditches that constricted flows and impacted the potential improvement options. These were located at the outlet of the Nansemond Pkwy culvert and on a private property crossing the ditch that runs from Driver Ln to the northeast. The pipe crossing the ditch in the northern stormwater system limited the amount of relief that any upstream improvements could make along that drainage path. The analysis model accounted for these pipes by assuming they created an earthen box culvert for the stormwater to flow beneath the pipe.

Proposed Conditions Drainage Analysis Methodology, Assumptions, Results, and Recommendations

At the initial meeting with the City, Timmons presented several initial options to alleviate neighborhood flooding at the intersection of Driver Ln and Kings Hwy. in the 5- and 10-yr storm event. Two additional options (Alternative II and III) were discussed with the City and Timmons Group proceeded to look at recommendations to alleviate flooding, analyzing both alternatives discussed with the City for 5- and 10-yr storm events.

At the second meeting with the City, Timmons presented the three alternatives listed in this report. All the improvement alternatives include an extension of the system into the intersection. The 5- and 10-yr results and figures are contained in Appendix A with detailed results in Appendix B.

Driver Ln and Kings Hwy Intersection

A total of three (3) improvement options were considered to reduce the flooding in the intersection to or below the critical elevation. These options, listed from most viable to least likely, were:

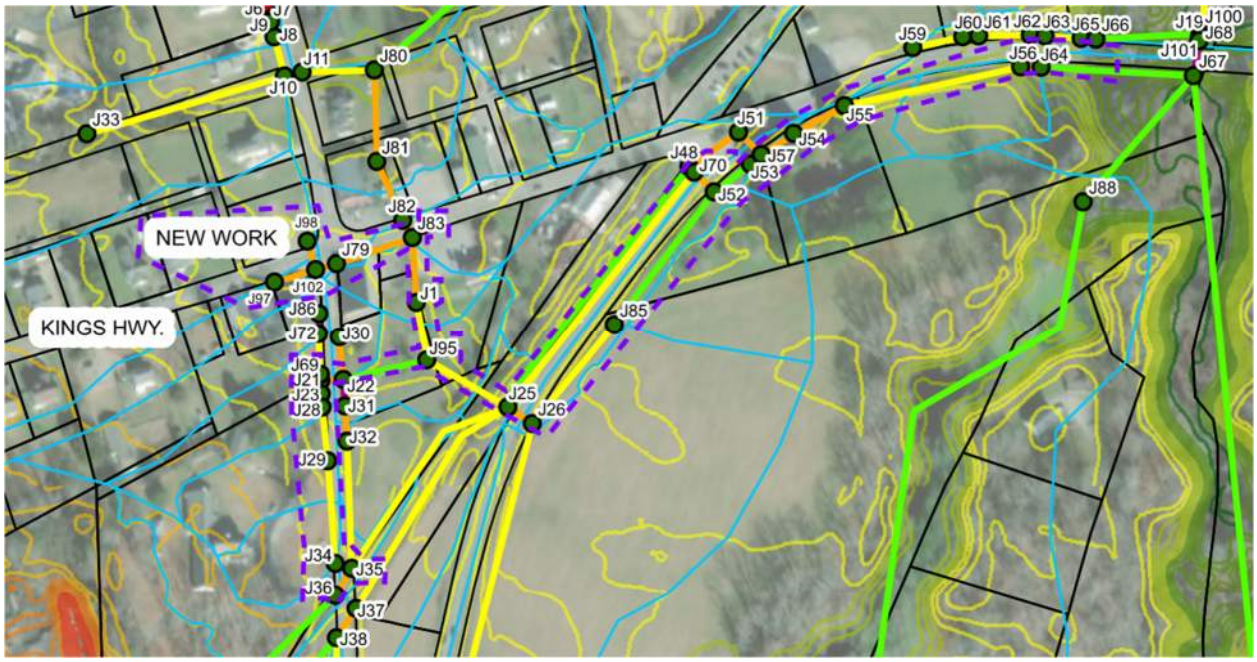
1. Alternative I: Intersection Improvements and southern Driver Improvements
2. Alternative III: Driver south Connection Potential Alignment
3. Alternative II: Seaboard Trail Potential Alignment

Alternative I. Intersection Improvements and southern Driver Improvements

Alternative I included regrading existing ditches, installing one proposed ditch, upsizing existing pipes, and installing three new pipes (in the intersection). The new ditch proposed, connecting the intersection with the drainage system along Nansemond Pkwy, is key to redirecting the drainage, as well as regarding the southern system along Nansemond Pkwy to provide a flow path with an appropriate slope, depth, and size. In addition, the intersection required a new storm system and pipe enlargement to accommodate the amount of flooding that currently backs up the intersection.

The systems north of Kings Hwy were not touched, as the improvements south of Kings Hwy along Driver Ln and Nansemond Pkwy alleviated flooding in the intersection. The proposed work for this alternative consisted of approx. 2300 LF of ditch regrading and 900 LF of proposed and upsized existing pipe.

Figure III: Alternative I Work Outline



Alternative II. Seaboard Trail Potential Alignment

For Alternative II, a new stormwater system would extend east down Kings Hwy and to the northeast along the current Seaboard trail pedestrian path, draining the intersection directly into Bennett Creek. Much of the work consisted of pipe installation except for one small stretch of proposed ditch at the end of the stormwater system where it discharges into the existing outfall. This system would be located to the south side of Seaboard trial in the right of way. There are small surface ditches along this portion of the trail that the proposed pipe network would run beneath.

With approx. 1800 LF of proposed pipe and 130 LF of proposed ditch, plus the surface ditches, this alternative is expected to significantly increase the cost compared to Alternative I and II. This alternative was not analyzed to pick up any drainage along its path to Bennett Creek – it would need to be upsized to accomplish this.

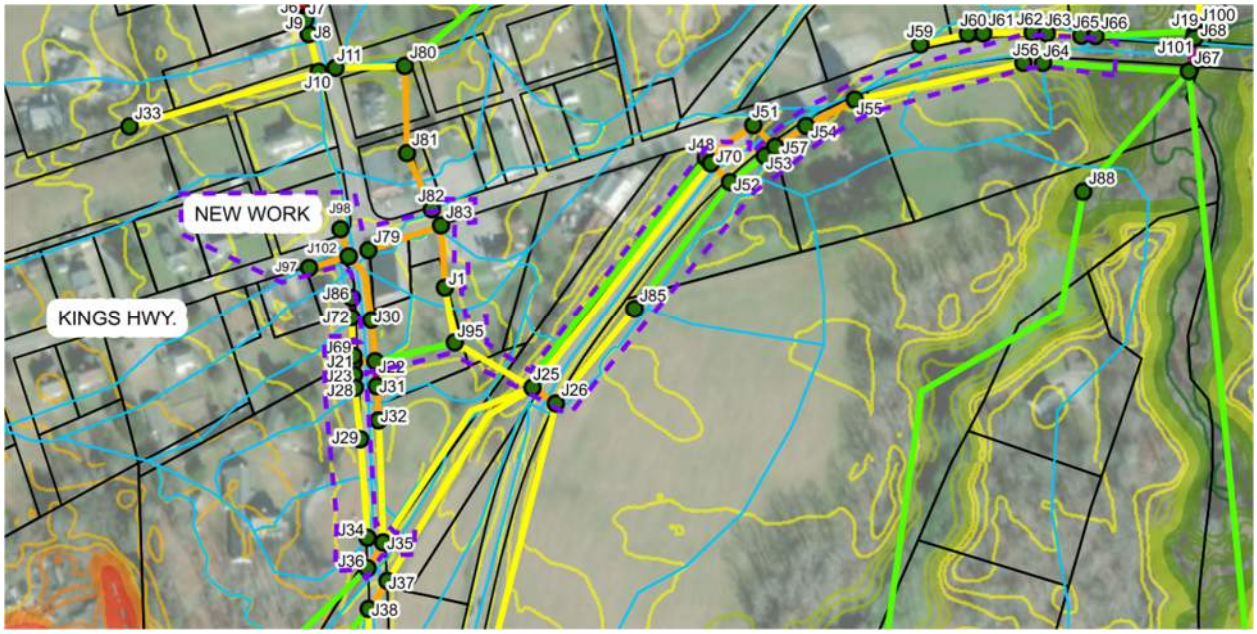
Figure IV: Alternative II Work Outline

Alternative III. Driver south Connection Potential Alignment

Similar to Alternative I, Alternative III consisted of regrading existing ditches, installing one proposed ditch, upsizing existing pipes, and installing three proposed pipes. Instead of directing the flow path to the east of the intersection and then south, this alternative directed the flow of stormwater from the intersection to the south, down Driver Ln, and discharge into a nearby ditch system leading into the newly proposed ditch then along Nansemond Pkwy.

The installation of an elliptical pipe would be required due to the available cover and elevations of the system, and the current 12” pipe connecting to the existing inlet in the system would still have to be replaced to relieve the intersection flooding, even without adding any additional intersection drainage. This increased the total proposed pipe by approx. 85 ft when compared to Alternative I. The proposed work for this alternative consisted of approx. 2300 LF of proposed ditch and 1000 LF of proposed and upsized existing pipe.

Figure V: Alternative III Work Outline



Intersection Alternative Results

Timmons Group presented the three improvement options at the second meeting with the City. The City eliminated Alternative II from consideration due to the extents of the impacts and costs of installation. The City also removed Alternative III agreeing that it was inferior compared to Alternative I and did not provide as much benefit. Alternative I provides the largest reduction in flooding and uses the least amount of new pipe, eliminating the flooding in the intersection, correcting flow paths and fixing flooding issues to the south along Nansemond Pkwy. The HGLs for the three options and the existing conditions are listed in Table I, showing the HGLs at the intersection during the 10-yr storm.

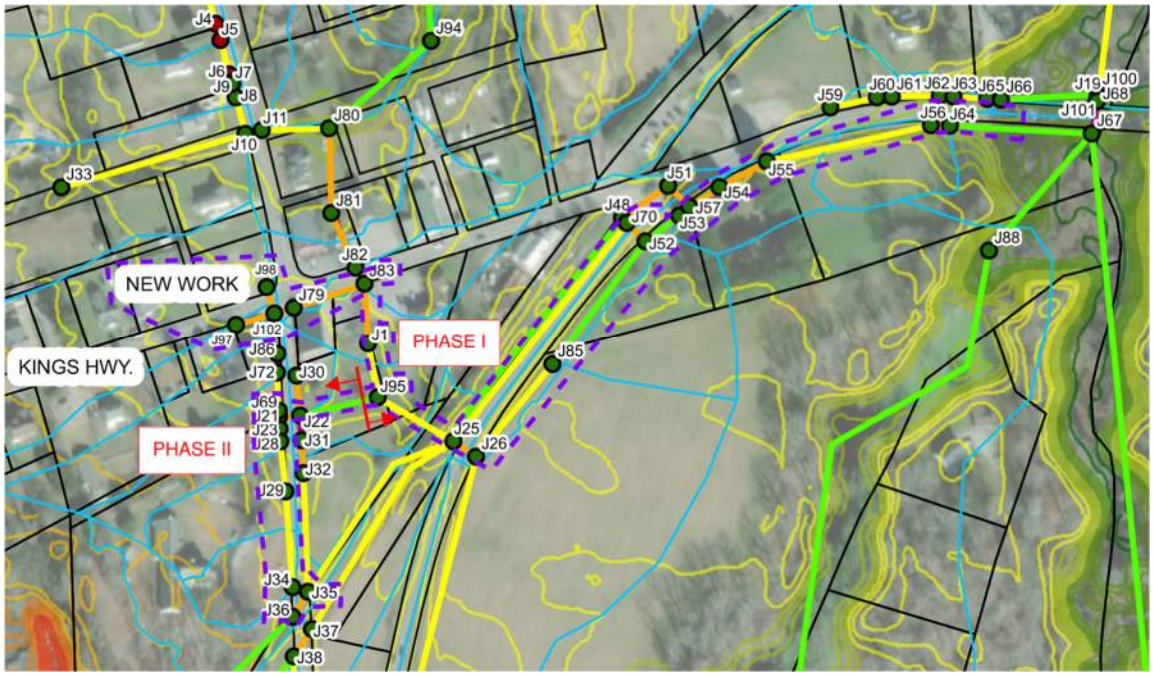
Table I: Intersection Alternative Options

Option	10-year Design HGL (Intersection @ J79) RIM = 16.5
Existing	16.68
Alternative I	16.10
Alternative II	15.94
Alternative III	15.07

Conclusions and Conceptual Cost Estimates:

The City requested additional information on the feasibility of Alternative I in the form of a preliminary cost estimate. Timmons Group prepared a preliminary cost estimate for Alternative I, Intersection Improvements and southern Driver Improvements, using recent project estimate and bid information for the work anticipated. The preliminary cost estimate for a single-phase project is $718,900. The preliminary cost estimate for a two-phase project is $655,100 for Phase I and $87,700 for Phase II (Figure VI). The detailed breakdown can be found in Appendix C.

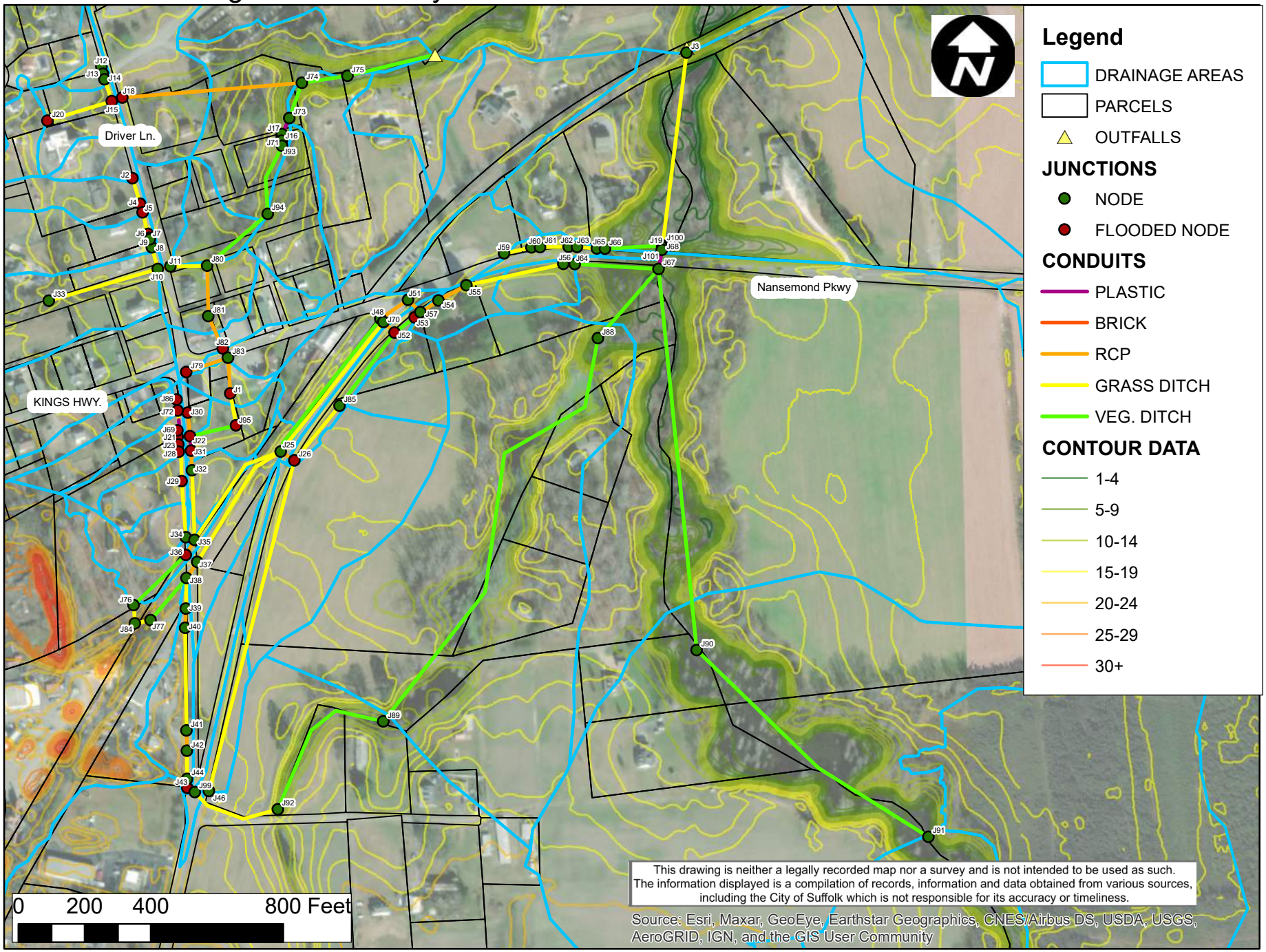
Figure VI: Phase I and Phase II



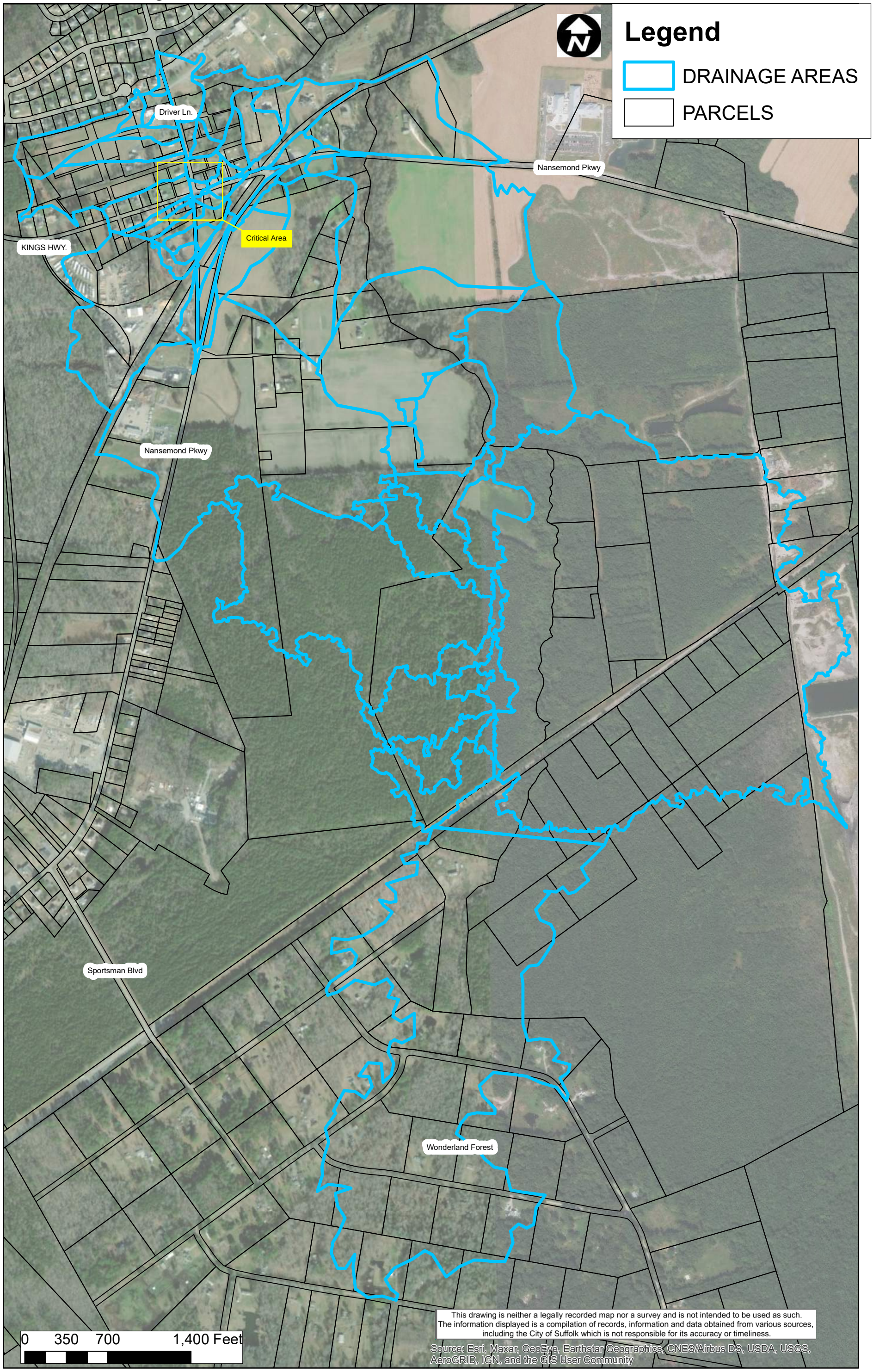
APPENDIX A

PROJECT GRAPHICS

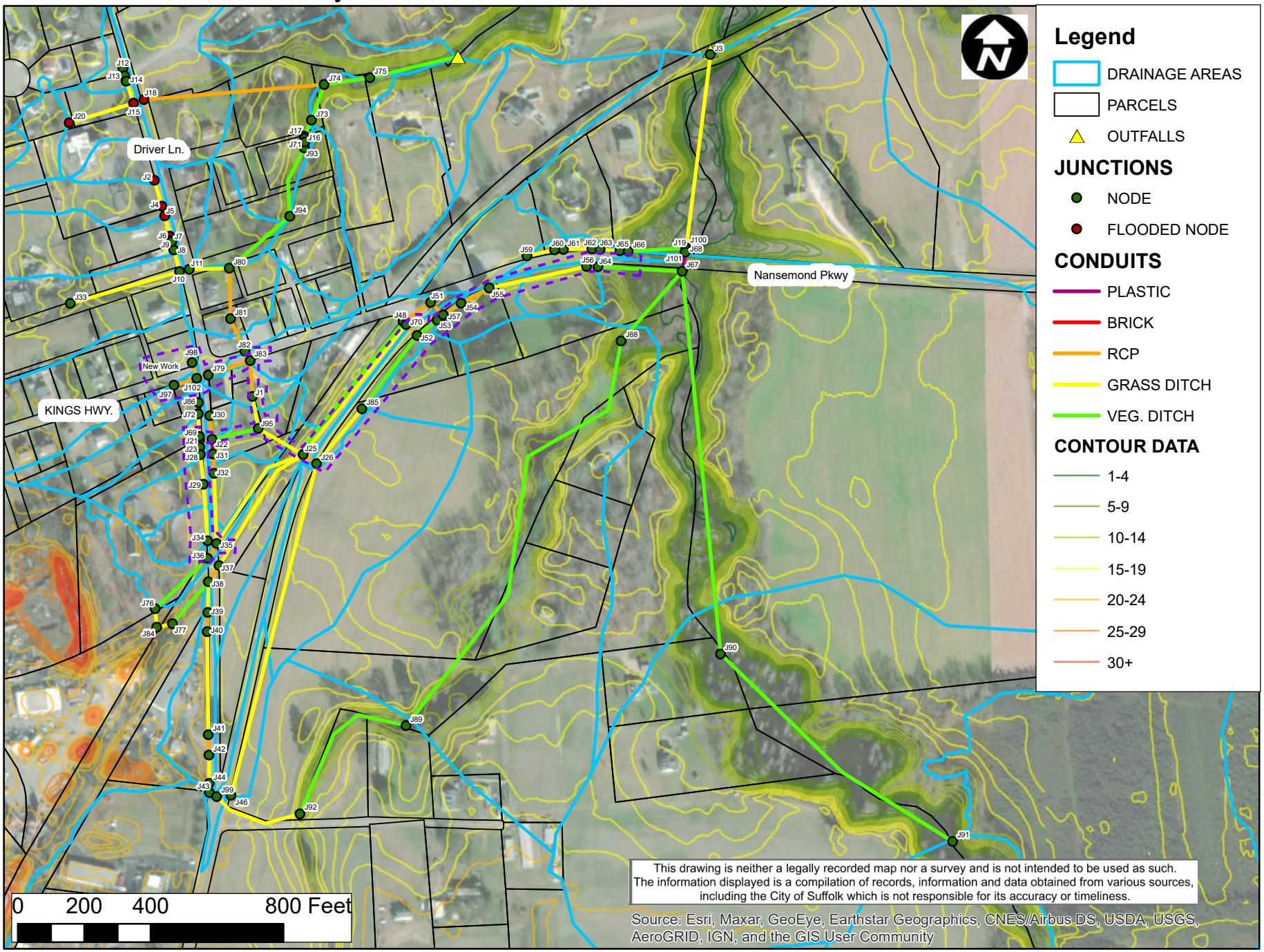
Driver Ln. Existing Conditions 10yr Storm



Driver Ln. Drainage Area



Driver Ln. Alternative I 10yr Storm



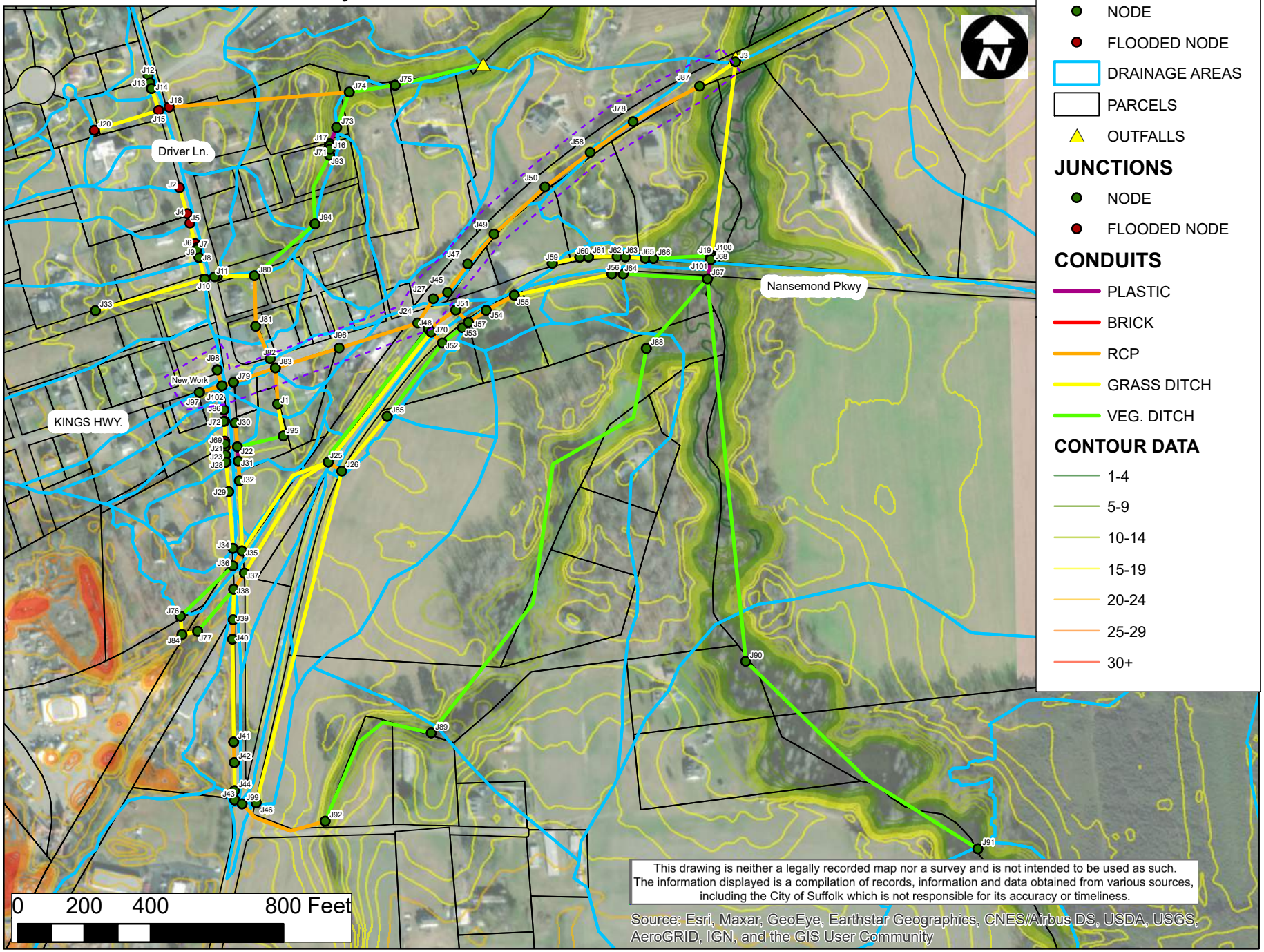
DITCH REGRADING			
CONDUIT	INLET NODE	OUTLET NODE	LENGTH (ft)
C47	J64	J67	254
C45	J55	J56	300
C41	J52	J53	76
C87	J85	J52	277
C40	J26	J85	215
C64	J25	J70	500
C28	J95	J25	157
C22	J22	J95	142
C98	J1	J95	98
C24	J29	J28	90
C23	J34	J29	171
		Total:	2280 ft

APPROX TOTAL	**2300** ft

PIPE WORK					
CONDUIT	INLET NODE	OUTLET NODE	EXISTING	PROPOSED	LENGTH (ft)
C46	J56	J64	30"	42"	35
C44	J54	J55	24"	42"	96
C43	J57	J54	24"	42"	65
C42	J53	J57	15"	42"	24
C65	J70	J52	18"	36"	46
C27	J36	J35	18"	30"	52
C66	J25	J26	18"	30"	49
C84	J83	J1	12"	30"	108
C17	J79	J83	12"	30"	133
C21	J21	J22	12"	24"	37
C25	J28	J23	12"	18"	25
INTERSECTION WORK					
C59	J102	J79	-	30"	40
C60	J98	J102	-	24"	50
C38	J97	J102	-	24"	75
				Total:	837 ft

APPROX TOTAL	**900** ft

Driver Ln. Alternative II 10yr Storm



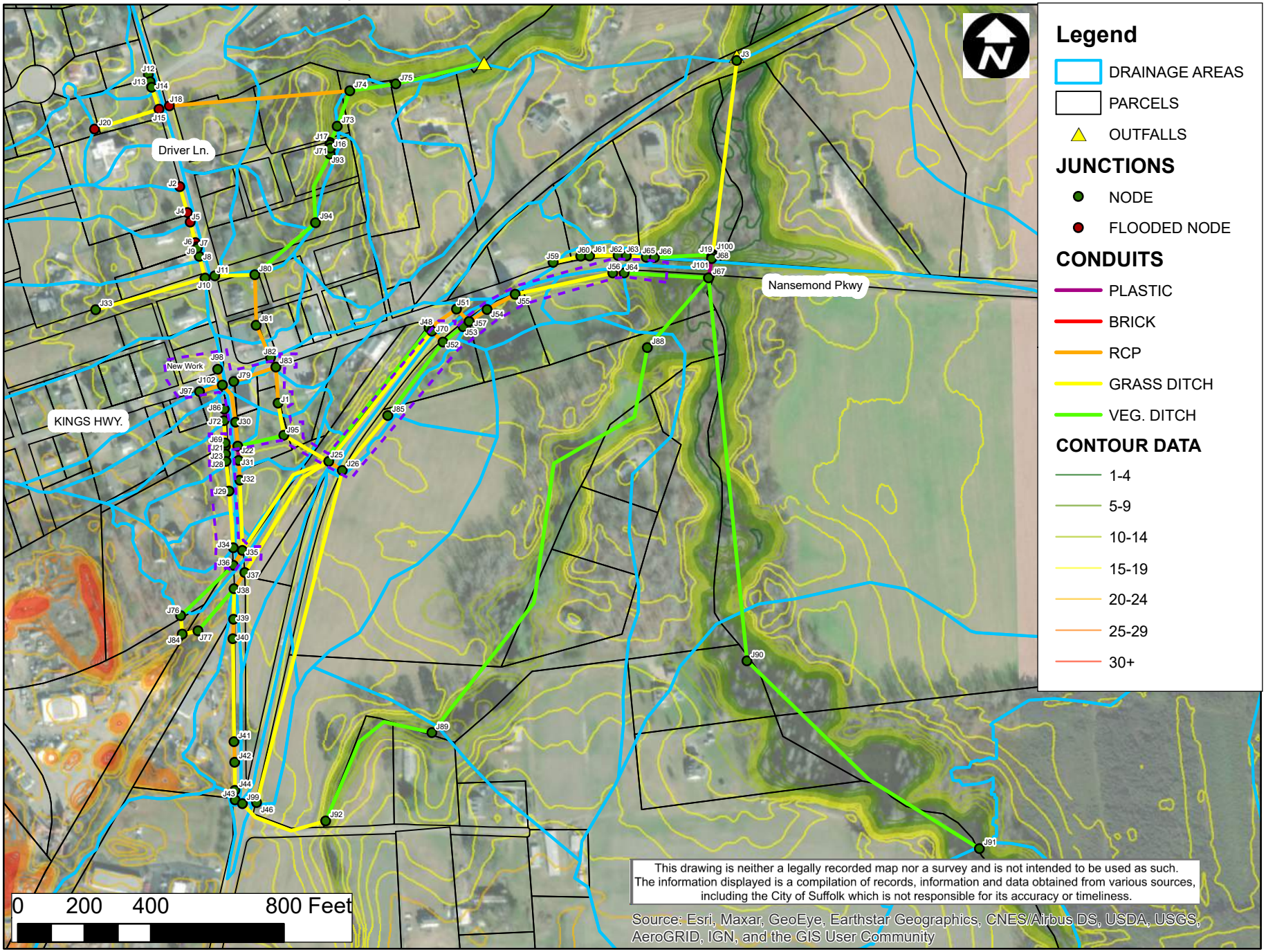
PIPE WORK					
CONDUIT	INLET NODE	OUTLET NODE	EXISTING	PROPOSED	LENGTH (ft)
C6	J83	J96	-	36"	200
C100	J96	J24	-	36"	250
C28	J24	J27	-	36"	90
C29	J27	J45	-	36"	50
C59	J45	J47	-	36"	105
C60	J47	J49	-	36"	120
C73	J49	J50	-	36"	210
C75	J50	J58	-	36"	175
C85	J58	J78	-	36"	160
C90	J78	J87	-	36"	230
INTERSECTION WORK					
C59	J102	J79	-	30"	40
C60	J98	J102	-	24"	50
C38	J97	J102	-	24"	75
				Total:	1755

ft

APPROX PIPE WORK TOTAL	**1800**	ft

DITCH WORK					
C99	J87	J3	-	2.5 TRAP.	110

Driver Ln. Alternative III 10yr Storm



DITCH REGRADING			
CONDUIT	INLET NODE	OUTLET NODE	LENGTH (ft)
C47	J64	J67	254
C45	J55	J56	300
C41	J52	J53	76
C87	J85	J52	277
C40	J26	J85	215
C64	J25	J70	500
C28	J95	J25	157
C22	J22	J95	142
C98	J1	J95	98
C24	J29	J28	90
C23	J34	J29	171
		Total:	2280 ft

APPROX TOTAL	**2300** ft

PIPE WORK					
CONDUIT	INLET NODE	OUTLET NODE	EXISTING	PROPOSED	LENGTH (ft)
C46	J56	J64	30"	42"	35
C44	J54	J55	24"	42"	96
C43	J57	J54	24"	42"	65
C42	J53	J57	15"	42"	24
C65	J70	J52	18"	36"	46
C27	J36	J35	18"	30"	52
C66	J25	J26	18"	30"	49
C84	J83	J1	12"	30"	108
C17	J79	J83	12"	30"	133
C21	J21	J22	12"	24"	37
C25	J28	J23	12"	18"	25
INTERSECTION WORK					
C60	J98	J102	-	24"	50
C38	J97	J102	-	24"	75
C59	J102	J30	-	24" X 38" ELLIPTICAL	125
				Total:	922 ft

	APPROX TOTAL	**1000** ft

APPENDIX B

MODEL RESULTS

Existing Conditions 5yr Junctions

Name	Invert Elev. (ft)	Rim Elev. (ft)	Depth (ft)	Max. HGL (ft)	Max. Total Inflow (cfs)	Min. Freeboard (ft)	Hours Flooded (h)	Max. Flood Rate (cfs)	Total Flood Vol. (MG)	Max. Ponded Depth (ft)
J1	13.3	15.5	2.2	15.9	11.73	0	2.07	8.01	0.055	0.403
J10	11.4	14.1	2.7	13.54	22.17	0.56	0	0	0	0
J100	1.5	12	10.5	9.39	1054.6	3.11	0	0	0	0
J101	1.5	12	10.5	7.78	929.56	4.22	0	0	0	0
J11	10.3	14.1	3.8	13.1	12.5	0.996	0	0	0	0
J12	15.73	16.73	1	16.18	0.9	0.55	0	0	0	0
J13	15.68	17.18	1.5	16.13	0.9	1.05	0	0	0	0
J14	15.64	17.14	1.5	15.83	1.08	1.31	0	0	0	0
J15	11.5	15.5	4	15.61	9.88	0	1.88	6.16	0.041	0.114
J16	10.75	14.75	4	12.06	46.2	2.69	0	0	0	0
J17	10.75	14.75	4	11.74	49.49	3.01	0	0	0	0
J18	11.4	15.1	3.7	15.33	13.54	0	3.27	10.2	0.107	0.226
J19	0	0	0	0	0	0	0	0	0	0
J2	14.9	15.9	1	15.92	3.33	0	2.77	0.93	0.01	0.021
J20	13.95	16.5	2.55	16.5	3.5	0	0.1	2.5	0.001	0.001
J21	14.6	16.6	2	16.67	8.87	0	0.66	3.1	0.015	0.071
J22	14.5	16	1.5	16	8.91	0	0.01	0.08	0	0
J23	15.6	16.7	1.1	16.68	3.22	0.02	0	0	0	0
J25	13.8	16.3	2.5	16.2	41.05	0.9	0	0	0	0
J26	12.6	16	3.4	16.02	30.63	0	0.63	28.73	0.024	0.022
J28	15.6	16.8	1.2	16.8	4.86	0	0.39	2.26	0.019	0
J29	16.3	17.5	1.2	17.53	7.55	0	0.32	2.75	0.008	0.035
J3	2	14	12	7.78	287.57	6.22	0	0	0	0
J30	15	16	1	15.97	0.99	0.03	0	0	0	0
J31	15	16	1	15.97	2.26	0.03	0	0	0	0
J32	15.7	16.9	1.2	16.25	2.81	0.65	0	0	0	0
J33	12.8	15	2.2	13.47	7.45	1.53	0	0	0	0
J34	18.8	20	1.2	19.67	2.78	0.33	0	0	0	0
J35	14.8	18.8	4	16.22	25.84	2.58	0	0	0	0
J36	15	18.8	3.8	18.62	25.29	0.179	0	0	0	0
J37	15.1	18.8	3.7	16.26	17.03	2.54	0	0	0	0
J38	15.4	19	3.6	16.78	12.85	2.22	0	0	0	0
J39	18	20	2	18.59	3.85	1.41	0	0	0	0
J4	14.2	15.7	1.5	15.91	8.76	0	7.51	7.92	0.099	0.215
J40	18.18	19.78	1.6	19	3.89	0.78	0	0	0	0
J41	19.11	20.71	1.6	20.02	3.85	0.69	0	0	0	0
J42	19.23	20.83	1.6	20.7	3.99	0.13	0	0	0	0
J43	19.5	21	1.5	20.91	4.33	0.093	0	0	0	0
J44	19.4	21	1.6	20.72	4.33	0.28	0	0	0	0
J46	17.6	19	1.4	17.9	1.32	1.1	0	0	0	0
J48	14.75	17	2.25	16.18	8.18	1.07	0	0	0	0
J5	14	15.5	1.5	15.88	1.09	0	7.78	0.35	0.002	0.381
J51	13.3	16.8	3.5	15.45	5.52	1.351	0	0	0	0
J52	13.5	16	2.5	16.01	18.49	0	0.32	2.32	0.004	0.009
J53	13.2	16	2.8	16	15.31	0	0.18	2.44	0.006	0
J54	12.4	16	3.6	14.64	19.1	1.358	0	0	0	0
J55	12.8	15	2.2	13.84	19.1	1.16	0	0	0	0

J56	9.5	12	2.5	10.45	19.94	1.55	0	0	0	0
J57	12.9	16	3.1	15.06	18.35	0.939	0	0	0	0
J59	14.4	15.4	1	14.77	2.36	0.63	0	0	0	0
J6	13.8	15.3	1.5	15.34	6.56	0	0.57	2.65	0.011	0.039
J60	11.83	13.33	1.5	12.52	2.35	0.81	0	0	0	0
J61	11.78	13.28	1.5	12.32	2.33	0.96	0	0	0	0
J62	10.55	12.55	2	11.09	2.33	1.46	0	0	0	0
J63	10.23	12.23	2	10.74	2.32	1.49	0	0	0	0
J64	8.6	11.1	2.5	8.92	19.94	2.68	0	0	0	0
J65	8.93	10.93	2	9.69	2.32	1.24	0	0	0	0
J66	8.78	10.78	2	9.59	4.01	1.19	0	0	0	0
J67	4.1	15.1	11	7.76	279.65	8.34	0	0	0	0
J68	1.8	13.5	11.7	9.3	951.42	4.2	0	0	0	0
J69	15.7	16.7	1	16.7	10.72	0	1.67	9.7	0.186	0
J7	13.65	15.15	1.5	14.38	3.96	0.77	0	0	0	0
J70	14.4	16.9	2.5	16.17	10.64	0.73	0	0	0	0
J71	10.75	14.75	4	12.3	31.73	2.45	0	0	0	0
J72	15.8	16.8	1	17.17	25.04	0	1.38	14.09	0.08	0.374
J73	10.5	12.7	2.2	12.01	40.34	0.69	0	0	0	0
J74	10	12.3	2.3	11.51	48.31	0.79	0	0	0	0
J75	9	11.3	2.3	10.74	50.64	0.56	0	0	0	0
J76	16.4	20	3.6	18.65	25.22	1.35	0	0	0	0
J77	17	20	3	18.2	9.15	1.8	0	0	0	0
J79	13.2	16.5	3.3	16.63	28.35	0	3.5	25.44	0.203	0.134
J8	12.28	14.98	2.7	14.01	11.18	0.97	0	0	0	0
J80	11.1	14	2.9	13.06	30.01	0.94	0	0	0	0
J81	12.4	15.5	3.1	14.55	10.6	0.951	0	0	0	0
J82	12.2	15.7	3.5	15.59	10.6	0.107	0	0	0	0
J83	12	16	4	15.76	10.48	0.238	0	0	0	0
J84	17.5	19.5	2	18.6	33.03	2.5	0	0	0	0
J85	13.65	15.9	2.25	16.02	25.93	0.13	0	0	0	0
J86	15.9	16.9	1	16.94	4.56	0	1.49	4.56	0.05	0.042
J88	7	17	10	7.77	89.69	9.23	0	0	0	0
J89	12.5	15.5	3	13.03	96.6	2.47	0	0	0	0
J9	13.6	15.1	1.5	14.31	3.96	0.79	0	0	0	0
J90	5	17	12	7.8	150.07	9.2	0	0	0	0
J91	6	17	11	7.81	149.6	9.19	0	0	0	0
J92	13.5	16.5	3	14.82	99.63	1.68	0	0	0	0
J93	10.8	14.8	4	12.67	31.99	2.13	0	0	0	0
J94	11.5	14.5	3	12.63	31.9	1.87	0	0	0	0
J95	13.35	15	1.65	15.9	12.6	0	1.98	9.35	0.054	0.355
J99	16	17	1	16.18	3.59	0.82	0	0	0	0

Existing Conditions 5yr Outfalls

Name	Invert Elev. (ft)	Rim Elev. (ft)	Fixed Stage (ft)	Max. Depth (ft)	Max. HGL (ft)	Max. Total Inflow (cfs)	Hours Surcharged (h)	Hours Flooded (h)
OF1	2	0	7.616	5.62	7.62	285.18	0	0
OF2	8	0	9.51	1.51	9.51	63.37	0	0

Existing Conditions 10yr Junctions

Name	Invert Elev. (ft)	Rim Elev. (ft)	Depth (ft)	Max. HGL (ft)	Max. Total Inflow (cfs)	Min. Freeboard (ft)	Hours Flooded (h)	Max. Flood Rate (cfs)	Total Flood Vol. (MG)	Max. Ponded Depth (ft)
J1	13.3	15.5	2.2	15.96	11.54	0	2.51	9.75	0.063	0.463
J10	11.4	14.1	2.7	13.84	29.81	0.26	0	0	0	0
J100	1.5	12	10.5	9.39	1054.6	3.11	0	0	0	0
J101	1.5	12	10.5	7.85	929.56	4.15	0	0	0	0
J11	10.3	14.1	3.8	13.22	14.97	0.881	0	0	0	0
J12	15.73	16.73	1	16.24	1.16	0.49	0	0	0	0
J13	15.68	17.18	1.5	16.19	1.16	0.99	0	0	0	0
J14	15.64	17.14	1.5	15.86	1.43	1.28	0	0	0	0
J15	11.5	15.5	4	15.7	12.48	0	2.81	8.75	0.065	0.195
J16	10.75	14.75	4	12.21	56.09	2.54	0	0	0	0
J17	10.75	14.75	4	11.77	58.18	2.98	0	0	0	0
J18	11.4	15.1	3.7	15.41	15.9	0	4.7	12.78	0.146	0.308
J19	0	0	0	0	0	0	0	0	0	0
J2	14.9	15.9	1	15.96	4.07	0	4.28	1.82	0.017	0.062
J20	13.95	16.5	2.55	16.5	4.8	0	0.08	2.78	0.001	0.001
J21	14.6	16.6	2	16.69	9.54	0	0.8	3.95	0.019	0.092
J22	14.5	16	1.5	16	9.45	0	0.56	1.99	0.021	0
J23	15.6	16.7	1.1	16.7	3.22	0	0.1	0.48	0.001	0
J25	13.8	16.3	2.5	16.44	54.05	0.66	0	0	0	0
J26	12.6	16	3.4	16.06	25.13	0	1.08	24.58	0.028	0.056
J28	15.6	16.8	1.2	16.8	4.97	0	0.52	2.56	0.029	0
J29	16.3	17.5	1.2	17.57	9.18	0	0.44	4.34	0.016	0.067
J3	2	14	12	7.85	339.61	6.15	0	0	0	0
J30	15	16	1	16.03	1.28	0	1.01	0.62	0.002	0.033
J31	15	16	1	16	2.69	0	0.6	0.88	0.009	0
J32	15.7	16.9	1.2	16.32	3.43	0.58	0	0	0	0
J33	12.8	15	2.2	13.76	10.44	1.24	0	0	0	0
J34	18.8	20	1.2	19.74	3.44	0.26	0	0	0	0
J35	14.8	18.8	4	16.44	27.9	2.36	0	0	0	0
J36	15	18.8	3.8	18.86	32.1	0	0.17	8.43	0.01	0.057
J37	15.1	18.8	3.7	16.46	23.12	2.34	0	0	0	0
J38	15.4	19	3.6	18.58	17.76	0.416	0	0	0	0
J39	18	20	2	18.61	4.09	1.39	0	0	0	0
J4	14.2	15.7	1.5	15.96	10.05	0	9.45	9.19	0.122	0.261
J40	18.18	19.78	1.6	19.03	4.11	0.75	0	0	0	0
J41	19.11	20.71	1.6	20.04	4.08	0.67	0	0	0	0
J42	19.23	20.83	1.6	20.79	4.47	0.04	0	0	0	0
J43	19.5	21	1.5	21.01	5.39	0	0.23	1.14	0.003	0.014
J44	19.4	21	1.6	20.81	5.02	0.19	0	0	0	0
J46	17.6	19	1.4	17.95	1.67	1.05	0	0	0	0
J48	14.75	17	2.25	16.42	10.71	0.83	0	0	0	0
J5	14	15.5	1.5	15.93	1.04	0	9.82	0.13	0.002	0.427
J51	13.3	16.8	3.5	15.57	5.97	1.235	0	0	0	0
J52	13.5	16	2.5	16.02	24.34	0	0.77	7.82	0.009	0.021
J53	13.2	16	2.8	16	23.51	0	0.68	11.04	0.124	0
J54	12.4	16	3.6	14.79	19.85	1.214	0	0	0	0
J55	12.8	15	2.2	13.86	19.92	1.14	0	0	0	0

J56	9.5	12	2.5	10.48	21.39	1.52	0	0	0	0
J57	12.9	16	3.1	15.16	18.54	0.844	0	0	0	0
J59	14.4	15.4	1	14.81	3	0.59	0	0	0	0
J6	13.8	15.3	1.5	15.37	7.98	0	0.94	4.05	0.02	0.07
J60	11.83	13.33	1.5	12.6	2.99	0.73	0	0	0	0
J61	11.78	13.28	1.5	12.37	2.96	0.91	0	0	0	0
J62	10.55	12.55	2	11.19	2.96	1.36	0	0	0	0
J63	10.23	12.23	2	10.79	2.95	1.44	0	0	0	0
J64	8.6	11.1	2.5	8.94	21.37	2.66	0	0	0	0
J65	8.93	10.93	2	9.83	2.95	1.1	0	0	0	0
J66	8.78	10.78	2	9.68	5.07	1.1	0	0	0	0
J67	4.1	15.1	11	7.85	333.06	8.25	0	0	0	0
J68	1.8	13.5	11.7	9.3	951.42	4.2	0	0	0	0
J69	15.7	16.7	1	16.7	12.05	0	2.07	11.52	0.247	0
J7	13.65	15.15	1.5	14.53	4.02	0.62	0	0	0	0
J70	14.4	16.9	2.5	16.39	11.2	0.51	0	0	0	0
J71	10.75	14.75	4	12.36	36.35	2.39	0	0	0	0
J72	15.8	16.8	1	17.3	30.82	0	1.61	18.26	0.107	0.5
J73	10.5	12.7	2.2	12.01	47.06	0.69	0	0	0	0
J74	10	12.3	2.3	11.51	53.8	0.79	0	0	0	0
J75	9	11.3	2.3	10.74	58.78	0.56	0	0	0	0
J76	16.4	20	3.6	18.91	31.03	1.09	0	0	0	0
J77	17	20	3	18.55	15.17	1.45	0	0	0	0
J79	13.2	16.5	3.3	16.68	34.72	0	4.38	31.9	0.267	0.176
J8	12.28	14.98	2.7	14.4	16.77	0.58	0	0	0	0
J80	11.1	14	2.9	13.17	34.14	0.83	0	0	0	0
J81	12.4	15.5	3.1	14.68	10.61	0.823	0	0	0	0
J82	12.2	15.7	3.5	15.7	10.66	0	0.06	0.29	0	0.001
J83	12	16	4	15.9	10.48	0.099	0	0	0	0
J84	17.5	19.5	2	18.9	40.84	2.2	0	0	0	0
J85	13.65	15.9	2.25	16.06	20.34	0.09	0	0	0	0
J86	15.9	16.9	1	16.96	5.53	0	1.9	5.53	0.071	0.059
J88	7	17	10	7.85	114.92	9.15	0	0	0	0
J89	12.5	15.5	3	13.11	120	2.39	0	0	0	0
J9	13.6	15.1	1.5	14.47	4.21	0.63	0	0	0	0
J90	5	17	12	7.9	190.42	9.1	0	0	0	0
J91	6	17	11	7.91	195.29	9.09	0	0	0	0
J92	13.5	16.5	3	14.97	123.2	1.53	0	0	0	0
J93	10.8	14.8	4	12.85	36.5	1.95	0	0	0	0
J94	11.5	14.5	3	12.77	36.83	1.73	0	0	0	0
J95	13.35	15	1.65	15.96	14.06	0	2.42	10.42	0.063	0.415
J99	16	17	1	16.2	4.39	0.8	0	0	0	0

Existing Conditions 10yr Outfalls

Name	Invert Elev. (ft)	Rim Elev. (ft)	Fixed Stage (ft)	Max. Depth (ft)	Max. HGL (ft)	Max. Total Inflow (cfs)	Hours Surcharged (h)	Hours Flooded (h)
OF1	2	0	7.616	5.62	7.62	337.33	0	0
OF2	8	0	9.51	1.51	9.51	74.95	0	0

Initial Improvements 5yr Junctions

Name	Invert Elev. (ft)	Rim Elev. (ft)	Depth (ft)	Max. HGL (ft)	Max. Total Inflow (cfs)	Min. Freeboard (ft)	Hours Flooded (h)	Max. Flood Rate (cfs)	Total Flood Vol. (MG)	Max. Ponded Depth (ft)
J1	12.71	15.5	2.79	14.62	25.23	0.88	0	0	0	0
J10	11.4	14.1	2.7	13.48	21.46	0.62	0	0	0	0
J100	1.51	12.01	10.5	9.39	1054.12	3.12	0	0	0	0
J101	1.5	12	10.5	7.82	927.59	4.18	0	0	0	0
J11	10.3	14.1	3.8	13.1	13.34	0.999	0	0	0	0
J12	15.73	16.73	1	16.18	0.9	0.55	0	0	0	0
J13	15.68	17.18	1.5	16.13	0.9	1.05	0	0	0	0
J14	15.64	17.14	1.5	15.83	1.07	1.31	0	0	0	0
J15	11.5	15.5	4	15.61	9.88	0	1.55	6.17	0.036	0.113
J17	10.75	14.75	4	11.72	31.23	3.03	0	0	0	0
J18	11.4	15.1	3.7	15.33	13.54	0	3.51	10.2	0.11	0.232
J19	0	0	0	0	0	0	0	0	0	0
J2	14.9	15.9	1	15.92	3.33	0	2.06	0.94	0.008	0.02
J20	14	16.55	2.55	16.55	3.5	0	0.02	2.2	0	0
J21	14.1	16.6	2.5	15.58	19.7	1.02	0	0	0	0
J22	13.5	16	2.5	14.66	22.89	1.34	0	0	0	0
J23	14.5	16.7	2.2	15.58	7.47	1.12	0	0	0	0
J25	12.1	16.1	4	14.5	96.49	1.6	0	0	0	0
J26	12	16	4	14.08	54.09	1.92	0	0	0	0
J28	15.3	16.8	1.5	16.02	7.47	0.78	0	0	0	0
J29	16	17.5	1.5	16.71	7.55	0.79	0	0	0	0
J3	2	14	12	7.82	313.5	6.18	0	0	0	0
J30	15	16	1	15.26	0.99	1.24	0	0	0	0
J31	15	16	1	15.18	2.25	1.32	0	0	0	0
J32	15.7	16.9	1.2	16.26	2.81	0.64	0	0	0	0
J33	12.8	15	2.2	13.41	7.45	1.59	0	0	0	0
J34	18.3	19.5	1.2	18.63	2.78	1.17	0	0	0	0
J35	14.8	18.8	4	15.53	35.34	3.27	0	0	0	0
J36	15	18.8	3.8	16.93	28.22	1.87	0	0	0	0
J37	15.1	18.8	3.7	15.56	17.24	3.24	0	0	0	0
J38	15.4	19	3.6	16.76	11.37	2.24	0	0	0	0
J39	18	20	2	18.61	4.09	1.39	0	0	0	0
J4	14.2	15.7	1.5	15.91	8.79	0	5.99	8.12	0.088	0.208
J40	18.18	19.78	1.6	19.03	4.18	0.75	0	0	0	0
J41	19.11	20.71	1.6	20.05	4.17	0.66	0	0	0	0
J42	19.23	20.83	1.6	20.23	4.24	0.6	0	0	0	0
J43	19.5	21	1.5	20.42	4.33	0.58	0	0	0	0
J44	19.4	21	1.6	20.33	4.33	0.67	0	0	0	0
J46	17.6	19	1.4	17.9	1.32	1.1	0	0	0	0
J48	14.75	17	2.25	15.25	5.82	2	0	0	0	0
J5	14	15.6	1.6	15.87	1.31	0	6.02	0.23	0.001	0.27
J51	13.3	16.8	3.5	13.89	2.46	2.91	0	0	0	0
J52	11.2	15.7	4.5	13.97	74.77	1.73	0	0	0	0
J53	10.9	15.7	4.8	13.93	75.92	1.77	0	0	0	0
J54	10.6	15.6	5	13.48	77.71	2.12	0	0	0	0
J55	10.1	14.8	4.7	12.47	80.84	2.33	0	0	0	0
J56	8.2	11.9	3.7	11.28	77.75	0.62	0	0	0	0

J57	10.8	15.7	4.9	13.83	76.99	1.87	0	0	0	0
J59	14.4	15.4	1	14.77	2.36	0.63	0	0	0	0
J6	13.5	15.5	2	15.52	6.39	0	0.34	1.76	0.006	0.02
J60	11.83	13.33	1.5	12.52	2.35	0.81	0	0	0	0
J61	11.78	13.28	1.5	12.32	2.33	0.96	0	0	0	0
J62	10.55	12.55	2	11.09	2.33	1.46	0	0	0	0
J63	10.23	12.23	2	10.74	2.32	1.49	0	0	0	0
J64	8.1	11.6	3.5	8.9	96.76	2.7	0	0	0	0
J65	8.93	10.93	2	9.69	2.32	1.24	0	0	0	0
J66	8.78	10.78	2	9.59	4.01	1.19	0	0	0	0
J67	4.1	15.1	11	7.81	311.93	8.29	0	0	0	0
J68	1.8	13.5	11.7	9.3	948.73	4.2	0	0	0	0
J69	14.8	16.7	1.9	15.57	7.94	1.13	0	0	0	0
J7	13.45	15.15	1.7	14.22	4.66	0.93	0	0	0	0
J70	11.5	15.8	4.3	14.02	38.07	1.78	0	0	0	0
J72	15.1	16.8	1.7	16.24	7.95	0.56	0	0	0	0
J73	10.5	12.7	2.2	12.01	31.27	0.69	0	0	0	0
J74	10	12.3	2.3	11.51	44.07	0.79	0	0	0	0
J75	9	11.3	2.3	10.74	48.31	0.56	0	0	0	0
J76	16.4	20	3.6	17.87	25.22	2.13	0	0	0	0
J77	17	20	3	18.11	7.75	1.89	0	0	0	0
J79	13.2	16.5	3.3	15.42	24.3	1.08	0	0	0	0
J8	12.28	14.98	2.7	13.91	9.68	1.07	0	0	0	0
J80	11.1	14	2.9	13.04	29.29	0.96	0	0	0	0
J81	12.4	15.5	3.1	14.07	9.24	1.433	0	0	0	0
J82	12.2	15.7	3.5	14.82	9.24	0.883	0	0	0	0
J83	12	16	4	14.91	28.02	1.09	0	0	0	0
J84	17.5	19.5	2	18.52	33.03	2.58	0	0	0	0
J85	11.65	15.9	4.25	14.03	43.7	1.87	0	0	0	0
J86	15.2	16.9	1.7	16.24	0.11	0.66	0	0	0	0
J88	7	17	10	7.81	89.21	9.19	0	0	0	0
J89	12.5	15.5	3	13.03	96	2.47	0	0	0	0
J9	13.35	15.1	1.75	14.18	4.69	0.92	0	0	0	0
J90	5	17	12	7.83	146.4	9.17	0	0	0	0
J91	6	17	11	7.83	149.6	9.17	0	0	0	0
J92	13.5	16.5	3	14.82	98.9	1.68	0	0	0	0
J93	10.8	14.8	4	12.65	31.44	2.15	0	0	0	0
J94	11.5	14.5	3	12.62	31.12	1.88	0	0	0	0
J95	12.51	15	2.49	14.59	50.29	0.42	0	0	0	0
J99	16	17	1	16.42	3.59	0.58	0	0	0	0
J16	10.75	14.75	4	11.87	31.22	2.88	0	0	0	0
J24	10.75	14.75	4	11.87	31.21	2.88	0	0	0	0
J27	14	17	3	15.48	7.28	1.52	0	0	0	0
J45	14	17	3	15.46	11.25	1.54	0	0	0	0
J47	13.4	16.6	3.2	15.46	18.6	1.14	0	0	0	0

Initial Improvements 5yr Outfalls

Name	Invert Elev. (ft)	Rim Elev. (ft)	Fixed Stage (ft)	Max. Depth (ft)	Max. HGL (ft)	Max. Total Inflow (cfs)	Hours Surcharged (h)	Hours Flooded (h)
OF1	2	0	7.616	5.62	7.62	312.75	0	0
OF2	8	0	9.51	1.51	9.51	61.23	0	0

Initial Improvements 10yr Junctions

Name	Invert Elev. (ft)	Rim Elev. (ft)	Depth (ft)	Max. HGL (ft)	Max. Total Inflow (cfs)	Min. Freeboard (ft)	Hours Flooded (h)	Max. Flood Rate (cfs)	Total Flood Vol. (MG)	Max. Ponded Depth (ft)
J1	12.71	15.5	2.79	14.92	32.9	0.58	0	0	0	0
J10	11.4	14.1	2.7	13.76	27.64	0.34	0	0	0	0
J100	1.51	12.01	10.5	9.39	1054.12	3.12	0	0	0	0
J101	1.5	12	10.5	7.9	927.59	4.1	0	0	0	0
J11	10.3	14.1	3.8	13.22	15.9	0.875	0	0	0	0
J12	15.73	16.73	1	16.24	1.16	0.49	0	0	0	0
J13	15.68	17.18	1.5	16.19	1.15	0.99	0	0	0	0
J14	15.64	17.14	1.5	15.86	1.39	1.28	0	0	0	0
J15	11.5	15.5	4	15.7	12.48	0	2.61	8.76	0.061	0.195
J17	10.75	14.75	4	11.72	36.22	3.03	0	0	0	0
J18	11.4	15.1	3.7	15.42	15.89	0	5.01	12.75	0.15	0.317
J19	0	0	0	0	0	0	0	0	0	0
J2	14.9	15.9	1	15.96	4.07	0	3.13	1.79	0.013	0.059
J20	14	16.55	2.55	16.55	4.8	0	0.01	1.64	0	0
J21	14.1	16.6	2.5	15.86	23.94	0.74	0	0	0	0
J22	13.5	16	2.5	14.94	27.9	1.06	0	0	0	0
J23	14.5	16.7	2.2	15.86	9.07	0.84	0	0	0	0
J25	12.1	16.1	4	14.84	120.26	1.26	0	0	0	0
J26	12	16	4	14.39	56.67	1.61	0	0	0	0
J28	15.3	16.8	1.5	16.19	9.08	0.61	0	0	0	0
J29	16	17.5	1.5	16.79	9.18	0.71	0	0	0	0
J3	2	14	12	7.89	369.95	6.11	0	0	0	0
J30	15	16	1	15.29	1.28	1.21	0	0	0	0
J31	15	16	1	15.2	2.69	1.3	0	0	0	0
J32	15.7	16.9	1.2	16.32	3.43	0.58	0	0	0	0
J33	12.8	15	2.2	13.69	10.44	1.31	0	0	0	0
J34	18.3	19.5	1.2	18.68	3.44	1.12	0	0	0	0
J35	14.8	18.8	4	15.61	45.26	3.19	0	0	0	0
J36	15	18.8	3.8	17.18	34.74	1.62	0	0	0	0
J37	15.1	18.8	3.7	15.61	19.58	3.19	0	0	0	0
J38	15.4	19	3.6	17.04	14.24	1.96	0	0	0	0
J39	18	20	2	18.68	5.1	1.32	0	0	0	0
J4	14.2	15.7	1.5	15.96	10.09	0	6.53	9.39	0.095	0.256
J40	18.18	19.78	1.6	19.16	5.25	0.62	0	0	0	0
J41	19.11	20.71	1.6	20.14	5.19	0.57	0	0	0	0
J42	19.23	20.83	1.6	20.36	5.28	0.47	0	0	0	0
J43	19.5	21	1.5	20.55	5.39	0.45	0	0	0	0
J44	19.4	21	1.6	20.45	5.38	0.55	0	0	0	0
J46	17.6	19	1.4	17.95	1.67	1.05	0	0	0	0
J48	14.75	17	2.25	15.31	7.2	1.94	0	0	0	0
J5	14	15.6	1.6	15.93	1.33	0	6.57	0.23	0.001	0.327
J51	13.3	16.8	3.5	14.12	3.06	2.68	0	0	0	0
J52	11.2	15.7	4.5	14.31	88.11	1.39	0	0	0	0
J53	10.9	15.7	4.8	14.28	87.16	1.42	0	0	0	0
J54	10.6	15.6	5	13.7	89.28	1.9	0	0	0	0
J55	10.1	14.8	4.7	12.63	92.95	2.17	0	0	0	0
J56	8.2	11.9	3.7	11.5	89.94	0.4	0	0	0	0

J57	10.8	15.7	4.9	14.14	87.81	1.56	0	0	0	0
J59	14.4	15.4	1	14.81	3	0.59	0	0	0	0
J6	13.5	15.5	2	15.55	7.82	0	0.58	3.17	0.013	0.047
J60	11.83	13.33	1.5	12.6	2.99	0.73	0	0	0	0
J61	11.78	13.28	1.5	12.37	2.96	0.91	0	0	0	0
J62	10.55	12.55	2	11.19	2.96	1.36	0	0	0	0
J63	10.23	12.23	2	10.79	2.95	1.44	0	0	0	0
J64	8.1	11.6	3.5	9	125.11	2.6	0	0	0	0
J65	8.93	10.93	2	9.82	2.95	1.11	0	0	0	0
J66	8.78	10.78	2	9.67	5.08	1.11	0	0	0	0
J67	4.1	15.1	11	7.91	375.17	8.19	0	0	0	0
J68	1.8	13.5	11.7	9.3	948.73	4.2	0	0	0	0
J69	14.8	16.7	1.9	15.84	9.74	0.86	0	0	0	0
J7	13.45	15.15	1.7	14.74	4.7	0.405	0	0	0	0
J70	11.5	15.8	4.3	14.48	47.97	1.32	0	0	0	0
J72	15.1	16.8	1.7	16.37	9.79	0.43	0	0	0	0
J73	10.5	12.7	2.2	12.01	36.25	0.69	0	0	0	0
J74	10	12.3	2.3	11.51	51.48	0.79	0	0	0	0
J75	9	11.3	2.3	10.74	57.41	0.56	0	0	0	0
J76	16.4	20	3.6	18.04	31.04	1.96	0	0	0	0
J77	17	20	3	18.24	9.76	1.76	0	0	0	0
J79	13.2	16.5	3.3	16.1	30.29	0.403	0	0	0	0
J8	12.28	14.98	2.7	14.28	15.03	0.7	0	0	0	0
J80	11.1	14	2.9	13.17	34.13	0.83	0	0	0	0
J81	12.4	15.5	3.1	14.34	9.49	1.161	0	0	0	0
J82	12.2	15.7	3.5	15.22	9.49	0.483	0	0	0	0
J83	12	16	4	15.31	35.11	0.69	0	0	0	0
J84	17.5	19.5	2	18.64	40.84	2.46	0	0	0	0
J85	11.65	15.9	4.25	14.35	45.08	1.55	0	0	0	0
J86	15.2	16.9	1.7	16.37	0.14	0.53	0	0	0	0
J88	7	17	10	7.91	114.38	9.09	0	0	0	0
J89	12.5	15.5	3	13.11	119.33	2.39	0	0	0	0
J9	13.35	15.1	1.75	14.73	5.03	0.374	0	0	0	0
J90	5	17	12	7.95	183.64	9.05	0	0	0	0
J91	6	17	11	7.96	195.29	9.04	0	0	0	0
J92	13.5	16.5	3	14.97	122.38	1.53	0	0	0	0
J93	10.8	14.8	4	12.85	36.34	1.95	0	0	0	0
J94	11.5	14.5	3	12.76	36.67	1.74	0	0	0	0
J95	12.51	15	2.49	14.91	62.69	0.1	0	0	0	0
J99	16	17	1	16.47	4.39	0.53	0	0	0	0
J16	10.75	14.75	4	11.87	36.2	2.88	0	0	0	0
J24	10.75	14.75	4	11.87	36.19	2.88	0	0	0	0
J27	14	17	3	16.37	8.95	0.63	0	0	0	0
J45	14	17	3	16.43	13.84	0.565	0	0	0	0
J47	13.4	16.6	3.2	16.24	23.12	0.361	0	0	0	0

Initial Improvements 10yr Outfalls

Name	Invert Elev. (ft)	Rim Elev. (ft)	Fixed Stage (ft)	Max. Depth (ft)	Max. HGL (ft)	Max. Total Inflow (cfs)	Hours Surcharged (h)	Hours Flooded (h)
OF1	2	0	7.616	5.62	7.62	369.6	0	0
OF2	8	0	9.51	1.51	9.51	73.94	0	0

Kings and Seaboard Trail Improvements 10yr Junctions

Name	Invert Elev. (ft)	Rim Elev. (ft)	Depth (ft)	Max. HGL (ft)	Max. Total Inflow (cfs)	Min. Freeboard (ft)	Hours Flooded (h)	Max. Flood Rate (cfs)	Total Flood Vol. (MG)	Max. Ponded Depth (ft)
J1	12.6	15.5	2.9	15.28	21.37	0.32	0	0	0	0
J10	11.4	14.1	2.7	13.77	28	0.33	0	0	0	0
J100	1.5	12	10.5	9.39	1054.6	3.11	0	0	0	0
J101	1.5	12	10.5	7.9	929.19	4.1	0	0	0	0
J11	10.3	14.1	3.8	13.19	14.74	0.915	0	0	0	0
J12	15.73	16.73	1	16.24	1.16	0.49	0	0	0	0
J13	15.68	17.18	1.5	16.19	1.16	0.99	0	0	0	0
J14	15.64	17.14	1.5	15.86	1.4	1.28	0	0	0	0
J15	11.5	15.5	4	15.7	12.48	0	2.6	8.77	0.06	0.196
J16	10.75	14.75	4	12.09	53.28	2.66	0	0	0	0
J17	10.75	14.75	4	11.77	54.33	2.98	0	0	0	0
J18	11.4	15.1	3.7	15.42	15.88	0	5.09	12.53	0.152	0.321
J19	0	0	0	0	0	0	0	0	0	0
J2	14.9	15.9	1	15.96	4.07	0	4.02	1.82	0.015	0.062
J20	13.95	16.5	2.55	16.5	4.8	0	0.01	1.46	0	0
J21	14.6	16.6	2	16.66	9.96	0	0.55	2.77	0.012	0.056
J22	14.5	16	1.5	15.55	12.93	0.45	0	0	0	0
J23	15.6	16.7	1.1	16.67	3.23	0.03	0	0	0	0
J25	13.8	16.3	2.5	16.44	53.96	0.66	0	0	0	0
J26	12.6	16	3.4	16.06	21.44	0	0.99	20.35	0.015	0.06
J28	15.6	16.8	1.2	16.8	4.97	0	0.51	2.23	0.025	0
J29	16.3	17.5	1.2	17.57	9.18	0	0.44	4.34	0.016	0.067
J3	2	14	12	7.89	369.71	6.11	0	0	0	0
J30	15	16	1	15.58	1.28	0.42	0	0	0	0
J31	15	16	1	15.71	2.79	0.29	0	0	0	0
J32	15.7	16.9	1.2	16.32	3.43	0.58	0	0	0	0
J33	12.8	15	2.2	13.72	10.44	1.28	0	0	0	0
J34	18.8	20	1.2	19.74	3.44	0.26	0	0	0	0
J35	14.8	18.8	4	16.45	27.9	2.35	0	0	0	0
J36	15	18.8	3.8	18.86	31.92	0	0.16	8.25	0.01	0.057
J37	15.1	18.8	3.7	16.47	23.11	2.33	0	0	0	0
J38	15.4	19	3.6	19	17.75	0	0.01	0.78	0	0
J39	18	20	2	18.61	4.09	1.39	0	0	0	0
J4	14.2	15.7	1.5	15.96	10.05	0	8.52	9.19	0.107	0.261
J40	18.18	19.78	1.6	19.03	4.11	0.75	0	0	0	0
J41	19.11	20.71	1.6	20.04	4.08	0.67	0	0	0	0
J42	19.23	20.83	1.6	20.79	4.47	0.04	0	0	0	0
J43	19.5	21	1.5	21.01	5.39	0	0.23	1.14	0.003	0.014
J44	19.4	21	1.6	20.81	5.02	0.19	0	0	0	0
J46	17.6	19	1.4	17.95	1.67	1.05	0	0	0	0
J48	14.75	17	2.25	16.42	10.78	0.83	0	0	0	0
J5	14	15.5	1.5	15.93	1.04	0	8.88	0.13	0.002	0.427
J51	13.3	16.8	3.5	15.57	5.97	1.233	0	0	0	0
J52	13.5	16	2.5	16.02	23.96	0	0.78	5.78	0.009	0.021
J53	13.2	16	2.8	16	23.54	0	0.68	11.09	0.125	0
J54	12.4	16	3.6	14.75	19.94	1.252	0	0	0	0
J55	12.8	15	2.2	13.86	19.94	1.14	0	0	0	0

J56	9.5	12	2.5	10.48	21.5	1.52	0	0	0	0
J57	12.9	16	3.1	15.12	18.54	0.879	0	0	0	0
J59	14.4	15.4	1	14.81	3	0.59	0	0	0	0
J6	13.8	15.3	1.5	15.37	7.98	0	0.94	4.05	0.019	0.07
J60	11.83	13.33	1.5	12.6	2.99	0.73	0	0	0	0
J61	11.78	13.28	1.5	12.37	2.96	0.91	0	0	0	0
J62	10.55	12.55	2	11.19	2.96	1.36	0	0	0	0
J63	10.23	12.23	2	10.79	2.95	1.44	0	0	0	0
J64	8.6	11.1	2.5	8.94	21.49	2.66	0	0	0	0
J65	8.93	10.93	2	9.82	2.95	1.11	0	0	0	0
J66	8.78	10.78	2	9.67	5.08	1.11	0	0	0	0
J67	4.1	15.1	11	7.88	324.58	8.22	0	0	0	0
J68	1.8	13.5	11.7	9.3	951.42	4.2	0	0	0	0
J69	15.7	16.7	1	16.7	12.06	0	1.59	10.81	0.187	0
J7	13.65	15.15	1.5	14.48	4.02	0.67	0	0	0	0
J70	14.4	16.9	2.5	16.39	11.2	0.51	0	0	0	0
J71	10.75	14.75	4	12.35	34.92	2.4	0	0	0	0
J72	15.8	16.8	1	17.3	30.82	0	1.6	18.25	0.106	0.5
J73	10.5	12.7	2.2	12.01	45.87	0.69	0	0	0	0
J74	10	12.3	2.3	11.51	52.28	0.79	0	0	0	0
J75	9	11.3	2.3	10.74	56.66	0.56	0	0	0	0
J76	16.4	20	3.6	18.91	31.04	1.09	0	0	0	0
J77	17	20	3	18.54	15.02	1.46	0	0	0	0
J79	12.3	16.5	4.2	15.94	34.72	0.56	0	0	0	0
J8	12.28	14.98	2.7	14.33	15.84	0.65	0	0	0	0
J80	11.1	14	2.9	13.13	32.89	0.87	0	0	0	0
J81	12.4	15.5	3.1	14.32	9.27	1.179	0	0	0	0
J82	12.2	15.7	3.5	15.16	9.27	0.544	0	0	0	0
J83	11.5	16	4.5	15.25	48.84	0.752	0	0	0	0
J84	17.5	19.5	2	18.89	40.84	2.21	0	0	0	0
J85	13.65	15.9	2.25	16.06	19.77	0.09	0	0	0	0
J86	15.9	16.9	1	16.96	5.53	0	1.83	5.53	0.071	0.059
J88	7	17	10	7.89	114.88	9.11	0	0	0	0
J89	12.5	15.5	3	13.11	120	2.39	0	0	0	0
J9	13.6	15.1	1.5	14.43	4.2	0.67	0	0	0	0
J90	5	17	12	7.93	186.96	9.07	0	0	0	0
J91	6	17	11	7.94	195.29	9.06	0	0	0	0
J92	13.5	16.5	3	14.97	123.2	1.53	0	0	0	0
J93	10.8	14.8	4	12.8	35.07	2	0	0	0	0
J94	11.5	14.5	3	12.72	35.38	1.78	0	0	0	0
J95	13.35	15	1.65	15.3	15.7	0.25	0	0	0	0
J99	16	17	1	16.2	4.39	0.8	0	0	0	0
J24	10.15	16	5.85	13.36	43.14	2.637	0	0	0	0
J27	9.89	15.5	5.61	13	43.13	2.5	0	0	0	0
J45	9.74	15.5	5.76	12.8	43.13	2.701	0	0	0	0
J47	9.43	15	5.57	12.38	43.14	2.62	0	0	0	0
J49	9.07	15	5.93	11.92	43.1	3.08	0	0	0	0
J50	8.44	15	6.56	11.12	43.08	3.88	0	0	0	0
J58	7.93	15	7.07	10.39	43.07	4.61	0	0	0	0

J78	7.45	15	7.55	9.61	43.06	5.39	0	0	0	0
J87	6.76	14.5	7.74	7.91	43.06	6.59	0	0	0	0
J96	10.9	16.5	5.6	14.4	43.15	2.1	0	0	0	0
J97	14	17	3	15.96	1.2	1.04	0	0	0	0
J98	14	17	3	15.99	0.96	1.01	0	0	0	0
J102	13.5	16.6	3.1	15.94	4.04	0.656	0	0	0	0

Kings and Seaboard Trail Improvements 10yr Outfalls

Name	Invert Elev. (ft)	Rim Elev. (ft)	Fixed Stage (ft)	Max. Depth (ft)	Max. HGL (ft)	Max. Total Inflow (cfs)	Hours Surcharged (h)	Hours Flooded (h)
OF1	2	0	7.616	5.62	7.62	368.93	0	0
OF2	8	0	9.51	1.51	9.51	72.72	0	0

Routing South down Driver Improvements 10yr Junctions

Name	Invert Elev. (ft)	Rim Elev. (ft)	Depth (ft)	Max. HGL (ft)	Max. Total Inflow (cfs)	Min. Freeboard (ft)	Hours Flooded (h)	Max. Flood Rate (cfs)	Total Flood Vol. (MG)	Max. Ponded Depth (ft)
J1	12.71	15.5	2.79	14.91	9.89	0.59	0	0	0	0
J10	11.4	14.1	2.7	13.74	27.64	0.36	0	0	0	0
J100	1.51	12.01	10.5	9.39	1054.12	3.12	0	0	0	0
J101	1.5	12	10.5	7.9	927.59	4.1	0	0	0	0
J11	10.3	14.1	3.8	13.21	15.9	0.887	0	0	0	0
J12	15.73	16.73	1	16.24	1.16	0.49	0	0	0	0
J13	15.68	17.18	1.5	16.19	1.16	0.99	0	0	0	0
J14	15.64	17.14	1.5	15.86	1.39	1.28	0	0	0	0
J15	11.5	15.5	4	15.7	12.48	0	2.69	8.75	0.062	0.195
J17	10.75	14.75	4	11.72	35.74	3.03	0	0	0	0
J18	11.4	15.1	3.7	15.42	15.9	0	5.01	12.7	0.15	0.317
J19	0	0	0	0	0	0	0	0	0	0
J2	14.9	15.9	1	15.96	4.07	0	3.3	1.79	0.014	0.059
J20	14	16.55	2.55	16.55	4.8	0	0.03	2.79	0	0.001
J21	14.1	16.6	2.5	15.45	24.01	1.15	0	0	0	0
J22	12.9	16	3.1	14.99	50.3	1.01	0	0	0	0
J23	14.5	16.7	2.2	15.45	9.11	1.25	0	0	0	0
J25	12.1	16.1	4	14.85	120.35	1.25	0	0	0	0
J26	12	16	4	14.39	56.36	1.61	0	0	0	0
J28	15.3	16.8	1.5	16.06	9.12	0.74	0	0	0	0
J29	16	17.5	1.5	16.8	9.18	0.7	0	0	0	0
J3	2	14	12	7.89	370.86	6.11	0	0	0	0
J30	13	16	3	15.18	23.84	0.82	0	0	0	0
J31	15	16	1	15.18	2.69	1.32	0	0	0	0
J32	15.7	16.9	1.2	16.33	3.43	0.57	0	0	0	0
J33	12.8	15	2.2	13.68	10.44	1.32	0	0	0	0
J34	18.3	19.5	1.2	18.68	3.44	1.12	0	0	0	0
J35	14.8	18.8	4	15.61	45.92	3.19	0	0	0	0
J36	15	18.8	3.8	17.19	34.74	1.61	0	0	0	0
J37	15.1	18.8	3.7	15.61	19.57	3.19	0	0	0	0
J38	15.4	19	3.6	17.04	14.24	1.96	0	0	0	0
J39	18	20	2	18.68	5.1	1.32	0	0	0	0
J4	14.2	15.7	1.5	15.96	10.09	0	7.19	9.39	0.104	0.256
J40	18.18	19.78	1.6	19.16	5.25	0.62	0	0	0	0
J41	19.11	20.71	1.6	20.14	5.19	0.57	0	0	0	0
J42	19.23	20.83	1.6	20.36	5.28	0.47	0	0	0	0
J43	19.5	21	1.5	20.55	5.39	0.45	0	0	0	0
J44	19.4	21	1.6	20.45	5.38	0.55	0	0	0	0
J46	17.6	19	1.4	17.95	1.67	1.05	0	0	0	0
J48	14.75	17	2.25	15.31	7.2	1.94	0	0	0	0
J5	14	15.6	1.6	15.93	1.33	0	7.23	0.23	0.001	0.327
J51	13.3	16.8	3.5	14.12	3.06	2.68	0	0	0	0
J52	11.2	15.7	4.5	14.3	87.38	1.4	0	0	0	0
J53	10.9	15.7	4.8	14.28	88.03	1.42	0	0	0	0
J54	10.6	15.6	5	13.69	89.68	1.91	0	0	0	0
J55	10.1	14.8	4.7	12.64	92.64	2.16	0	0	0	0
J56	8.2	11.9	3.7	11.5	90.57	0.4	0	0	0	0

J57	10.8	15.7	4.9	14.15	89.01	1.55	0	0	0	0
J59	14.4	15.4	1	14.81	3	0.59	0	0	0	0
J6	13.5	15.5	2	15.55	7.82	0	0.57	3.17	0.013	0.047
J60	11.83	13.33	1.5	12.6	2.99	0.73	0	0	0	0
J61	11.78	13.28	1.5	12.37	2.96	0.91	0	0	0	0
J62	10.55	12.55	2	11.19	2.96	1.36	0	0	0	0
J63	10.23	12.23	2	10.79	2.95	1.44	0	0	0	0
J64	8.1	11.6	3.5	9	123.17	2.6	0	0	0	0
J65	8.93	10.93	2	9.82	2.95	1.11	0	0	0	0
J66	8.78	10.78	2	9.67	5.08	1.11	0	0	0	0
J67	4.1	15.1	11	7.91	373.38	8.19	0	0	0	0
J68	1.8	13.5	11.7	9.3	948.73	4.2	0	0	0	0
J69	14.8	16.7	1.9	15.6	9.74	1.1	0	0	0	0
J7	13.45	15.15	1.7	14.58	4.7	0.57	0	0	0	0
J70	11.5	15.8	4.3	14.47	47.87	1.33	0	0	0	0
J72	15.1	16.8	1.7	16.3	9.78	0.5	0	0	0	0
J73	10.5	12.7	2.2	12.01	35.78	0.69	0	0	0	0
J74	10	12.3	2.3	11.51	51.01	0.79	0	0	0	0
J75	9	11.3	2.3	10.74	56.93	0.56	0	0	0	0
J76	16.4	20	3.6	18.04	31.04	1.96	0	0	0	0
J77	17	20	3	18.24	9.76	1.76	0	0	0	0
J79	13.2	16.5	3.3	15.07	7.02	1.43	0	0	0	0
J8	12.28	14.98	2.7	14.26	14.63	0.72	0	0	0	0
J80	11.1	14	2.9	13.15	33.63	0.85	0	0	0	0
J81	12.4	15.5	3.1	14.2	8.95	1.295	0	0	0	0
J82	12.2	15.7	3.5	14.97	8.95	0.731	0	0	0	0
J83	12	16	4	15.04	11.42	0.96	0	0	0	0
J84	17.5	19.5	2	18.64	40.84	2.46	0	0	0	0
J85	11.65	15.9	4.25	14.35	44.96	1.55	0	0	0	0
J86	15.2	16.9	1.7	16.3	0.14	0.6	0	0	0	0
J88	7	17	10	7.91	114.38	9.09	0	0	0	0
J89	12.5	15.5	3	13.11	119.33	2.39	0	0	0	0
J9	13.35	15.1	1.75	14.55	5.02	0.549	0	0	0	0
J90	5	17	12	7.95	183.61	9.05	0	0	0	0
J91	6	17	11	7.96	195.29	9.04	0	0	0	0
J92	13.5	16.5	3	14.97	122.38	1.53	0	0	0	0
J93	10.8	14.8	4	12.83	35.86	1.97	0	0	0	0
J94	11.5	14.5	3	12.75	36.14	1.75	0	0	0	0
J95	12.51	15	2.49	14.91	62.31	0.1	0	0	0	0
J99	16	17	1	16.47	4.39	0.53	0	0	0	0
J16	10.75	14.75	4	11.87	35.73	2.88	0	0	0	0
J24	10.75	14.75	4	11.87	35.72	2.88	0	0	0	0
J97	14	17	3	15.58	8.95	1.42	0	0	0	0
J98	14	17	3	15.59	13.84	1.41	0	0	0	0
J102	13.5	16.6	3.1	15.53	22.71	1.069	0	0	0	0

Routing South down Driver Improvements 10yr Outfalls

Name	Invert Elev. (ft)	Rim Elev. (ft)	Fixed Stage (ft)	Max. Depth (ft)	Max. HGL (ft)	Max. Total Inflow (cfs)	Hours Surcharged (h)	Hours Flooded (h)
OF1	2	0	7.616	5.62	7.62	370.3	0	0
OF2	8	0	9.51	1.51	9.51	73.48	0	0

APPENDIX C

PRELIMINARY COST ESTIMATE FOR ALTERNATIVE I

ENGINEER'S OPINION OF PROBABLE COST
DRIVER LN DRAINAGE IMPROVEMENTS ALTERNATIVE I LAYOUT

I. Demolition

Description	Qty.	Unit	Unit Price	Total
Asphalt Pavement Removal	280	SY	$9.00	$ 2,520
Concrete Removal (Driveway)	55	SY	$20.00	$ 1,100
Concrete Removal (Sidewalk)	120	SY	$15.00	$ 1,800
Pipe Removal	605	LF	$12.00	$ 7,260
Subtotal Demolition				$ 12,680

II. Storm Drainage

Description	Qty.	Unit	Unit Price	Total
18" RCP Class III (VDOT STD. PB-1)	25	LF	$149.00	$ 3,725
24" RCP Class III (VDOT STD. PB-1)	37	LF	$163.00	$ 6,031
30" RCP Class III (VDOT STD. PB-1)	342	LF	$182.00	$ 62,244
36" RCP Class III (VDOT STD. PB-1)	46	LF	$198.00	$ 9,108
42" RCP Class III (VDOT STD. PB-1)	220	LF	$301.00	$ 66,220
Earth-lined Ditch Regrading/Widening	2300	LF	$81.00	$ 186,300
Subtotal Storm Drainage				$ 333,628

III. Pavement

Description	Qty.	Unit	Unit Price	Total
Asphalt Pavement Patch (3" of SM-9.5 over 6" of Stone Base)	280	SY	$100.00	$ 28,000
Gravel Parking Area (salvage existing and replace - 8" depth)	20	CY	$60.00	$ 1,200
Concrete Residential Driveway Apron	55	SY	$140.00	$ 7,700
Concrete Sidewalk	120	SY	$70.00	$ 8,400
Subtotal Pavement				$ 45,300

Subtotal Improvements = $ 391,608

V. Mark-Ups

Description		Total
Mobilization (8%)	=	$ 31,400
Erosion and Sediment Control (5%)	=	$ 19,600
Traffic Control (10%)	=	$ 39,200
Environmental Permitting (3%)	=	$ 11,800
Subtotal Mark-Ups =		$ 102,000

Total Items I - V	**$ 493,608**
General Construction Contingency (30%)	**$ 148,100**
Total	**$ 641,708**
Design Contingency (12%)	**$ 77,100**
Grand Total	**$ 718,900**
***estimate does not include easement acquisition**	

ENGINEER'S OPINION OF PROBABLE COST - PHASE ONE
DRIVER LN DRAINAGE IMPROVEMENTS ALTERNATIVE I LAYOUT

I. Demolition

Description	Qty.	Unit	Unit Price	Total
Asphalt Pavement Removal	250	SY	$9.00	$ 2,250
Concrete Removal (Driveway)	55	SY	$20.00	$ 1,100
Concrete Removal (Sidewalk)	120	SY	$15.00	$ 1,800
Pipe Removal	545	LF	$12.00	$ 6,540
Subtotal Demolition				$ 11,690

II. Storm Drainage

Description	Qty.	Unit	Unit Price	Total
30" RCP Class III (VDOT STD. PB-1)	342	LF	$182.00	$ 62,244
36" RCP Class III (VDOT STD. PB-1)	46	LF	$198.00	$ 9,108
42" RCP Class III (VDOT STD. PB-1)	220	LF	$301.00	$ 66,220
Earth-lined Ditch Regrading/Widening	2040	LF	$81.00	$ 165,240
Subtotal Storm Drainage				$ 302,812

III. Pavement

Description	Qty.	Unit	Unit Price	Total
Asphalt Pavement Patch (3" of SM-9.5 over 6" of Stone Base)	250	SY	$100.00	$ 25,000
Gravel Parking Area (salvage existing and replace - 8" depth)	20	CY	$60.00	$ 1,200
Concrete Residential Driveway Apron	55	SY	$140.00	$ 7,700
Concrete Sidewalk	120	SY	$70.00	$ 8,400
Subtotal Pavement				$ 42,300

Subtotal Improvements = $ 356,802

V. Mark-Ups

Description		Total
Mobilization (8%)	=	$ 28,600
Erosion and Sediment Control (5%)	=	$ 17,900
Traffic Control (10%)	=	$ 35,700
Environmental Permitting (3%)	=	$ 10,800
Subtotal Mark-Ups =		$ 93,000

Total Items I - V	**$**	**449,802**
General Construction Contingency (30%)	**$**	**135,000**
Total	**$**	**584,802**
Design Contingency (12%)	**$**	**70,200**
Grand Total	**$**	**655,100**
***estimate does not include easement acquisition**		

ENGINEER'S OPINION OF PROBABLE COST - PHASE TWO
DRIVER LN DRAINAGE IMPROVEMENTS ALTERNATIVE I LAYOUT

I. Demolition

Description	Qty.	Unit	Unit Price	Total
Asphalt Pavement Removal	50	SY	$9.00	$ 450
Pipe Removal	65	LF	$12.00	$ 780
Subtotal Demolition				$ 1,230

II. Storm Drainage

Description	Qty.	Unit	Unit Price	Total
18" RCP Class III (VDOT STD. PB-1)	25	LF	$149.00	$ 3,725
24" RCP Class III (VDOT STD. PB-1)	37	LF	$163.00	$ 6,031
Earth-lined Ditch Regrading/Widening	405	LF	$81.00	$ 32,805
Subtotal Storm Drainage				$ 42,561

III. Pavement

Description	Qty.	Unit	Unit Price	Total
Asphalt Pavement Patch (3" of SM-9.5 over 6" of Stone Base)	50	SY	$100.00	$ 5,000
Subtotal Pavement				$ 5,000

Subtotal Improvements = $ 48,791

V. Mark-Ups

Description		Total
Mobilization (8%)	=	$ 4,000
Erosion and Sediment Control (5%)		$ 2,500
Traffic Control (10%)	=	$ 4,900
Subtotal Mark-Ups =		$ 11,400

Total Items I - V	**$**	**60,191**
General Construction Contingency (30%)	**$**	**18,100**
Total	**$**	**78,291**
Design Contingency (12%)	**$**	**9,400**
Grand Total	**$**	**87,700**
***estimate does not include easement acquisition**		

CITY OF SUFFOLK

P.O. BOX 1858, SUFFOLK, VIRGINIA 23439-1858 PHONE: (757) 514-4012

CITY MANAGER

November 8, 2023

Virginia Department of Conservation and Recreation
Attention: Virginia Community Flood Preparedness Fund
Division of Dam Safety and Floodplain Management
600 East Main Street, 24th Floor
Richmond, Virginia 23219

Dear Sir or Ma'am:

Please accept this written correspondence as signed documentation authorizing the City of Suffolk's request for funding from Round 4 of the 2023 Virginia Community Flood Preparedness Fund (CFPF).

The CFPF funding would enable the City of Suffolk to make improvements to stormwater infrastructure to mitigate flooding in the Driver area of the City. The cost of the proposed project is $1,960,000. Following the 50% Fund, 50% Match requirements for this category, the City respectfully requests funding from the CFPF in the amount of $980,000.00. Furthermore, the City will provide the 50% matching contribution from the Stormwater Utility Fund in the amount of $980,000.00.

Thank you for your consideration of this grant proposal. Should you have any questions regarding this proposal please feel free to contact Erin Rountree by phone at 757-514-7678, or via email at erountree@suffolkva.us or Heather Baggett by phone at 757-514-7627, or via email at hbaggett@suffolkva.us.

Sincerely,

Albert S. Moor II, P.E.
City Manager

pc: Kevin Hughes, Deputy City Manager
Robert Lewis, Public Works Director
Darryll Lewis, Public Works/Engineering Asst. Director

Project (Study Date)	Study Est	Study Est including 15% design contingency	Estimated Total Project Cost (FY25)	
Driver Drainage Improvements (2021)			**$1,960,000**	
Phase I*	$883,900	$1,016,485	$1,235,545	***
Phase 2	$106,490	$122,464	$148,855	***
Easement cost estimate			$60,000	
Allotment for pipe installation**			$460,000	
CEI			$55,600	

* assumes ditch widening, not pipe

**design and construction estimate for pipe in place of ditch installation

*** 5% increase per year from FY21 to FY25

ENGINEER'S OPINION OF PROBABLE COST - PHASE ONE
DRIVER LN DRAINAGE IMPROVEMENTS ALTERNATIVE I LAYOUT

I. Demolition

Description	Qty.	Unit	Unit Price	Total
Asphalt Pavement Removal	300	SY	$9.00	$ 2,700
Concrete Removal (Driveway)	30	SY	$20.00	$ 600
Concrete Removal (Sidewalk)	25	SY	$15.00	$ 375
Pipe Removal	600	LF	$12.00	$ 7,200
Subtotal Demolition				$ 10,875

II. Storm Drainage

Description	Qty.	Unit	Unit Price	Total
30”x19” RCP Class III (VDOT STD. PB-1)	110	LF	$170.00	$ 18,700
38”x24” RCP Class III (VDOT STD. PB-1)	190	LF	$300.00	$ 57,000
30" RCP Class III (VDOT STD. PB-1)	160	LF	$182.00	$ 29,120
36" RCP Class III (VDOT STD. PB-1)	50	LF	$198.00	$ 9,900
42" RCP Class III (VDOT STD. PB-1)	270	LF	$301.00	$ 81,270
Installation of Earth-lined Ditch	145	LF	$68.00	$ 9,860
Large Earth-lined Ditch Regrading/Widening	3740	LF	$69.00	$ 258,060
Subtotal Storm Drainage				$ 463,910

III. Pavement

Description	Qty.	Unit	Unit Price	Total
Asphalt Pavement Patch (3" of SM-9.5 over 6" of Stone Base)	300	SY	$100.00	$ 30,000
Asphalt Stamping	124	SY	$60.00	$ 7,440
Pavement Striping (4" Yellow)	100	LF	$3.00	$ 300
Pavement Striping (8" White)	175	LF	$5.00	$ 875
Gravel Parking Area (salvage existing and replace - 8" depth)	20	CY	$60.00	$ 1,200
Concrete Residential Driveway Apron	30	SY	$140.00	$ 4,200
Concrete Sidewalk	25	SY	$70.00	$ 1,750
Subtotal Pavement				$ 44,015

Subtotal Improvements = $ 518,800

V. Mark-Ups

Description		Total
Mobilization (8%)	=	$ 41,600
Erosion and Sediment Control (5%)	=	$ 26,000
Traffic Control (15%)	=	$ 77,900
Environmental Permitting (3%)	=	$ 15,600
Subtotal Mark-Ups =		$ 161,100

Total Items I - V	**$ 679,900**
General Construction Contingency (30%)	**$ 204,000**
Total	**$ 883,900**
***estimate does not include easement acquisition**	

ENGINEER'S OPINION OF PROBABLE COST - PHASE TWO
DRIVER LN DRAINAGE IMPROVEMENTS ALTERNATIVE I LAYOUT

I. Demolition

Description	Qty.	Unit	Unit Price		Total
Asphalt Pavement Removal	60	SY	$9.00	$	540
Pipe Removal	190	LF	$12.00	$	2,280
Subtotal Demolition				$	2,820

II. Storm Drainage

Description	Qty.	Unit	Unit Price		Total
18" RCP Class III (VDOT STD. PB-1)	100	LF	$149.00	$	14,900
24" RCP Class III (VDOT STD. PB-1)	90	LF	$163.00	$	14,670
Small Earth-lined Ditch Regrading/Widening	700	LF	$40.00	$	28,000
Subtotal Storm Drainage				$	57,570

III. Pavement

Description	Qty.	Unit	Unit Price		Total
Asphalt Pavement Patch (3" of SM-9.5 over 6" of Stone Base)	60	SY	$100.00	$	6,000
Pavement Striping (8" White)	60	LF	$5.00	$	300
Subtotal Pavement				$	6,000

Subtotal Improvements = $ 66,390

V. Mark-Ups

Description		Total
Mobilization (8%)	= $	5,400
Erosion and Sediment Control (5%)	$	3,400
Traffic Control (10%)	= $	6,700
Subtotal Mark-Ups =	$	15,500

Total Items I - V	**$**	**81,890**
General Construction Contingency (30%)	**$**	**24,600**
Total	**$**	**106,490**
***estimate does not include easement acquisition**		

CIVIL CONSTRUCTION PLANS
FOR
DRIVER LANE DRAINAGE STUDY
SUFFOLK, VIRGINIA
AUGUST 10, 2021

RESPONSIBLE LAND DISTURBER DESIGNATION

THE PERSON IDENTIFIED BELOW IS DESIGNATED AS THE RESPONSIBLE LAND DISTURBER WHO WILL BE IN CHARGE OF AND RESPONSIBLE FOR CARRYING OUT THE LAND DISTURBING ACTIVITY ASSOCIATED WITH THIS PROJECT. THE PERSON MEETS THE APPLICABLE REQUIREMENTS OF VIRGINIA CODE SECTION 10.1-563 AND 10.1-566 BY VIRTUE OF THE FOLLOWING:

_____ RESPONSIBLE LAND DISTURBER CERTIFICATE

_____ DEQ CERTIFICATION FOR COMBINED ADMINISTRATOR, ADMINISTRATOR, PLAN REVIEWER, INSPECTOR, OR CONTRACTOR.

_____ VIRGINIA PROFESSIONAL ENGINEER, LAND SURVEYOR, LANDSCAPE ARCHITECT, OR ARCHITECT

RESPONSIBLE LAND DISTURBER CONTACT INFORMATION:

NAME (SIGNATURE): _____ DATE: _____
NAME (PRINT): _____

CERTIFICATION/REGISTRATION NUMBER: _____ RLD # : _____
COMPANY: _____
MAILING ADDRESS: _____

TELEPHONE: _____ FAX: _____
E-MAIL: _____

THIS DESIGNATION MAY ONLY BE CHANGED BY PROVIDING A LETTER WITH DOCUMENTATION IDENTIFYING THE NEW RLD TO THE DEPARTMENT OF PUBLIC WORKS - ENGINEERING FOR VERIFICATION AND APPROVAL.

THE DEPARTMENT OF PUBLIC WORKS - ENGINEERING MUST BE CONTACTED AT LEAST 48 HOURS PRIOR TO THE COMMENCEMENT OF ANY LAND-DISTURBING ACTIVITY IN ORDER TO SCHEDULE A PRE-CONSTRUCTION MEETING.
PLEASE CALL THE CONSTRUCTION MANAGER AT (757) 514-7704

ADJACENT PROPERTY OWNERS NOTE

THE CONTRACTOR SHALL PROVIDE WRITTEN NOTIFICATION TO ALL PROPERTY OWNERS AND RESIDENTS OF PROPERTY ADJACENT TO THE DEVELOPMENT OR OFFSITE IMPROVEMENTS, 30 DAYS PRIOR TO THE COMMENCEMENT OF WORK UNLESS OTHERWISE DIRECTED BY THE CITY. CONSTRUCTION WITHIN EASEMENTS OR ON PUBLIC RIGHT-OF-WAY NECESSITATES NOTICE WHETHER ADJACENT TO OR LOCATED ON THE ADJOINING PROPERTY. FAILURE TO PROVIDE THE MINIMUM NOTIFICATION TIME WILL RESULT IN A SUSPENSION OF WORK.

NO WORK CAN BE DONE ON PRIVATE PROPERTY WITHOUT EXPRESS PERMISSION FROM PROPERTY OWNER(S).

GENERAL PROJECT NOTES

PROJECT DESCRIPTION

THIS PROJECT CONSISTS OF A NEW DITCH INSTALLATION, DITCH REGRADING, NEW STORM PIPE AND STRUCTURE INSTALLATION AND STORM PIPE REPLACEMENTS IN SUFFOLK, VA TO RELIEVE FLOODING CONCERNS AT THE INTERSECTION OF DRIVER LANE AND KINGS HIGHWAY. THE DITCH WILL BE INSTALLED WITHIN AN EXISTING EASEMENT ON PRIVATE PROPERTY DIRECTLY ADJACENT TO AN EXISTING DITCH. THE PROPOSED DITCH WILL CONNECT THE EXISTING NORTHERN AND SOUTHERN SYSTEMS. THE PARCEL LINES, ROADWAYS, UTILITIES, AND ELEVATION DATA SHOWN ARE APPROXIMATE ACCORDING TO GIS.

THE PROJECT AREA IS APPROXIMATELY 113,700 SF / 2.610 ACRES (NO NET INCREASE IN IMPERVIOUS AREA). THE PROPOSED NEW STORM PIPE WILL BE INSTALLED ABOVE EXISTING UTILITIES IN THE DRIVER LANE AND KINGS HIGHWAY INTERSECTION. TEST HOLES AND SURVEY WILL BE REQUIRED TO CONFIRM CONFLICTS AND NECESSARY COORDINATION. ANTICIPATED UTILITIES THAT THE PROPOSED STORM PIPE WILL CROSS INCLUDE BUT ARE NOT LIMITED TO: POWER, COMMUNICATION, AND SEWER MAIN.

EXISTING SITE CONDITIONS AND GENERAL NOTES

1. THE EXISTING SITE PROJECT LIMITS OF CONSTRUCTION CONSIST OF STORM PIPE AND STRUCTURE INSTALLATION ON PRIVATE PROPERTY PARCELS, CITY OWNED PROPERTY, AND IN THE RIGHT OF WAY ADJACENT TO PRIVATE PROPERTY PARCELS.
2. THERE ARE EXISTING STORM INLET STRUCTURES AND ASSOCIATED PIPES LOCATED ADJACENT TO THE PROPOSED PIPE INSTALLATION LOCATION. THESE STORM STRUCTURES SHALL BE PROTECTED FROM SEDIMENT DURING THE DURATION OF CONSTRUCTION ACTIVITIES.
3. PRIOR TO CONSTRUCTION OR EXCAVATION, CONTRACTOR WILL BE RESPONSIBLE FOR LOCATING ALL UNDERGROUND UTILITIES (PUBLIC OR PRIVATE) THAT MAY EXIST OR CROSS THROUGH THE AREA OF CONSTRUCTION WHETHER OR NOT THEY ARE SHOWN ON THESE PLANS. BEFORE DIGGING, TO AVOID THE UTILITIES, CONTRACTOR SHALL CALL "MISS UTILITY OF VIRGINIA" AT "811". CONTRACTOR TO BE RESPONSIBLE FOR REPAIR TO ALL DAMAGED UTILITIES AT HIS EXPENSE. THE LOCATIONS OF EXISTING AND/OR PROPOSED UTILITY LOCATIONS SHOWN ON THE DRAWINGS ARE APPROXIMATE, BASED ON CURRENT RECORDS AND PRELIMINARY FIELD INVESTIGATIONS. CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING ALL EXISTING UTILITIES PRIOR TO COMPLETING ANY REHAB OR REPLACEMENT WORK.
4. THIS PLAN DOES NOT GUARANTEE THE EXISTENCE, NON-EXISTENCE, SIZE, TYPE, LOCATION, ALIGNMENT OR DEPTH OF ANY OR ALL UNDERGROUND UTILITIES OR OTHER FACILITIES. CONTRACTOR SHALL PERFORM WHATEVER TEST EXCAVATION OR OTHER INVESTIGATION IS NECESSARY TO VERIFY TIE-IN INVERTS, LOCATIONS AND CLEARANCES, AND SHALL REPORT IMMEDIATELY ANY DISCREPANCIES TO THE OWNER. UTILITY COMPANIES SHALL BE NOTIFIED 48 HOURS IN ADVANCE OF ANY EXCAVATION IN THE PROXIMITY OF THEIR UTILITIES.
5. ALL CONSTRUCTION METHODS AND MATERIALS SHALL CONFORM WITH THE CURRENT SPECIFICATIONS AND STANDARDS OF THE CITY OF SUFFOLK, VA. PUBLIC FACILITIES MANUAL, HRPDC 6TH EDITION HAMPTON ROADS REGIONAL CONSTRUCTION STANDARDS, AND THE CURRENT VDOT ROAD AND BRIDGE SPECIFICATIONS AND STANDARDS. REFERENCE TO VDOT SHALL MEAN THE CURRENT STANDARDS AND/OR SPECIFICATIONS OF VDOT.
6. ALL CONCRETE TO BE MINIMUM CLASS A-3 AIR ENTRAINED (3000 P.S.I.).
7. CONTRACTOR SHALL, AT ALL TIMES, COMPLY WITH ALL OSHA AND STATE SAFETY ORDERS.
8. NOTES AND DETAILS ON DRAWINGS SHALL TAKE PRECEDENCE OVER THESE GENERAL NOTES.
9. DIMENSIONS TAKE PRECEDENCE OVER SCALE.
10. CONTRACTOR SHALL BE RESPONSIBLE FOR REPLACING WITH MATCHING MATERIALS ANY PAVEMENT, DRIVEWAY, WALKS, CURBS, TRAFFIC SIGNAL DEVICES, PAVEMENT MARKINGS, ETC. THAT MAY BE CUT, OR THAT ARE DAMAGED DURING CONSTRUCTION AT HIS OWN EXPENSE.
11. THE CONSTRUCTION SITE, ADJACENT AREAS, AND RIGHT-OF-WAYS SHALL BE KEPT CLEAN AND CLEAR OF CONSTRUCTION DEBRIS AT ALL TIMES.
12. CONTACT RIGHT OF WAYS OR THE APPROPRIATE CONTACT IF ANY PART OF THE ROAD IS BLOCKED OR CLOSED THAT COULD PREVENT EMERGENCY VEHICLE ACCESS AND WHEN ANY FIRE HYDRANTS WILL POSSIBLY BE PLACED OUT OF SERVICE.

CONSTRUCTION SEQUENCE

BEFORE SITE DEMOLITION OR CLEARING AND GRADING CAN BEGIN, EROSION AND SEDIMENT CONTROL MEASURES ARE TO BE IN PLACE. THE PRIMARY E&SC MEASURES THAT WILL BE UTILIZED DURING CONSTRUCTION INCLUDE: SILT FENCE, INLET PROTECTION, OUTLET PROTECTION, BLANKETS AND MATTING, AND TEMPORARY AND PERMANENT SEEDING.

IN GENERAL, CONSTRUCTION WILL BE SEQUENCED SO THAT GRADING OPERATIONS CAN BEGIN AND END AS QUICKLY AS POSSIBLE. SEDIMENT TRAPPING MEASURES WILL BE INSTALLED AS A FIRST STEP IN GRADING. TEMPORARY SEEDING OR OTHER STABILIZATION WILL FOLLOW IMMEDIATELY AFTER GRADING. AFTER ACHIEVING ADEQUATE STABILIZATION, THE TEMPORARY E&S CONTROLS WILL BE CLEANED AND REMOVED.

CONSTRUCTION WILL BE COMPLETED IN TWO PHASES:

PHASE I:
INSTALLATION OF NEW STORM STRUCTURES AND PIPES FROM A1-A4, INSTALLATION OF LARGER STORM PIPES A5-A10, INSTALLATION OF NEW STORM DITCH, AND REGRADING OF EXISTING STORM DITCHES. COORDINATE WITH UTILITIES IF ANY RELOCATION IS REQUIRED. THIS WORK IS SHOWN ON SHEETS C-101 TO C-102.

PHASE II:
- INSTALLATION OF LARGER STORM PIPES B1-B5 AND REGRADING OF ASSOCIATED DITCHES.THIS WORK IS SHOWN ON SHEET C-102.

THE FOLLOWING GENERAL SEQUENCE OF CONSTRUCTION IS PROPOSED FOR EACH PHASE:

1. SUBMIT AND OBTAIN ALL APPLICABLE PERMITS AND FORMS INCLUDING RIGHT OF ENTRY ONTO PRIVATE PROPERTY. CONTACT APPLICABLE UTILITY COMPANIES AND COORDINATE UTILITY RELOCATION/REMOVAL AS APPLICABLE.
2. DO NOT INITIATE ANY LAND DISTURBING ACTIVITY UNTIL AUTHORIZED TO PROCEED BY OWNER.
3. COORDINATE MOBILIZATION AND JOB SITE ACCESS WITH OWNER'S REPRESENTATIVE AND CITY OF SUFFOLK DEPARTMENT OF PUBLIC WORKS.
4. CONTRACTOR SHALL CONTACT PUBLIC WORKS AT (757) 514-4355 (48 HOUR NOTICE) PRIOR TO ANY LAND DISTURBING ACTIVITY (INCLUDING DEMOLITION) SO THAT A PRECONSTRUCTION CONFERENCE CAN BE SCHEDULED.
5. CONTRACTOR IS RESPONSIBLE FOR CLEANLINESS OF THE ROADWAY AND ANY DAMAGE TO EXISTING PAVEMENT, UNPAVED RIGHT OF WAY, AND EXISTING STRUCTURES TO REMAIN.
6. INSTALL SILT FENCE AND INLET PROTECTION ON EXISTING STRUCTURES. LIMITED DEMOLITION AND CLEARING IS ALLOWED TO ESTABLISH A PERIMETER FOR E&SC MEASURES. MAINTAIN E&SC MEASURES THROUGHOUT THE PROJECT.
7. BEGIN DEMOLITION AND TRENCHING FOR PIPE INSTALLATION. PROVIDE CLEAN WATER BYPASS AROUND ACTIVE WORK AREAS.
8. TEMPORARY SEED ALL DENUDED AREAS THAT WILL REMAIN DORMANT FOR 14 DAYS OR MORE, WITHIN 7 DAYS.
9. INSTALL PIPE, WORKING FROM DOWNSTREAM TO UPSTREAM. DEWATERING FLOWS MUST BE FILTERED PRIOR TO DISCHARGE. ANY UTILITY WORK TO BE PERFORMED BY THE CONTRACTOR SHALL BE COORDINATED WITH THE OWNERS AND MINIMIZE DISTURBANCE TO PROPERTY OWNERS.
10. REPLACE CURB, SIDEWALK, AND PAVEMENT WHERE REMOVED OR DAMAGED.
11. MILL AND OVERLAY ASPHALT PAVEMENT AS SHOWN.
12. PROMPTLY STABILIZE AREAS TO BE VEGETATED AS THEY ARE BROUGHT TO FINAL GRADE. PLACE TOPSOIL ON ALL SEEDED AREAS. SEED AND MULCH ALL DENUDED AREAS.
13. REPAIR ANY INADVERTENT EROSION AND REMOVE ANY INADVERTENT SEDIMENTATION.
14. CLEAN ALL STORM PIPES AND STRUCTURES WITHIN THE PROJECT AREA TO CLEAR OUT SETTLED SEDIMENT.
15. REMOVE ALL TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES IN ACCORDANCE WITH THE LATEST EDITION OF THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK. DO NOT REMOVE EROSION CONTROL MEASURES UNTIL THE ENTIRE SITE HAS BEEN PERMANENTLY STABILIZED.

OFF-SITE AREAS

THERE WILL BE NO DISTURBANCE IMPACTS TO ADJACENT PROPERTIES NOT SHOWN WITHIN THE LIMITS OF CONSTRUCTION. DISRUPTION OF UTILITY SERVICE TO THE ADJACENT PARCELS WILL BE AVOIDED AS MUCH AS POSSIBLE.

VICINITY MAP
SCALE: 1" = 2,000'

DRAWING INDEX

DRAWING	TITLE
C-001	COVER SHEET
C-002	OVERALL LAYOUT
C-101	PHASE I SITE PLAN
C-102	PHASE I AND II SITE PLANS
C-201	NOTES AND DETAILS

OWNER:
CITY OF SUFFOLK
PUBLIC WORKS ENGINEERING
442 W. WASHINGTON ST.
SUFFOLK, VIRGINIA 23434
PHONE: (757) 514-7678
CONTACT: ERIN ROUNTREE

ENGINEER:
TIMMONS GROUP
2901 S. LYNNHAVEN ROAD
SUITE 200
VIRGINIA BEACH, VIRGINIA 23452
PHONE: (757) 213-6662
FAX: (757) 340-1415
CONTACT: LIZ SCHEESSELE, PE, CFM, ENV SP

THIS DRAWING PREPARED AT THE
HAMPTON ROADS OFFICE
2901 South Lynnhaven Road, Suite 200 | Virginia Beach, VA 23452
TEL 757.213.6679 FAX 757.340.1415 www.timmons.com

YOUR VISION ACHIEVED THROUGH OURS.

REVISION DESCRIPTION

DATE

DATE: 8/10/21
DRAWN BY: A. JOHNSON
DESIGNED BY: D. DUNCAN
CHECKED BY: L. SCHEESSELE
SCALE: NTS

TIMMONS GROUP

DRIVER LANE DRAINAGE STUDY
SUFFOLK, VIRGINIA
COVER SHEET

JOB NO. 43134.013
SHEET NO. C-001

S:\108-43134-Suffolk_Env_ASC\013-108-Driver_Lane\DWG\Sheet\CD\43134.013-108-C-001-COVR.dwg | Plotted on 8/9/2021 12:37 PM | by Amanda Johnson

TIMMONS GROUP

YOUR VISION ACHIEVED THROUGH OURS.

THIS DRAWING PREPARED AT THE
HAMPTON ROADS OFFICE
2901 South Lynnhaven Road, Suite 200 | Virginia Beach, VA 23452
TEL 757.213.6679 FAX 757.340.1415 www.timmons.com

DRIVER LANE DRAINAGE STUDY

SUFFOLK, VIRGINIA

OVERALL LAYOUT

SHEET NO.	C-002
JOB NO.	43134.013
SCALE	1" = 80'
CHECKED BY	L. SCHEESSELE
DESIGNED BY	D. DUNCAN
DRAWN BY	A. JOHNSON
DATE	8/10/21

DATE	REVISION DESCRIPTION

LEGEND

- PAVEMENT PATCH
- DRIVEWAY REPLACEMENT
- LIMITS OF CONSTRUCTION
- TOP OF BANK
- BOTTOM OF BANK
- DITCH CENTERLINE
- SF — SILT FENCE
- IP — INLET PROTECTION
- TS PS — TEMPORARY AND PERMANENT SEEDING

DITCH ANNOTATION LEGEND
L= LENGTH
D= DEPTH
T= TOP WIDTH
B= BOTTOM WIDTH
S= SIDE SLOPE

GIS DATA NOTES:

THIS DRAWING IS NEITHER A LEGALLY RECORDED MAP NOR A SURVEY AND IS NOT INTENDED TO BE USED AS SUCH. THE INFORMATION DISPLAYED IS A COMPILATION OF RECORDS, INFORMATION, AND DATA OBTAINED FROM VARIOUS SOURCES, INCLUDING THE CITY OF SUFFOLK, WHICH IS NOT RESPONSIBLE FOR ITS ACCURACY OR TIMELINESS.

THE CONTOURS, EXISTING SITE FEATURES, PARCEL INFORMATION, STRUCTURES, AND ANY OTHER DISPLAYED ITEMS ON THIS SITE PLAN ARE APPROXIMATED AS DISPLAYED.

CONTRACTOR SHALL FIELD VERIFY ALL EXISTING SITE CONDITIONS TO INCLUDE BUT NOT LIMITED TO UTILITIES, STRUCTURES, GRADES AND ANY OTHER ITEMS WITHIN THE PROJECT LIMITS OF CONSTRUCTION.

PROFILE NOTES:

EXISTING UTILITY LOCATIONS AND DEPTHS SHOWN ARE APPROXIMATED BASED ON FIELD MEASUREMENTS AND GIS LIDAR. THIS PLAN DOES NOT GUARANTEE THE EXISTENCE OR NON-EXISTENCE, SIZE, TYPE, ALIGNMENT, OR DEPTH OF ANY OR ALL UNDERGROUND UTILITIES OR OTHER FACILITIES.

TREE PROTECTION:
INSTALL TREE PROTECTION AROUND ANY EXISTING VEGETATION TO REMAIN WITHIN THE VICINITY OF THE PROJECT.

NANSEMOND PKWY
KINGS HWY
15" RCP
PROPERTY LINE
ROW LINE
W
POTENTIAL WATER MAIN CONFLICT
INV 10.1'
A9: 207' OF 42" RCP @ 0.34%
DI 4
TOP 4.42
INV IN 10.80 (A8)
INV OUT 10.80 (A9)
A8: 18' OF 42" RCP @ 0.57%
INV 10.9'
TRAPEZOID DITCH
L = 96 LF
D = 3.5'
T = 13 LF
B = 4 LF
S = 1.3:1
INV 11.1'
A7: 44' OF 36" RCP @ 0.90%
INV 11.3'
MG INV 11.5'
MG INV 14.75'
TS PS
TS/PS IN ALL DISTURBED PERVIOUS AREAS (TYP)
TRAPEZOID DITCH
L = 312 LF
D = 3.5'
T = 11'
B = 2'
S = 1.3:1
INV 8.2'
A10: 42' OF 42" RCP @ 0.24%
INV 8.1'
SF
TRAPEZOID DITCH
L = 266 LF
D = 3'
T = 11 LF
B= 2 LF
S = 1.5:1
DITCH CONNECTS TO EXISTING WETLAND AREA
MG INV 4.1'
TRAPEZOID DITCH
L = 526 LF
D = 3'
T = 10 LF
B = 2 LF
S = 1.3:1
TRAPEZOID DITCH
LENGTH = 503 LF
DEPTH = 3'
T = 11 LF
B = 2 LF
S = 1.5:1
TRAPEZOID DITCH
L = 525 LF
D = 3'
T = 12 LF
B = 3 LF
S = 1.5:1
MATCH LINE 1
INV 12.1'
INV 12'
SCALE 1"=40'
0 40' 80'

THIS DRAWING PREPARED AT THE
HAMPTON ROADS OFFICE
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YOUR VISION ACHIEVED THROUGH OURS.

TIMMONS GROUP

REVISION DESCRIPTION	DATE

DRIVER LANE DRAINAGE STUDY
SUFFOLK, VIRGINIA
PHASE I SITE PLAN

DATE: 8/10/21
DRAWN BY: A. JOHNSON
DESIGNED BY: D. DUNCAN
CHECKED BY: L. SCHEESSELE
SCALE: 1" = 40'
JOB NO.: 43134.013
SHEET NO.: C-101

S:\108\43134-Suffolk_Env_ASC\013-108-Driver_Lane\DWG\Sheet\CD\43134-013-108-C-101-SITE.dwg | Plotted on 8/9/2021 10:40 AM | by Amanda Johnson

LEGEND

- PAVEMENT PATCH
- LIMITS OF CONSTRUCTION
- TOP OF BANK
- BOTTOM OF BANK
- DITCH CENTERLINE
- PHASE II WORK
- SF — SILT FENCE
- IP — INLET PROTECTION
- TS PS — TEMPORARY AND PERMANENT SEEDING

GIS DATA NOTES:

THIS DRAWING IS NEITHER A LEGALLY RECORDED MAP NOR A SURVEY AND IS NOT INTENDED TO BE USED AS SUCH. THE INFORMATION DISPLAYED IS A COMPILATION OF RECORDS, INFORMATION, AND DATA OBTAINED FROM VARIOUS SOURCES, INCLUDING THE CITY OF SUFFOLK, WHICH IS NOT RESPONSIBLE FOR ITS ACCURACY OR TIMELINESS.

THE CONTOURS, EXISTING SITE FEATURES, PARCEL INFORMATION, STRUCTURES, AND ANY OTHER DISPLAYED ITEMS ON THIS SITE PLAN ARE APPROXIMATED AS DISPLAYED.

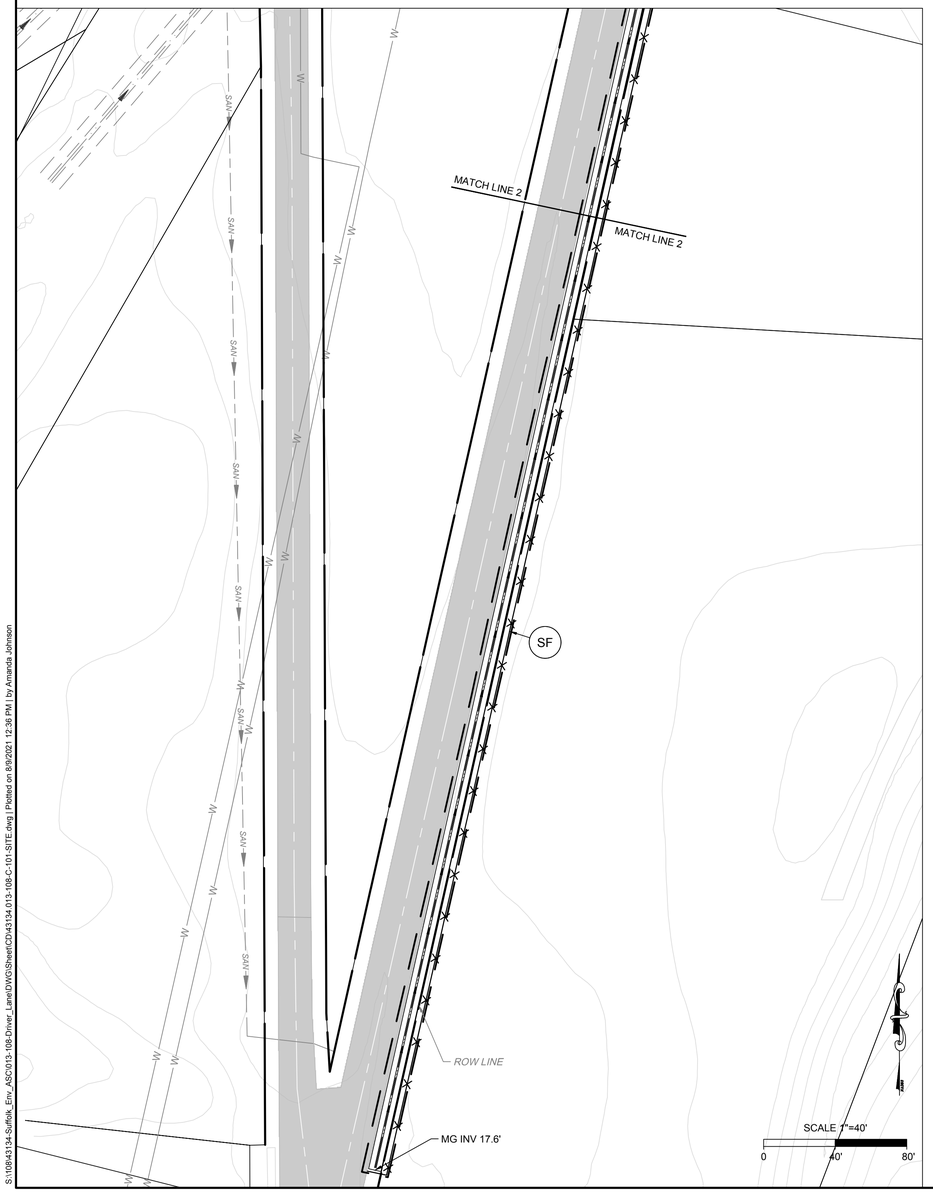
CONTRACTOR SHALL FIELD VERIFY ALL EXISTING SITE CONDITIONS TO INCLUDE BUT NOT LIMITED TO UTILITIES, STRUCTURES, GRADES AND ANY OTHER ITEMS WITHIN THE PROJECT LIMITS OF CONSTRUCTION.

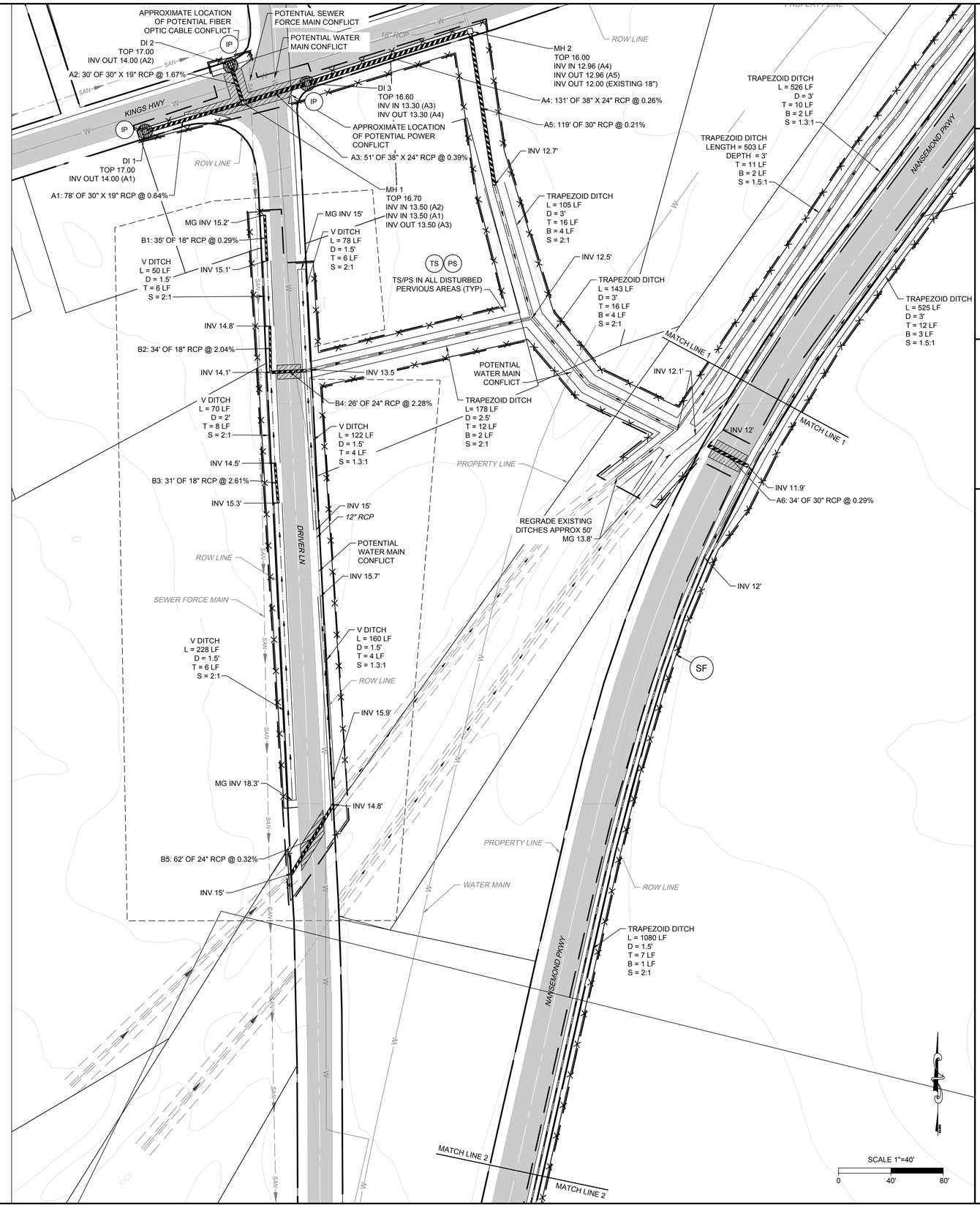
PROFILE NOTES:

EXISTING UTILITY LOCATIONS AND DEPTHS SHOWN ARE APPROXIMATED BASED ON FIELD MEASUREMENTS AND GIS LIDAR. THIS PLAN DOES NOT GUARANTEE THE EXISTENCE OR NON-EXISTENCE, SIZE, TYPE, ALIGNMENT, OR DEPTH OF ANY OR ALL UNDERGROUND UTILITIES OR OTHER FACILITIES.

TREE PROTECTION:
INSTALL TREE PROTECTION AROUND ANY EXISTING VEGETATION TO REMAIN WITHIN THE VICINITY OF THE PROJECT.

DITCH ANNOTATION LEGEND
L= LENGTH
D= DEPTH
T= TOP WIDTH
B= BOTTOM WIDTH
S= SIDE SLOPE





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CHECKED BY	L. SCHEESSELE
SCALE	1" = 40'
JOB NO.	43134.013
SHEET NO.	C-102

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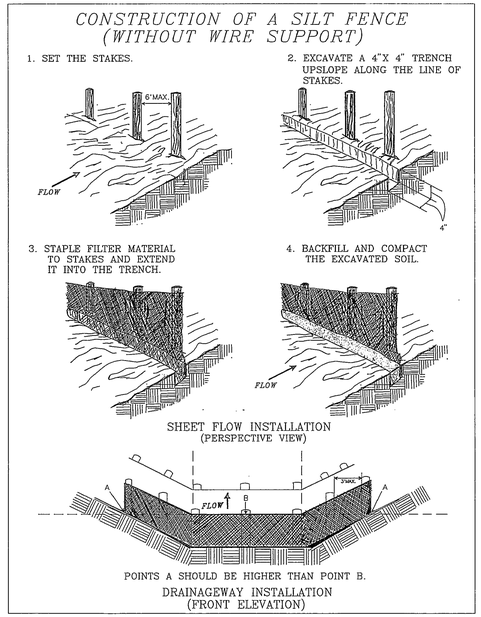
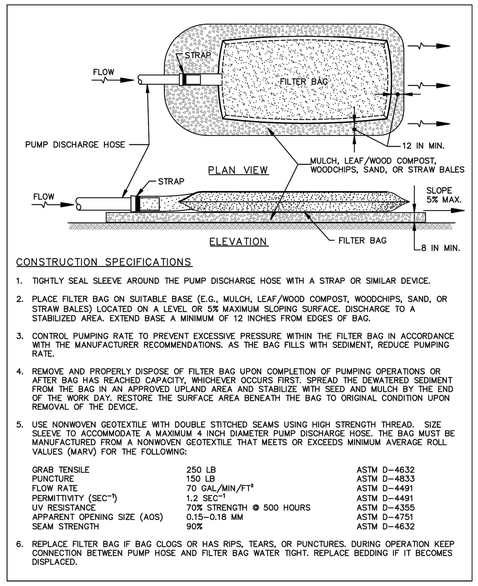


Source: Adapted from Installation of Straw and Fabric Filter Barriers for Sediment Control, Sherwood and Wyant

Plate 3.05-2



CONSTRUCTION SPECIFICATIONS

1. TIGHTLY SEAL SLEEVE AROUND THE PUMP DISCHARGE HOSE WITH A STRAP OR SIMILAR DEVICE.
2. PLACE FILTER BAG ON SUITABLE BASE (E.G., MULCH, LEAF/WOOD COMPOST, WOODCHIPS, SAND, OR STRAW BALES) LOCATED ON A LEVEL OR 5% MAXIMUM SLOPING SURFACE. DISCHARGE TO A STABILIZED AREA. EXTEND BASE A MINIMUM OF 12 INCHES FROM EDGES OF BAG.
3. CONTROL PUMPING RATE TO PREVENT EXCESSIVE PRESSURE WITHIN THE FILTER BAG IN ACCORDANCE WITH THE MANUFACTURER RECOMMENDATIONS. AS THE BAG FILLS WITH SEDIMENT, REDUCE PUMPING RATE.
4. REMOVE AND PROPERLY DISPOSE OF FILTER BAG UPON COMPLETION OF PUMPING OPERATIONS OR AFTER BAG HAS REACHED CAPACITY, WHICHEVER OCCURS FIRST. SPREAD THE DEWATERED SEDIMENT FROM THE BAG IN AN APPROVED UPLAND AREA AND STABILIZE WITH SEED AND MULCH BY THE END OF THE WORK DAY. RESTORE THE SURFACE AREA BENEATH THE BAG TO ORIGINAL CONDITION UPON REMOVAL OF THE DEVICE.
5. USE NONWOVEN GEOTEXTILE WITH DOUBLE STITCHED SEAMS USING HIGH STRENGTH THREAD. SIZE SLEEVE TO ACCOMMODATE A MAXIMUM 4 INCH DIAMETER PUMP DISCHARGE HOSE. THE BAG MUST BE MANUFACTURED FROM A NONWOVEN GEOTEXTILE THAT MEETS OR EXCEEDS MINIMUM AVERAGE ROLL VALUES (MARV) FOR THE FOLLOWING:

GRAB TENSILE	250 LB	ASTM D-4632
PUNCTURE	150 LB	ASTM D-4833
FLOW RATE	70 GAL/MIN/FT²	ASTM D-4491
PERMITTIVITY (SEC⁻¹)	1.2 SEC⁻¹	ASTM D-4491
UV RESISTANCE	70% STRENGTH @ 500 HOURS	ASTM D-4355
APPARENT OPENING SIZE (AOS)	0.15–0.18 MM	ASTM D-4751
SEAM STRENGTH	90%	ASTM D-4632

6. REPLACE FILTER BAG IF BAG CLOGS OR HAS RIPS, TEARS, OR PUNCTURES. DURING OPERATION KEEP CONNECTION BETWEEN PUMP HOSE AND FILTER BAG WATER TIGHT. REPLACE BEDDING IF IT BECOMES DISPLACED.

TABLE 3.31-B
(Revised June 2003)
TEMPORARY SEEDING SPECIFICATIONS
QUICK REFERENCE FOR ALL REGIONS

SEED		
APPLICATION DATES	SPECIES	APPLICATION RATES
Sept. 1 - Feb. 15	50/50 Mix of Annual Ryegrass (lolium multi-florum) & Cereal (Winter) Rye (Secale cereale)	50 -100 (lbs/acre)
Feb. 16 - Apr. 30	Annual Ryegrass (lolium multi-florum)	60 - 100 (lbs/acre)
May 1 - Aug. 31	German Millet	50 (lbs/acre)

FERTILIZER & LIME

- Apply 10-10-10 **fertilizer** at a rate of 450 lbs. / acre (or 10 lbs. / 1,000 sq. ft.)
- Apply **Pulverized Agricultural Limestone** at a rate of 2 tons/acre (or 90 lbs. / 1,000 sq. ft.)

NOTE:
1 - A soil test is necessary to determine the actual amount of lime required to adjust the soil pH of site.
2 - Incorporate the lime and fertilizer into the top 4 – 6 inches of the soil by disking or by other means.
3 - When applying Slowly Available Nitrogen, use rates available in Erosion & Sediment Control Technical Bulletin # 4, 2003 Nutrient Management for Development Sites at http://www.dcr.state.va.us/sw/e&s.htm#pubs

TABLE 3.32-E
(Revised June 2003)
PERMANENT SEEDING SPECIFICATIONS FOR COASTAL PLAIN AREA

SEED[1]		
LAND USE	SPECIES	APPLICATION RATES
Minimum Care Lawn (Commercial or Residential)	Tall Fescue[1] or Bermudagrass[1]	175 - 200 lbs. 75 lbs.
High-Maintenance Lawn	Tall Fescue[1] or Bermudagrass[1] (seed) or Bermudagrass[1] (by other vegetative establishment method, see Std. & Spec. 3.34)	200-250 lbs. 40 lbs. (unhulled) 30 lbs. (hulled)
General Slope (3:1 or less)	Tall Fescue[1] Red Top Grass or Creeping Red Fescue Seasonal Nurse Crop[2]	128 lbs. 2 lbs. 20 lbs. TOTAL: 150 lbs.
Low-Maintenance Slope (Steeper than 3:1)	Tall Fescue[1] Bermudagrass[1] Red Top Grass or Creeping Red Fescue Seasonal Nurse Crop[2] Sericea Lespedeza[3]	93-108 lbs. 0-15 lbs. 2 lbs. 20 lbs. 20 lbs. TOTAL: 150 lbs.

1 - When selecting varieties of turfgrass, use the Virginia Crop improvement Association (VCIA) recommended turfgrass variety list. Quality seed will bear a label indicating that they are approved by VCIA. A current turfgrass variety list is available at the local County Extension office or through VCIA at 804-746-4884 or at http://sudan.cses.vt.edu/html/Turf/turfpublications/publications2.html

2 - Use seasonal nurse crop in accordance with seeding dates as stated below:

February, March - April	Annual Rye
May 1st - August	Foxtail Millet
September, October - November 15th	Annual Rye
November 16th - January	Winter Rye

3 - May through October, use hulled seed. All other seeding periods, use unhulled seed. If Weeping Lovegrass is used, include in any slope or low maintenance mixture during warmer seeding periods, increase to 30 -40 lbs/acre.

FERTILIZER & LIME

- Apply 10-20-10 **fertilizer** at a rate of **500** lbs. / acre (or 12 lbs. / 1,000 sq. ft.)
- Apply **Pulverized Agricultural Limestone** at a rate of 2 tons/acre (or 90 lbs. / 1,000 sq. ft.)

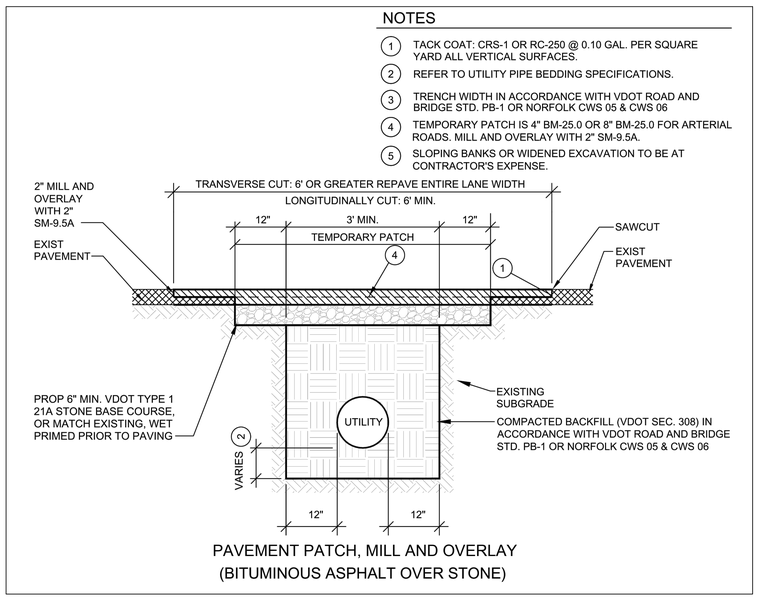
NOTE:
- A soil test is necessary to determine the actual amount of lime required to adjust the soil pH of site.
- Incorporate the lime and fertilizer into the top 4 – 6 inches of the soil by disking or by other means.
- When applying Slowly Available Nitrogen, use rates available in Erosion & Sediment Control Technical Bulletin # 4, 2003 Nutrient Management for Development Sites at http://www.dcr.state.va.us/sw/e&s.htm#pubs

SF SILT FENCE
No Scale

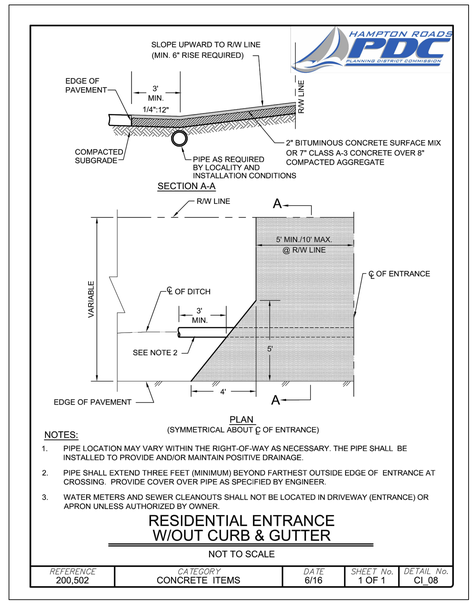
FILTER BAG
No Scale

TS TEMPORARY SEEDING
No Scale

PS PERMANENT SEEDING
No Scale



PAVEMENT PATCH
No Scale



NOTES:
1. PIPE LOCATION MAY VARY WITHIN THE RIGHT-OF-WAY AS NECESSARY. THE PIPE SHALL BE INSTALLED TO PROVIDE AND/OR MAINTAIN POSITIVE DRAINAGE.
2. PIPE SHALL EXTEND THREE FEET (MINIMUM) BEYOND FARTHEST OUTSIDE EDGE OF ENTRANCE AT CROSSING. PROVIDE COVER OVER PIPE AS SPECIFIED BY ENGINEER.
3. WATER METERS AND SEWER CLEANOUTS SHALL NOT BE LOCATED IN DRIVEWAY (ENTRANCE) OR APRON UNLESS AUTHORIZED BY OWNER.

RESIDENTIAL ENTRANCE
W/OUT CURB & GUTTER
NOT TO SCALE

REFERENCE	CATEGORY	DATE	SHEET NO.	DETAIL NO.
200,502	CONCRETE ITEMS	6/16	1 OF 1	CI_08

DRIVEWAY PATCH DETAIL
No Scale

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REVISION DESCRIPTION

DATE

DATE 8/10/21
DRAWN BY A. JOHNSON
DESIGNED BY D. DUNCAN
CHECKED BY L. SCHEESSELE
SCALE NTS

TIMMONS GROUP

DRIVER LANE DRAINAGE STUDY
SUFFOLK, VIRGINIA
NOTES AND DETAILS

JOB NO. 43134.013
SHEET NO. C-201

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 it 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 Driver Drainage Improvements.

Driver is a village, neighborhood, commercial, and historic district in the City of Suffolk. The area has been plagued be recurring flooding and the City plans to upgrade the storm drainage system to alleviate flooding.

The current consultant, Timmons Group, completed a hydrologic & hydraulic study (see Attachment A) followed by a conceptual design (see Attachment G) in 2021. The associated study and concepts provide a detailed description of the project, background, site, analysis, and design. A detailed map of the project area including drainage area and area to be protected by this project can be found in Appendix A of the attached study.

The selected alternative includes regrading existing ditches, upsizing existing pipes, and installing new pipes (in the intersection). The new ditch proposed, connecting the intersection with the drainage system along Nansemond Pkwy, is key to redirecting the drainage, as well as regrading the southern system along Nansemond Pkwy to provide a flow path with an appropriate slope, depth, and size. In addition, the intersection required a new storm system and pipe enlargement to accommodate the amount of flooding that currently backs up the intersection. The systems north of Kings Hwy were not touched, as the improvements south of Kings Hwy along Driver Ln and Nansemond Pkwy alleviated flooding in the intersection. As part of the design process, the City plans to modify the recommendation slightly to pipe a part of the system that was recommended to be a wide ditch in the study.

The City of Suffolk 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 the City's project public meeting process, where we host a public meeting as close to the project site as possible with project visuals to inform the citizens and seek public input, and additional, specific outreach as needed.

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 Suffolk – 98,537 est 7/1/2022 as of 2020 Census

U.S. Census Bureau QuickFacts: Suffolk city, Virginia

Identification of any low-income geographic area that will be impacted by the project: the project is located in Census Tract 755.02, Suffolk City, VA. The median household income for Census Tract 755.02 is not lower than the Suffolk median household income.

The estimate number of residents impacted by the project: 9,249 (census tracts 755.02, 752.07, and 752.08) Census Tract 752.07, Suffolk, VA - Profile data - Census Reporter

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: The majority of the project area is Flood Zone X. However, the system outfall improvements will be in either Zone X (shaded) or the AE Zone, last mapped effective date 8/3/2015. See *Attachment B* for the FIRMette of the project area.

Information on the dates of past flood events and the amount of damage sustained: Driver Ln and Kings Hwy intersection which has seen flooding after several intense rain events in recent years, particularly after the rainfall on November 12, 2020. The City has received several complaints on the flooding in this area and throughout portions of Driver Ln and Kings Hwy. Photos and video of site flooding have been provided as *Attachment C.*

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 study performed by Timmons Group and included as *Attachment A* looked at the entire subwatershed areas draining to the ultimate outfall to tidal waters to ensure that the project would have no adverse impacts under various design conditions.

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: $1,960,000

Source of the funds being used: The approved FY23 & FY24 Capital Improvements Program and Plan provides $136,100 and $776,700 respectively in funding for the project. The additional $67,200 will be requested in the FY26 CIP. However, funding from the Citywide Drainage Improvements CIP can be used to cover the remainder of the match in the meantime.

Driver Drainage Improvements
City Council Goal – *Civic Engagement and Responsive City Services*
The project will provide for the design and construction of drainage improvements to reduce flooding in downtown Driver.

FY 23	FY 24	FY 25	FY 26	FY 27	FY 28-32	Total
$136,100	$641,700	$0	$0	$0	$0	$777,800

Operating Costs: The project will not have an operational impact on the City.

Driver Drainage Improvements
City Council Goal – *Civic Engagement and Responsive City Services*
The project will provide for the design and construction of drainage improvements to reduce flooding in downtown Driver.

FY 24	FY 25	FY 26	FY 27	FY 28	FY 29-33	Total
$776,700	$0	$0	$0	$0	$0	$776,700

Operating Costs: The project will not have an operational impact on the City.

Stormwater

Citywide Drainage Improvements

City Council Goal – *Civic Engagement and Responsive City Services*

The project will provide for the design and construction of drainage improvements to relieve flooding across the City. Funding is programmed for drainage studies, pipe and structure rehabilitations, easement acquisitions for improved maintenance capabilities, full drainage designs and construction.

FY 24	FY 25	FY 26	FY 27	FY 28	FY 29-33	Total
$500,000	$500,000	$500,000	$500,000	$500,000	$2,500,000	$5,000,000

Operating Costs: The project will not have an operational impact on the City.

Evidence of Ability to Pay: See Budget Narrative and referenced Attachments

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)

N/A. Total project cost is less than $2 million.

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:

Unified Development Ordinance Article 4- Sec. 31-416.2- Floodplain Overlay District
https://library.municode.com/va/suffolk/codes/unified_development_ordinance?nodeId=SUFFOLK_UNIFIED_DEVELOPMENT_ORDINANCE_ART4ZO_S31-416.2FLOVDIF

Unified Development Ordinance Appendix B- B-15- Flood Prevention Plan
https://library.municode.com/va/suffolk/codes/unified_development_ordinance?nodeId=SUFFOLK_UNIFIED_DEVELOPMENT_ORDINANCE_APXBSURE_B-15FLPRPL

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: 0

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.

This project directly benefits the residents and businesses of the village of Driver, approximately 10% of the population of the City of Suffolk.

Driver is a neighborhood in the City of Suffolk located at the junction of State Route 337, State Route 125, and State Route 627. Originally named Persimmon Orchard, Driver was once located on the now-abandoned Atlantic Coast Line Railroad's line in the former Nansemond County between the former town of Suffolk and the City of Portsmouth, which itself was located in the former Norfolk County. In modern times, as the Hampton Roads area has become largely urbanized all around it, it has been said that Driver is a town "suspended in time." Driver, Suffolk, Virginia - Wikipedia

Driver Historic District is a national historic district located in Suffolk, Virginia. The district encompasses 20 contributing buildings in the crossroads community of Driver in Suffolk. The district includes eight residences, two churches, two school structures, a lodge, an outbuilding, and five commercial structures. They are in a variety of popular 19th and early-20th century architectural styles including Federal, Queen Anne, and Colonial Revival. Notable buildings include the Parker House (1820-1840), Norfolk and Carolina Railroad depot and station master's house (c. 1890), Brannon House (c. 1892), Arthur's Store (c. 1925), Randy's Rods, Driver Variety Store, Beech Grove United Methodist Church, Berea Congregational Christian Church (c. 1891), Dejarnette High School (1926), and Harmony Lodge #149 (1938). Driver Historic District - Wikipedia

The project is included in the DCR-approved City of Suffolk Resilience Plan and is consistent with the mitigation actions identified in the 2022 Hampton Roads Hazard Mitigation Plan.

Exact number of residential structures and commercial structures within the project area: There are 3,163 residential structures (census tracts 755.02, 752.07, and 752.08) Census Tract 752.07, Suffolk, VA - Profile data - Census Reporter and 683 commercial structures in the project area 23435 ZIP Code Profile, Map, Data & Demographics (hometownlocator.com)

ii. Critical Facilities

- If there are critical facilities within the project area, describe each facility. Suffolk Fire and Rescue Station #10 at 4869 Bennetts Pasture Rd., Nansemond River High School at 3301 Nansemond Pkwy., John Yeates Middle School at 4901 Bennetts Pasture Rd.

***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 Plan. The approved FY24 CIP is available at:

www.suffolkva.us/DocumentCenter/View/8095/FY-2024-2033-Planning-Commission-Adopted-Capital-Improvements-Program-and-Plan

Number of relevant staff members:

- **1 Floodplain Administrator**
- **1 Development and Environmental Manager**
- **1 additional Certified Floodplain Manager**
- **4 Civil Engineers**
- **1 Senior Environmental Planner**
- **1 Deputy Emergency Management Coordinator**

ii. Identify relevant software the local government has access to.

Relevant Software: Cityworks, Bluebeam Revu, Microsoft Office Suite, ArcGIS

iii. Explain the local government's capabilities.

Capabilities: The City has engineers and environmental staff in Public Works Engineering and Public Works Operations to manage the design and construction work performed by consultants and contractors, as well as construction inspectors to conduct inspections during each phase of construction.

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*. The project area has an average SVI of 0.8.

***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.

N/A. Total project cost is less than $2 million.

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.

This area experiences frequent flooding due to the old and undersized drainage system. The 2021 Timmons Group study included as *Attachment A* recommended drainage improvements to improve the conditions and prevent flooding. This project includes the construction of stormwater pipes and inlets to support connections to the existing system and ditches to enhance stormwater drainage capacity. The project will address transportation, public and mental health, providing a more secure evacuation route by alleviating flooding among other locations, at the primary intersection in the study area, within the 3-year performance period allowed by the program.

Goal 1. Reduce the frequency and severity of flooding impacts to the project area.

Currently, much of the area floods during the 5-yr 24-hr design storm. Very little of the system has the capacity for the 10-yr storm. See *Attachment 1* for more details.

Goal 2. Improve the quality of life for impacted residents and businesses. Improve transportation network and emergency response, access, and egress by reducing roadway flooding.

The expected results and benefits of the project are in line with the project goals to decrease flooding risk and increase resilience as it relates to emergency response, access and egress. Additional benefits include provision of a neighborhood amenity and decreased financial burden and loss associated with flooding.

Primary benefits provided by the project include: (1) Reduces physical damage to road and building infrastructure from frequent flooding and (2) Reduces loss of service to road infrastructure. Secondary benefits provided by the project include social benefits including more reliable access to the community therefore reducing impacts to the livelihoods of the hundreds of residents in the community.

Project success shall be documented through continued collection of flooding data and citizen reports and comparison with rainfall data to evaluate performance under various storm and tidal conditions. Lack of flooding during an event similar to the 10-year 24-hr 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 Award through construction of the project. This schedule assumes a grant execution date of March 1, 2024. Teams within the Public Works Department regularly provide project progress reports to the Director'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	Anticipated Date of Delivery
Design Scoping	**2 months**	**May 1, 2024**
100% Construction Docs	**12 months**	**May 1, 2025**
Private Utility Relocation & Easement Acquisition	**4 months**	**September 1, 2025**
Bidding and Award	**4 months**	**January 1, 2026**
Construction	**14 months**	**March 1, 2027**

It is anticipated that the City will contract with Timmons Group to develop the design and construction documents. It will take several months to get Timmons Group under contract and is then anticipated to take 1 year to prepare the project to go to bid with the deliverable at that stage being construction and other bid documents. The bid and award process is estimated to take 4 months and will result in the execution of a construction contract. Finally, we estimate that construction can be completed in 14 months with the final deliverables to include the installed system and as-built drawings.

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 drainage analysis and design which will be overseen and managed by City staff in the Public Works Department.

***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.

This project is included in the City of Suffolk DCR-approved Resilience Plan. 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 – Staff Training & Resilience Plan Development (awarded)**
- **Grant Round 3**
  - **Study – Finney Outfall to Nansemond River Drainage Area Study (awarded)**
  - **Study – Kimberly Bridge Feasibility Study (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 drainage analysis 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 and Storm Drainage system. As such it will be maintained by our Road Maintenance division. The Road Maintenance division completes maintenance of closed and open stormwater management systems throughout the City. The division is equipped with maintenance equipment such as vactor trucks, CCTV equipment, ditching maintenance tractors as well as equipment for replacement of structures and pipes. The City also maintains a contract for these maintenance services when assistance from a contractor is necessary. The City has staff that respond to drainage complaints and 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 funds in the road maintenance fund and/or the stormwater utility fund to repair or replace the system that is failing.

The total project cost as identified in the application is for design and 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), Storm system upgrades

Social Vulnerability Index Score, 5 points.

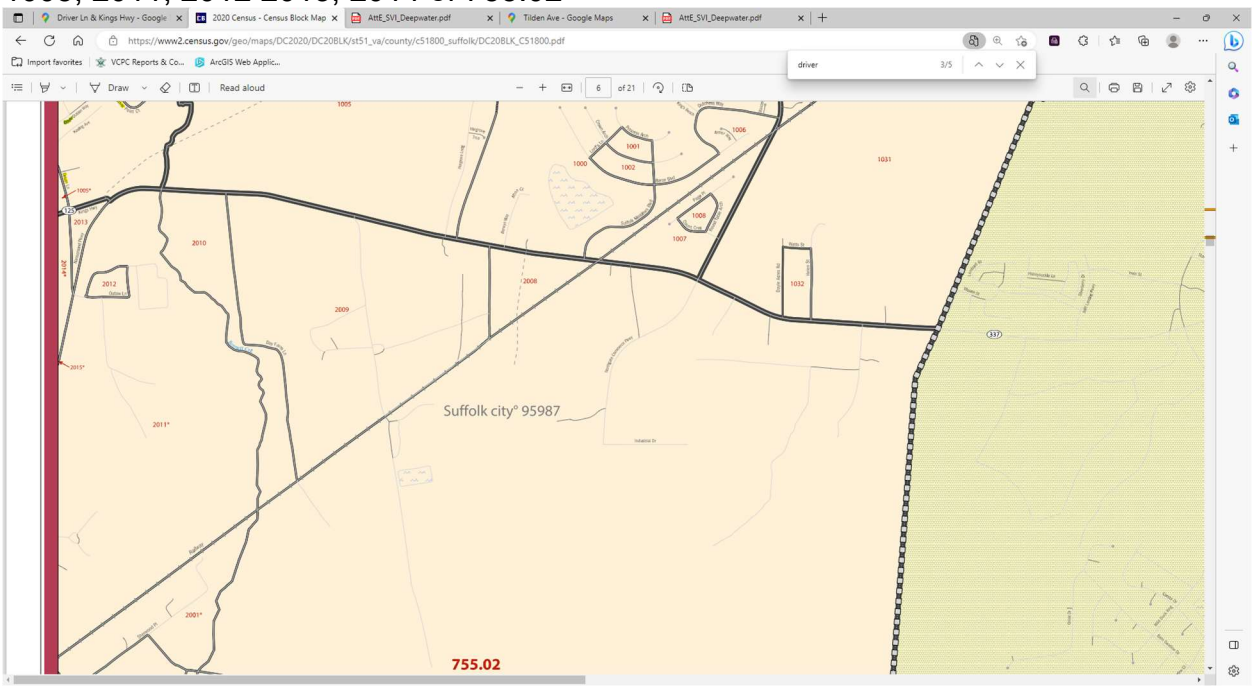
• Moderate Social Vulnerability (0.0 to 1.0) (5)

Average SVI of 0.8.

Community scale of benefits, 30 points.

• More than one census block (30)

1005, 2011, 2012 2013, 2014 of 755.02



Expected lifespan of project, 10 points.
• Over 20 Years (10)

Remedy for NFIP probation or suspension- No, 0 points

Proposed project part of a low-income geographic area- No, 0 points

Proposed project implements a Chesapeake Bay TMDL BMP- No, 0 points

BUDGET NARRATIVE

***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.

$1,960,000

This amount represents the total project cost and represents the costs associated with design and construction and related items. The project construction cost estimate is based on the construction cost opinion developed during the 2021 consultant study (Attachment A) and revised when the concept plan was developed (Attachment G). See *Attachment F*. A contingency for design was added and the cost was projected to FY2025 by incorporating an annual 5% inflation rate. An additional component was added to allow for modifications of the recommended solution to incorporate closed pipes in place of open ditches. Lastly, allotments for easement acquisition and construction inspection were added.

***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.

$980,000

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 funding that the City will provide for the project. The amount requested is 50% of the total cost.

Estimated Funding Request Breakdown

- **Salaries, 0**
- **Fringe Benefits, 0**
- **Travel, 0**
- **Equipment, 0**
- **Supplies, 0**
- **Construction, ~82%, $1,603,826 (Phase I + Phase II + pipe installation)**
- **Contracts, ~15%, $296,174 (design + CEI)**
- **Other Direct Costs, ~3%, $60,000 (easement costs)**

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.

$980,000

The source of these funds is the City CIP. The majority of this funding, $912,800, is already available through prior CIP funding cycles in a dedicated fund for Driver Drainage Improvements, and additional funding will be requested in the FY26 CIP. The City is committed to provide the match required, and funding in the Citywide Drainage Improvements Fund can be used to make up the remainder of the match until the FY26 funding is available.

CAPITAL IMPROVEMENTS PROGRAM & PLAN
STORMWATER FUND
FY 2024 - 2033

Stormwater Fund	5 Year Summary								
Planned Expenditures	Previous Funding	2023-2024	2024-2025	2025-2026	2026-2027	2027-2028	5 Year Subtotal	6-10 Year Subtotal	10 Year Total
Citywide Drainage Improvements	2,170,000	500,000	500,000	500,000	500,000	500,000	2,500,000	2,500,000	5,000,000
Olde Towne Drainage Improvements	956,000	2,224,000	2,446,000	500,000	1,000,000	1,500,000	7,670,000	1,203,000	8,873,000
Oakland Drainage Improvements	500,000	600,000	1,200,000	1,200,000	-	-	3,000,000	-	3,000,000
Wilkins Drive Drainage	-	-	-	-	216,750	783,250	1,000,000	1,000,000	2,000,000
Pughsville Drainage Improvements	4,126,912	1,411,044	-	-	-	-	1,411,044	-	1,411,044
Woodrow South Suffolk Drainage	482,300	-	573,000	500,000	500,000	-	1,573,000	1,000,000	2,573,000
Jefferson Street Drainage	294,000	-	-	-	-	195,000	195,000	1,000,000	1,195,000
First Avenue Drainage	275,000	156,250	468,750	312,500	312,500	-	1,250,000	-	1,250,000
Sadler Heights	-	-	537,500	-	-	-	537,500	-	537,500
Driver Drainage Improvements	136,100	776,700	-	-	-	-	776,700	-	776,700
Downtown Infrastructure Improvements	-	100,000	100,000	100,000	100,000	100,000	500,000	500,000	1,000,000
Total Stormwater Fund		**5,767,994**	**5,825,250**	**3,112,500**	**2,629,250**	**3,078,250**	**20,413,244**	**7,203,000**	**27,616,244**

Stormwater Fund									
Funding Sources	Previous Funding	2023-2024	2024-2025	2025-2026	2026-2027	2027-2028	5 Year Subtotal	6-10 Year Subtotal	10 Year Total
Citywide Drainage Improvements		500,000	500,000	500,000	500,000	500,000			
Wilkins Drive Drainage		-	-	-	-	205,000			
Woodrow South Suffolk Drainage		-	-	87,500	87,500	-			
Jefferson Street Drainage		-	-	-	-	195,000			
First Avenue Drainage		156,250	400,000	312,500	312,500	-			
Driver Drainage Improvements		243,750	-	-	-	-			
Downtown Infrastructure Improvements		100,000	100,000	100,000	100,000	100,000			
Transfer from Stormwater Fund		1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	5,000,000	3,800,000	8,800,000
Olde Towne Drainage Improvements		2,224,000	2,446,000	500,000	1,000,000	1,500,000			
Oakland Drainage Improvements		600,000	1,200,000	1,200,000	-	-			
Wilkins Drive Drainage		-	-	-	216,750	578,250			
Pughsville Drainage Improvements		1,411,044	-	-	-	-			
Woodrow South Suffolk Drainage		-	573,000	412,500	412,500	-			
Jefferson Street Drainage		-	-	-	-	-			
First Avenue Drainage		-	68,750	-	-	-			
Sadler Heights		-	537,500	-	-	-			
Driver Drainage Improvements		532,950	-	-	-	-			
Stormwater Revenue Bonds		4,767,994	4,825,250	2,112,500	1,629,250	2,078,250	15,413,244	3,403,000	18,816,244
Total Stormwater Fund		**5,767,994**	**5,825,250**	**3,112,500**	**2,629,250**	**3,078,250**	**20,413,244**	**7,203,000**	**27,616,244**

https://www.suffolkva.us/DocumentCenter/View/8540/FY-2023-2024-Adopted-Operating--Capital-Budget

Citywide Drainage Improvements Fund

514-82220-3527 - Stormwater Utility Fund, Stormwater Engineering, Citywide Drainage Improvements Fiscal Year: 2024

			Amended Budget	Encumbrances	Expenses	Remaining Balance	% Used	
			$882,048.73	$289,015.08	$24,678.24	$568,355.41	36%	
Account Number	Description	Adopted Budget	Amended Budget	Encumbrances	Expenses	Remaining Balance	Percent Used	Analyze
53850	Construction Contracts	$0.00	$0.00	$0.00	$0.00	$0.00	+++	
53850.100	Construction Contracts Bond Funds	$0.00	$37,305.90	$0.00	$0.00	$37,305.90	0%	
53850.514	Construction Contracts Tr Fr Storm...	$500,000.00	$844,742.83	$289,015.08	$24,678.24	$531,049.51	37%	

See *Attachment E* for the letter and attachments 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.

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: The majority of the project area is Flood Zone X. However, the system outfall improvements will be in either Zone X (shaded) or the AE Zone, last mapped effective date 8/3/2015. See *Attachment B* for the FIRMette of the project area.

Information on the dates of past flood events and the amount of damage sustained: Driver Ln and Kings Hwy intersection which has seen flooding after several intense rain events in recent years, particularly after the rainfall on November 12, 2020. The City has received several complaints on the flooding in this area and throughout portions of Driver Ln and Kings Hwy. Photos and video of site flooding have been provided as *Attachment C.*

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)

N/A. Total project cost is less than $2 million.

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 study performed by Timmons Group and included as *Attachment A* looked at the entire subwatershed areas draining to the ultimate outfall to tidal waters to ensure that the project would have no adverse impacts under various design conditions.

***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 Award through construction of the project. This schedule assumes a grant execution date of March 1, 2024. Teams within the Public Works Department regularly provide project progress reports to the Director'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	Anticipated Date of Delivery
Design Scoping	**2 months**	**May 1, 2024**
100% Construction Docs	**12 months**	**May 1, 2025**
Private Utility Relocation & Easement Acquisition	**4 months**	**September 1, 2025**
Bidding and Award	**4 months**	**January 1, 2026**
Construction	**14 months**	**March 1, 2027**

It is anticipated that the City will contract with Timmons Group to develop the design and construction documents. It will take several months to get Timmons Group under contract and is then anticipated to take 1 year to prepare the project to go to bid with the deliverable at that stage being construction and other bid documents. The bid and award process is estimated to take 4 months and will result in the execution of a construction contract. Finally, we estimate that construction can be completed in 14 months with the final deliverables to include the installed system and as-built drawings.

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 drainage analysis 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: $1,960,000

Source of the funds being used: The approved FY23 & FY24 Capital Improvements Program and Plan provides $136,100 and $776,700 respectively in funding for the project. The additional $67,200 will be requested in the FY26 CIP. However, funding from the Citywide Drainage Improvements CIP can be used to cover the remainder of the match in the meantime.

Driver Drainage Improvements
City Council Goal – *Civic Engagement and Responsive City Services*
The project will provide for the design and construction of drainage improvements to reduce flooding in downtown Driver.

FY 23	FY 24	FY 25	FY 26	FY 27	FY 28-32	Total
$136,100	$641,700	$0	$0	$0	$0	$777,800

Operating Costs: The project will not have an operational impact on the City.

Driver Drainage Improvements
City Council Goal – *Civic Engagement and Responsive City Services*
The project will provide for the design and construction of drainage improvements to reduce flooding in downtown Driver.

FY 24	FY 25	FY 26	FY 27	FY 28	FY 29-33	Total
$776,700	$0	$0	$0	$0	$0	$776,700

Operating Costs: The project will not have an operational impact on the City.

Stormwater

Citywide Drainage Improvements

City Council Goal – *Civic Engagement and Responsive City Services*

The project will provide for the design and construction of drainage improvements to relieve flooding across the City. Funding is programmed for drainage studies, pipe and structure rehabilitations, easement acquisitions for improved maintenance capabilities, full drainage designs and construction.

FY 24	FY 25	FY 26	FY 27	FY 28	FY 29-33	Total
$500,000	$500,000	$500,000	$500,000	$500,000	$2,500,000	$5,000,000

Operating Costs: The project will not have an operational impact on the City.

Evidence of Ability to Pay: See Budget Narrative and referenced Attachments

Signed Pledge Agreement: N/A

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 and Storm Drainage system. As such, it will be maintained by the Road Maintenance division. The Road Maintenance division completes maintenance of closed and open stormwater management systems throughout the City. The division is equipped with maintenance equipment such as vactor trucks, CCTV equipment, ditching maintenance tractors as well as equipment for replacement of structures and pipes. The City also maintains a contract for these maintenance services when assistance from a contractor is necessary. The City has staff that respond to drainage complaints and 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 necessary repairs. Should any portion of the project fail under normal operating conditions within 50 years of project completion, the City will utilize funds in the road maintenance fund and/or the stormwater utility fund to repair or replace the system that is failing.

The total project cost as identified in the application is for design and construction and related costs only. Funding for maintenance is non-fund financed.

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: 0

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.

This project directly benefits the residents and businesses of the village of Driver, approximately 10% of the population of the City of Suffolk.

Driver is a neighborhood in the City of Suffolk located at the junction of State Route 337, State Route 125, and State Route 627. Originally named Persimmon Orchard, Driver was once located on the now-abandoned Atlantic Coast Line Railroad's line in the former Nansemond County between the former town of Suffolk and the City of Portsmouth, which itself was located in the former Norfolk County. In modern times, as the Hampton Roads area has become largely urbanized all around it, it has been said that Driver is a town "suspended in time." Driver, Suffolk, Virginia - Wikipedia

Driver Historic District is a national historic district located in Suffolk, Virginia. The district encompasses 20 contributing buildings in the crossroads community of Driver in Suffolk. The district includes eight residences, two churches, two school structures, a lodge, an outbuilding, and five commercial structures. They are in a variety of popular 19th and early-20th century architectural styles including Federal, Queen Anne, and Colonial Revival. Notable buildings include the Parker House (1820-1840), Norfolk and Carolina Railroad depot and station master's house (c. 1890), Brannon House (c. 1892), Arthur's Store (c. 1925), Randy's Rods, Driver Variety Store, Beech Grove United Methodist Church, Berea Congregational Christian Church (c. 1891), Dejarnette High School (1926), and Harmony Lodge #149 (1938). Driver Historic District - Wikipedia

The project is included in the DCR-approved City of Suffolk Resilience Plan and is consistent with the mitigation actions identified in the 2022 Hampton Roads Hazard Mitigation Plan.