

RESILIENCE PLAN

CITY OF SUFFOLK, VIRGINIA

DRAFT SUBMITTED AUGUST 2022

RESUBMITTED SEPTEMBER 2022

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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 Public 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 history¹. 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 acres³. 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 Carolina⁴. 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 people⁵. In 2020, the city had a population of 92,108 people⁶.

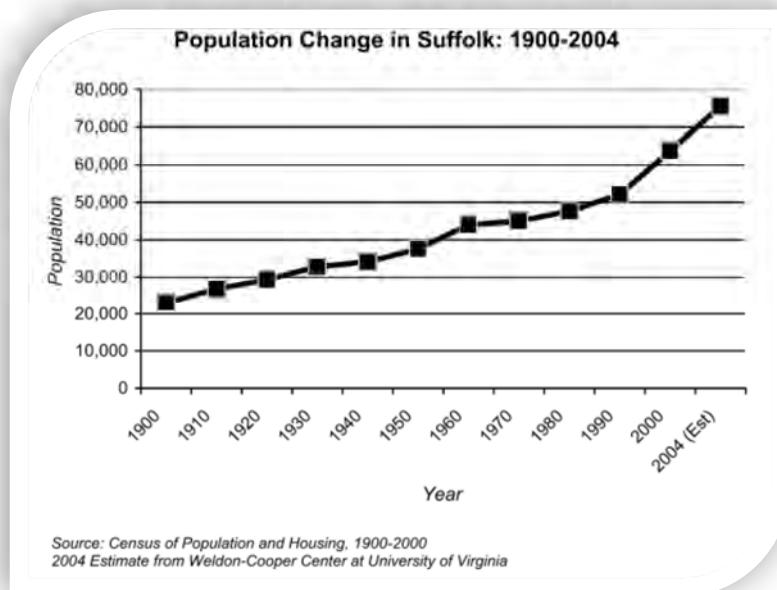


Figure 1: Population Growth in Suffolk from 1900 to 2004

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.

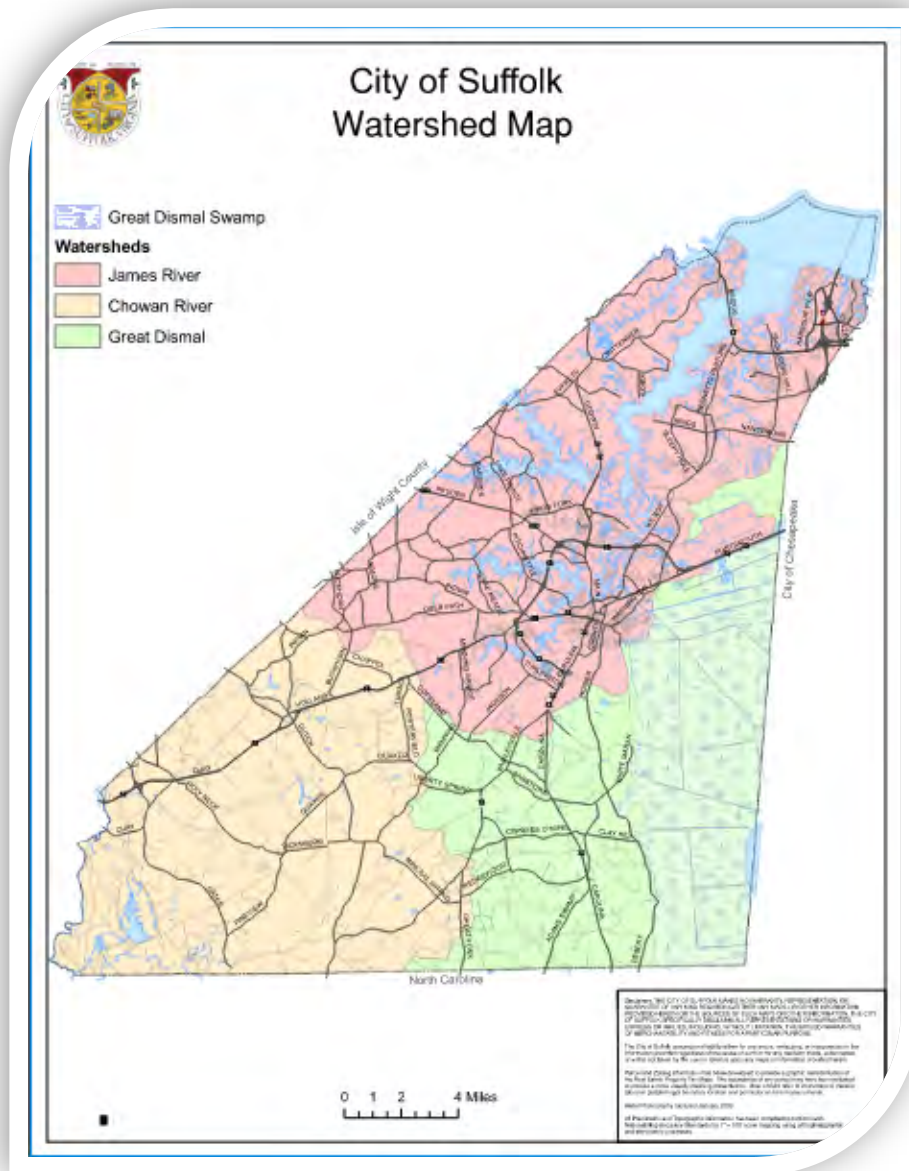


Figure 2: James River, Chowan River, and Dismal Swamp Watersheds

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 according to. 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 listed in the Comprehensive Plan for 2026⁹. See <http://webmap.suffolk-va.net/FemaFloodMap/index.html> for the entirety of the floodplain mapping.

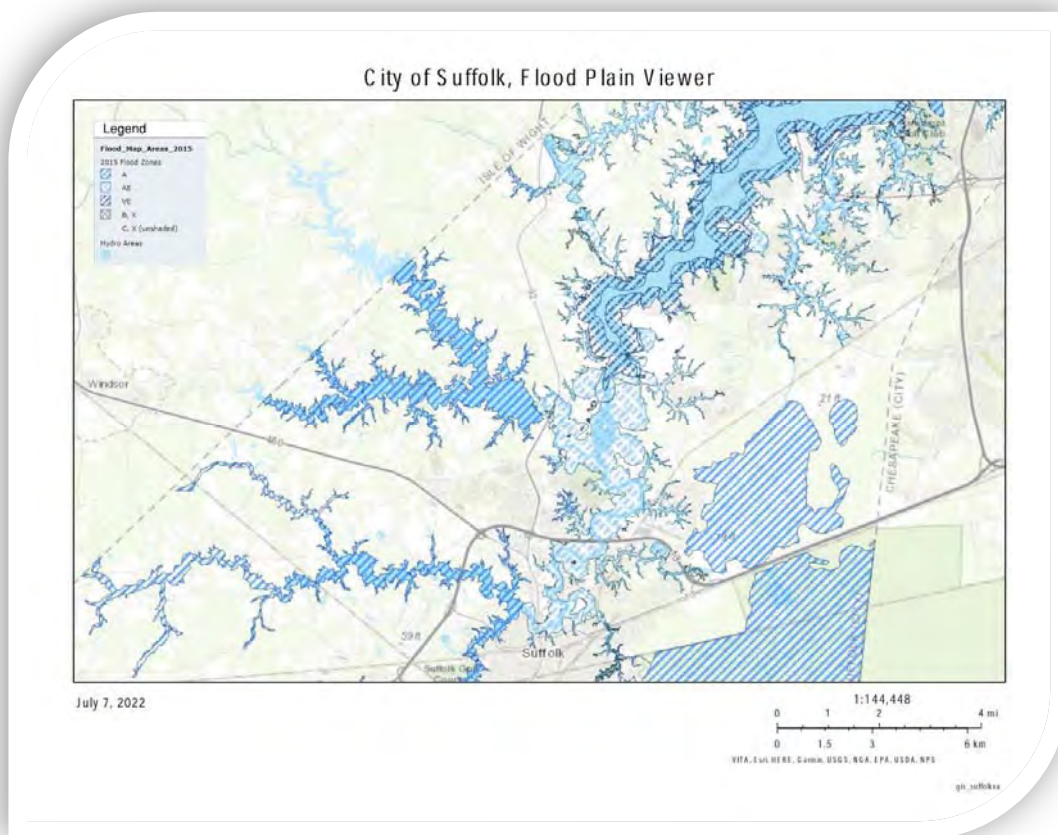


Figure 3: Floodplains in the City of Suffolk

⁹ (Planning C. o., Comprehensive Plan for 2026, 2006)

- 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)

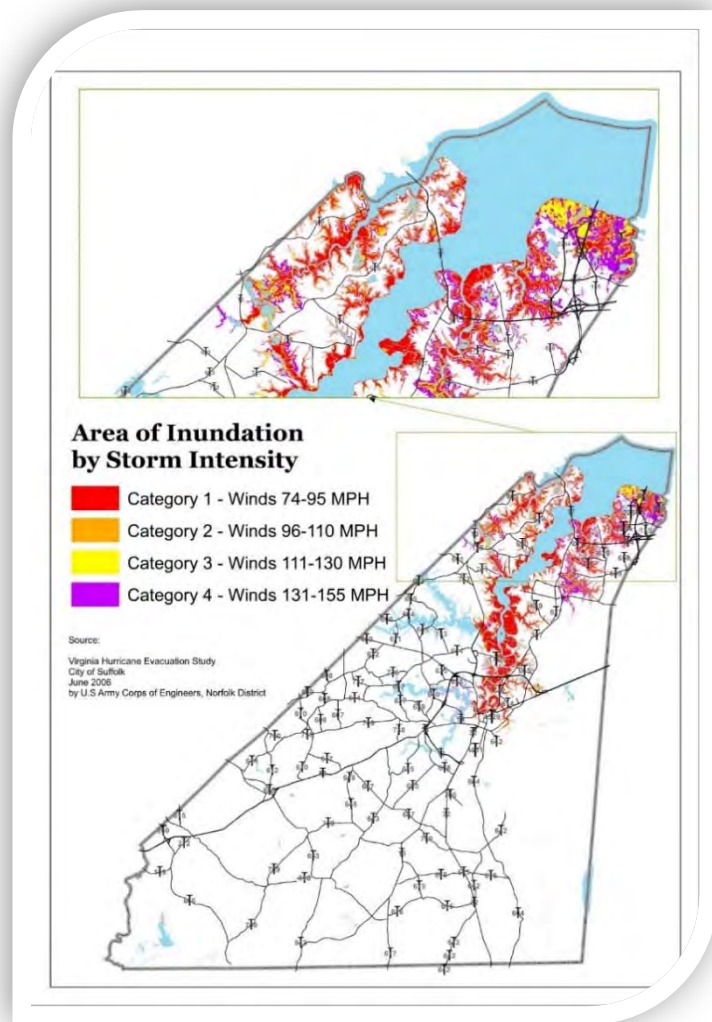


Figure 4: Potential Hurricane Flooding for Suffolk

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 damages¹⁰.

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 wind¹¹. 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 damage¹².

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 time¹³.

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 year¹⁴.

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

¹⁰ (Hampton Roads Planning District Commission, 2017)

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)

erosion as well. While it is ideal to avoid sensitive regions entirely, it is imperative designs for land disturbing activities along the shore incorporate resilience¹⁵.

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.¹⁶

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 line¹⁷.

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 population¹⁸.

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 utilities¹⁹.

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

¹⁵ (Hampton Roads Planning District Commission, 2017)

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)

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 repellent – 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 suppressed²⁰.

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 likely²¹.

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

²⁰ (Hampton Roads Planning District Commission, 2017)

²¹ (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]

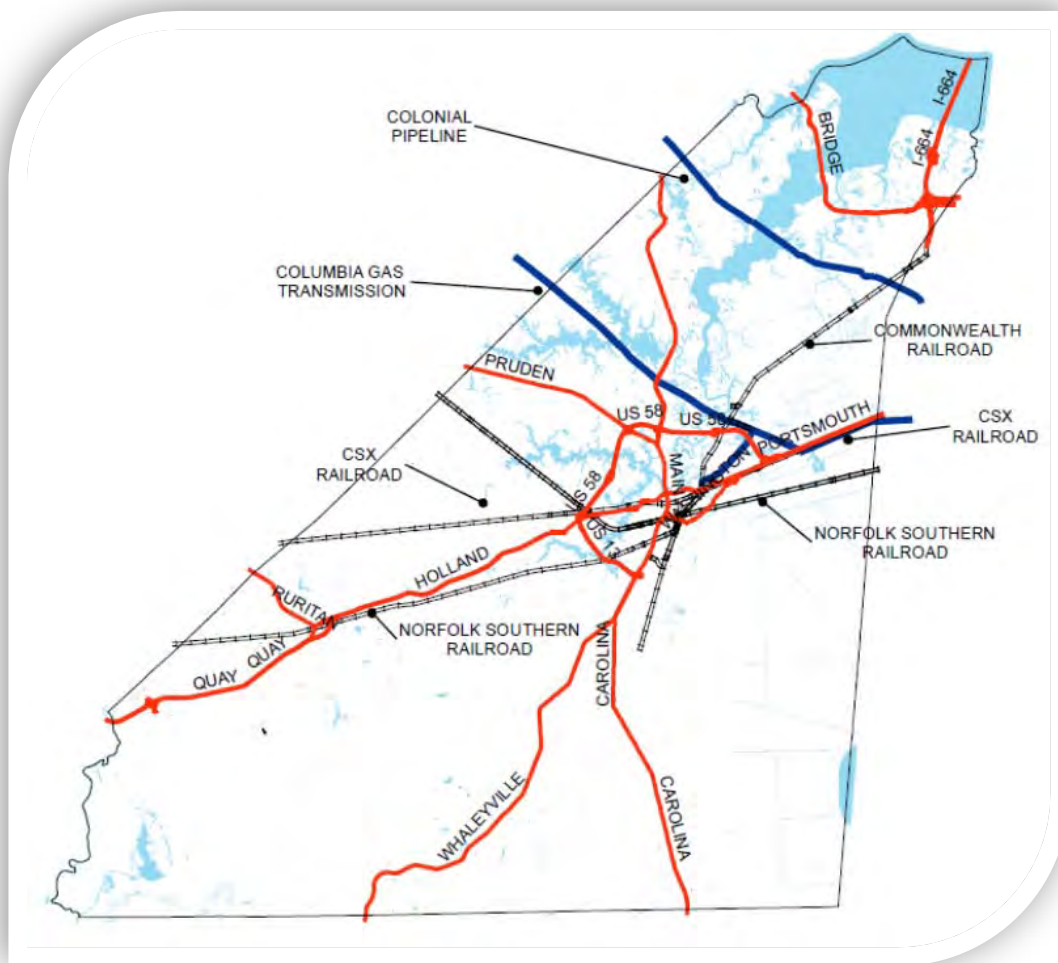


Figure 5: Networks Impacting Critical Facilities

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]²²

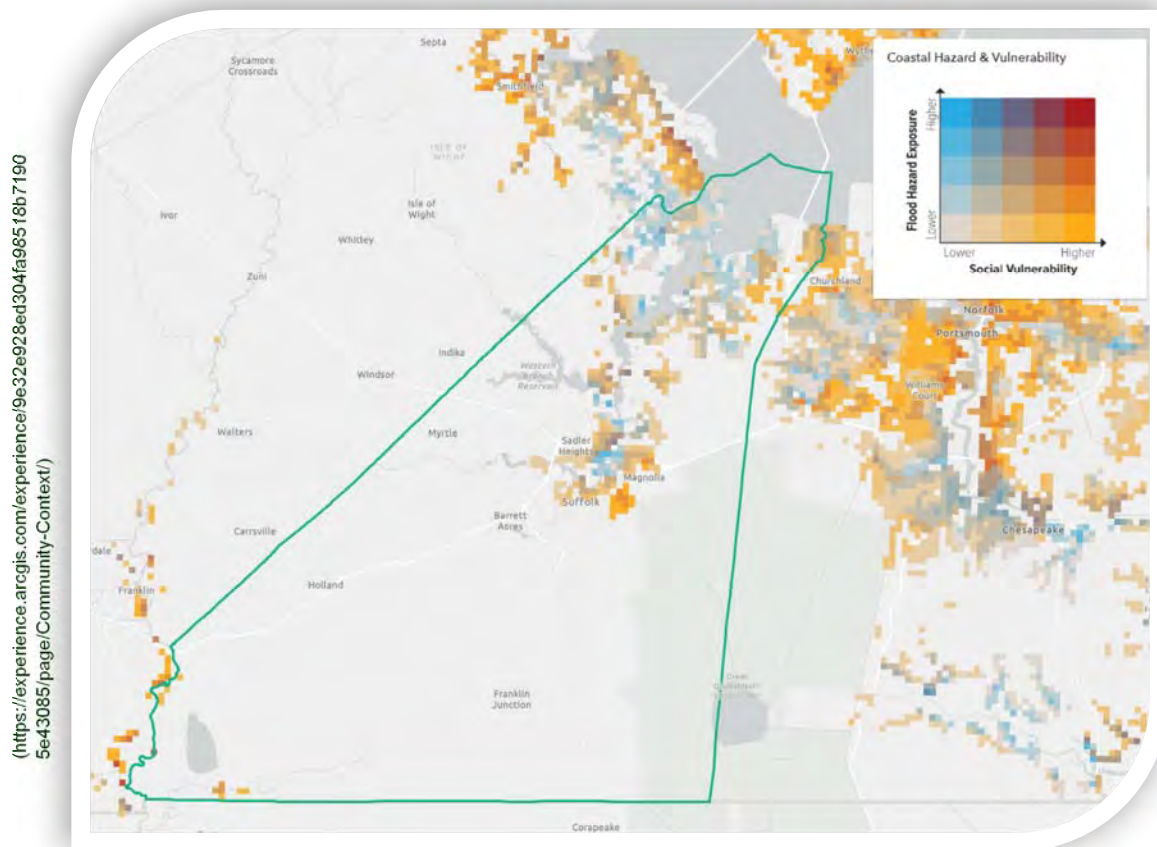


Figure 6: Social Vulnerability and Flood Hazard Exposure in Suffolk

²² (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 socioeconomic status 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 hazards²³. [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 participants 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.

²³ (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 pollution²⁴. [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 management²⁵. [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 below²⁶ [c11, c12]:

<http://askhrgreen.org/>

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

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

[Report | Suffolk, VA \(suffolkva.us\)](#)

²⁴ (City of Suffolk, 2016)

²⁵ (City of Suffolk, 2016)

²⁶ (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 recipient²⁷. 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]²⁸.

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 MS4²⁹.

²⁷ (Suffolk Keeps Citizens Safe and Informed with Suffolk Mass Notification System, 2020)

²⁸ (Hampton Roads Planning District Commission, 2017)

²⁹ (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
 - o 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 follows³⁰ [c3 , c12]:

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

3.3.1 Comprehensive Plan

There are six overall plan themes that have been carried over from the 2018 Comprehensive Plan to the 2026 Comprehensive Plan. Those themes are listed below in Figure 7 ³¹ [c4]. Overall, the 2026 Comprehensive Plan strives to protect irreplaceable natural resources and historical areas. [c2,c14]

³⁰ (Hampton Roads Planning District Commission, 2017)

³¹ (Planning C. o., Comprehensive Plan for 2026, 2006)



Figure 7: 2026 Comprehensive Plan Themes

3.3.1.1 Culture and Development

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 ³²[c6, c9].

³² (Planning C. o., Comprehensive Plan for 2026, 2006)

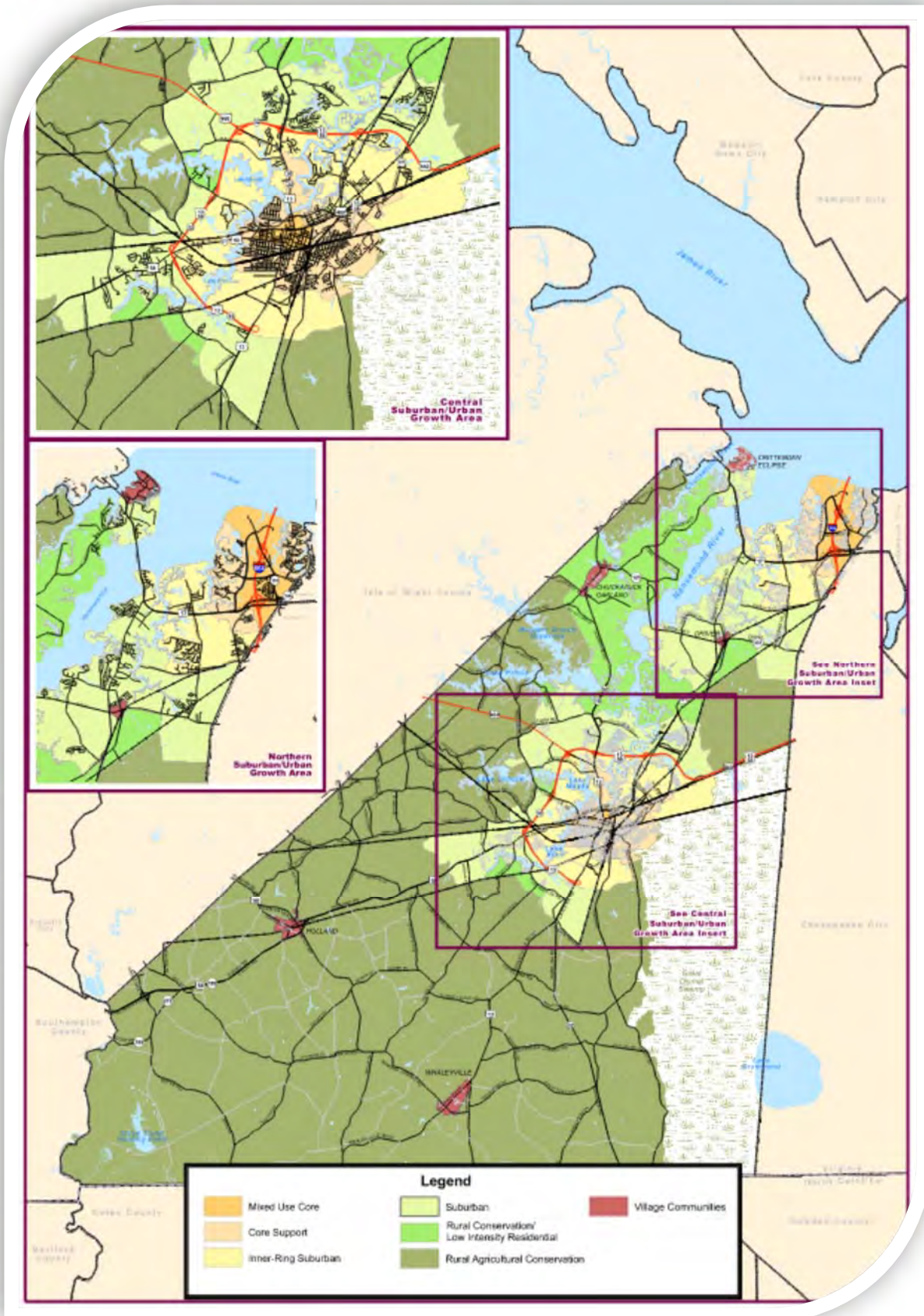


Figure 8: Focused Growth Areas in Suffolk

3.1.1.2 Environmental Protection

The responsibility of 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. The City has opted to examine different opportunities for conservation easement, which will ensure that some private land will be entirely safe from development [c6, c9]. To implement some other goals and objectives, the City has developed a policy that will protect lakes, rivers, streams, and reservoirs from the negative impact of development. Some of the actions under this policy include:

1. Continuation of implementing and enforcing the Chesapeake Bay Preservation Act
2. Preserving tidal marshes along City shorelines
3. Increasing public access to Suffolk's shoreline and water bodies using water quality-friendly techniques
4. Providing resources to implement farm planning programs and update the agricultural farm plan inventory
5. Continuation of support of implementation of shoreline erosion mitigation measures
6. Promoting coastal water quality improvement initiatives involving fisheries
7. Studying the opportunities and constraints of providing full access to blocked waterways for boating activities
8. Explore new and innovative ways to apply water quality protection measures
9. Continuation of the protection of water quality in the Great Dismal Swamp
10. Continuation of bettering water quality by working with the health department to adjust regulations for septic systems
11. Promote the development and implementation of Farm Conservation Plans
12. Continue to work with neighboring jurisdictions to improve the regions watershed management plan

The City will continue to promote water quality protection by implementing its existing protection program as well as seeking new solutions as additional information and technology become available. Although the City currently implements a variety of water quality protection programs, surface water quality in the City continues to show signs of impairment³³.

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^{34 35} [c7, c9, c10,].

³³ (Planning C. o., Comprehensive Plan for 2026, 2006)

³⁴ (Council, Code of Ordinances, 2022)

³⁵ (Council, Unified Development Ordinance , 2021)

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

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

The Chesapeake Bay Preservation Area District (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 CPBA³⁶ [c5]. The following figure presents the City CBPA.

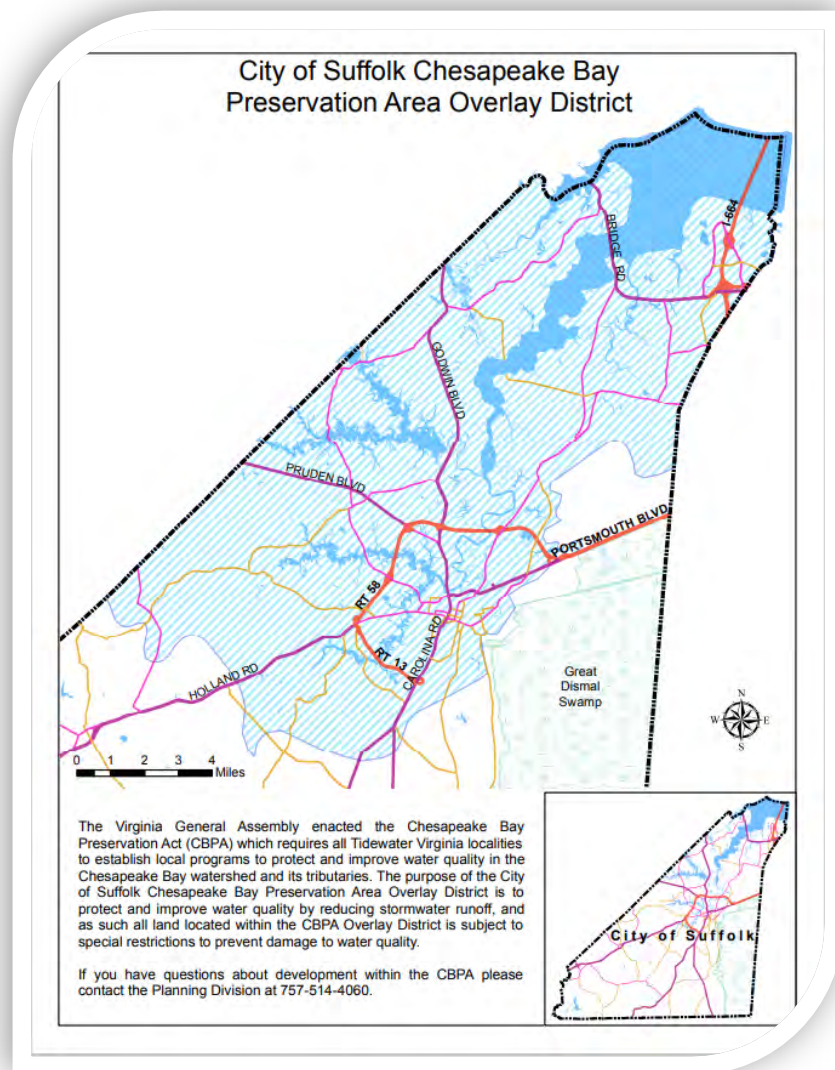


Figure 9: City of Suffolk Chesapeake Bay Preservation Area

³⁶ (Council, Unified Development Ordinance, 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 public³⁷. 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)

³⁷ (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.

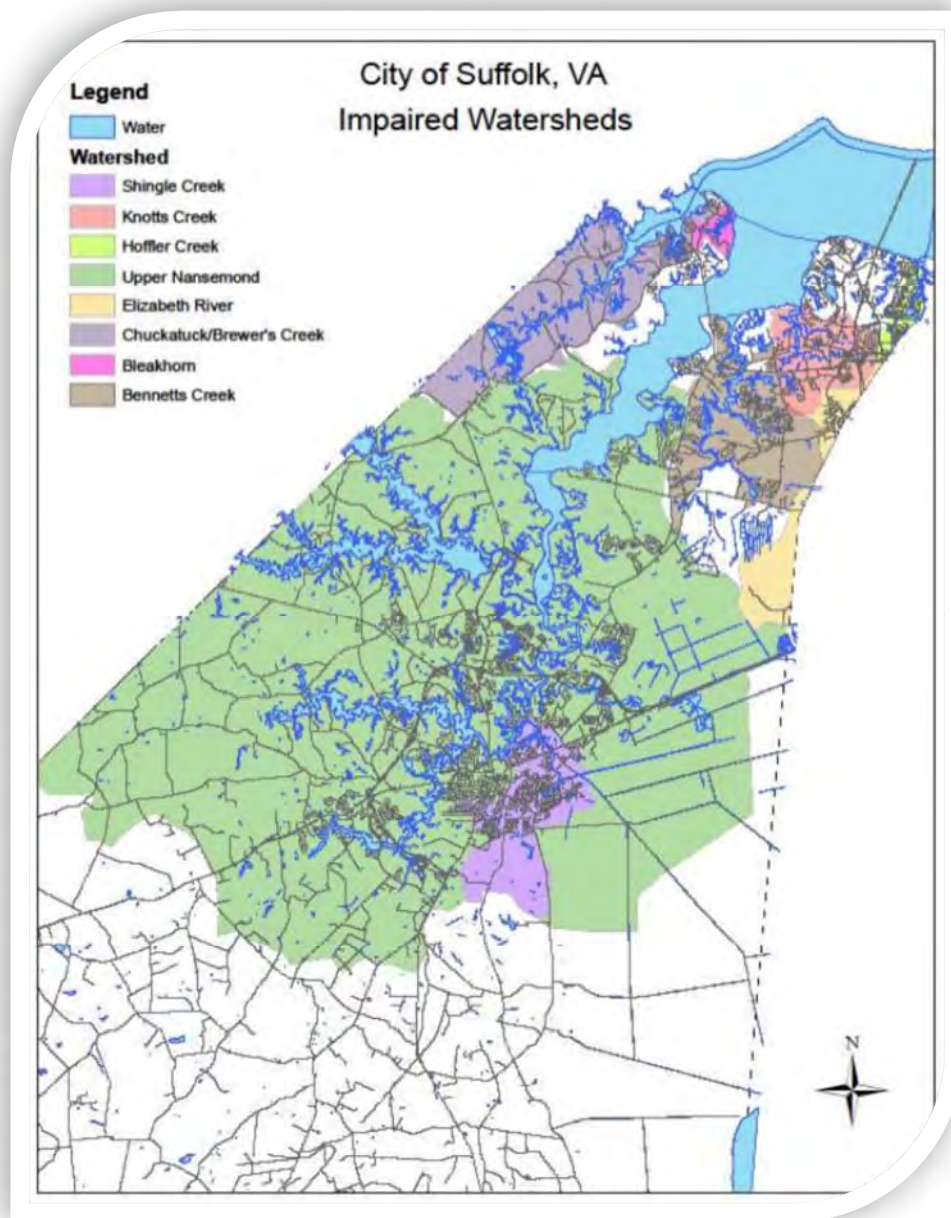


Figure 10: Impaired Watersheds for the City of Suffolk

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 damage³⁸ [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

³⁸ (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 well³⁹.

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.⁴⁰ [c15]

³⁹ (Hampton Roads Planning District Commission, 2017)

⁴⁰ (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.

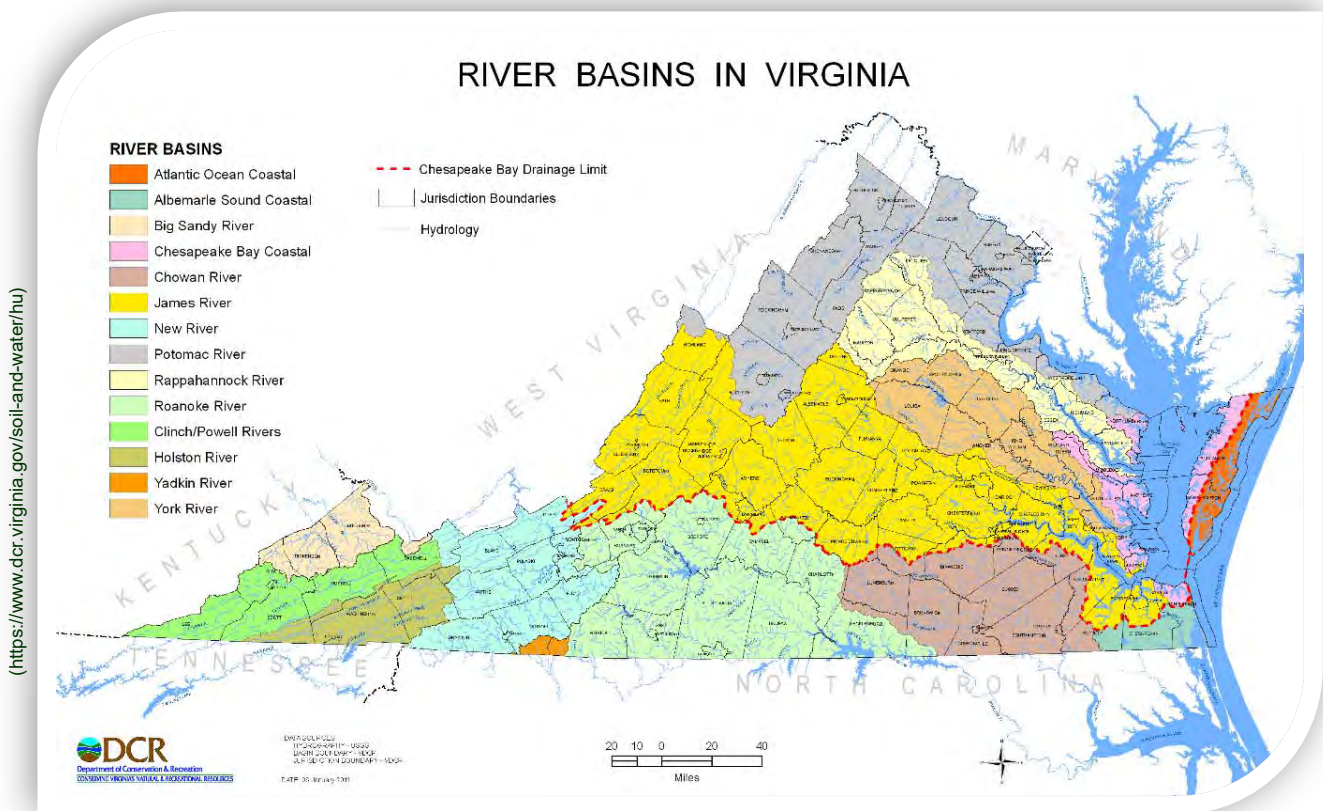


Figure 11: River Basins in Virginia

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. ⁴¹[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.”⁴² 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 12⁴³ [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

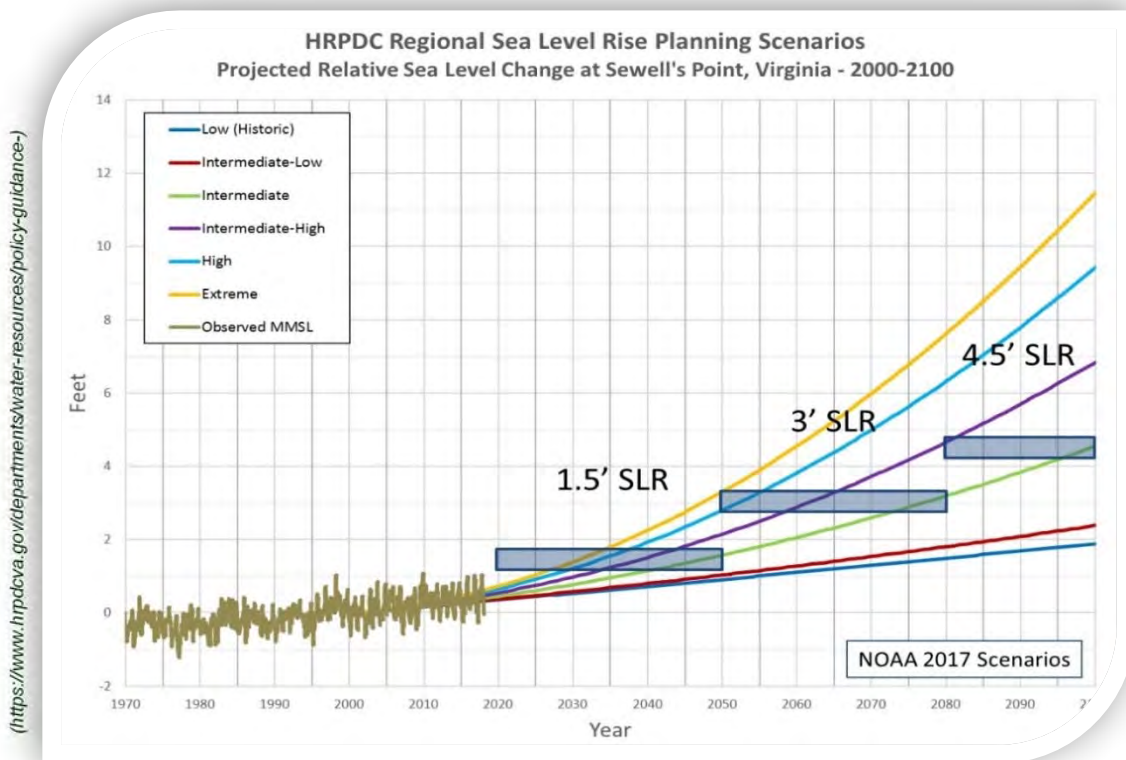


Figure 12: Projected SLR

⁴¹ (Hampton Roads Planning District Commission, 2017)

⁴² (Commonwealth of Virginia Department of Conservation and Recreation, 2022)

⁴³ (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)

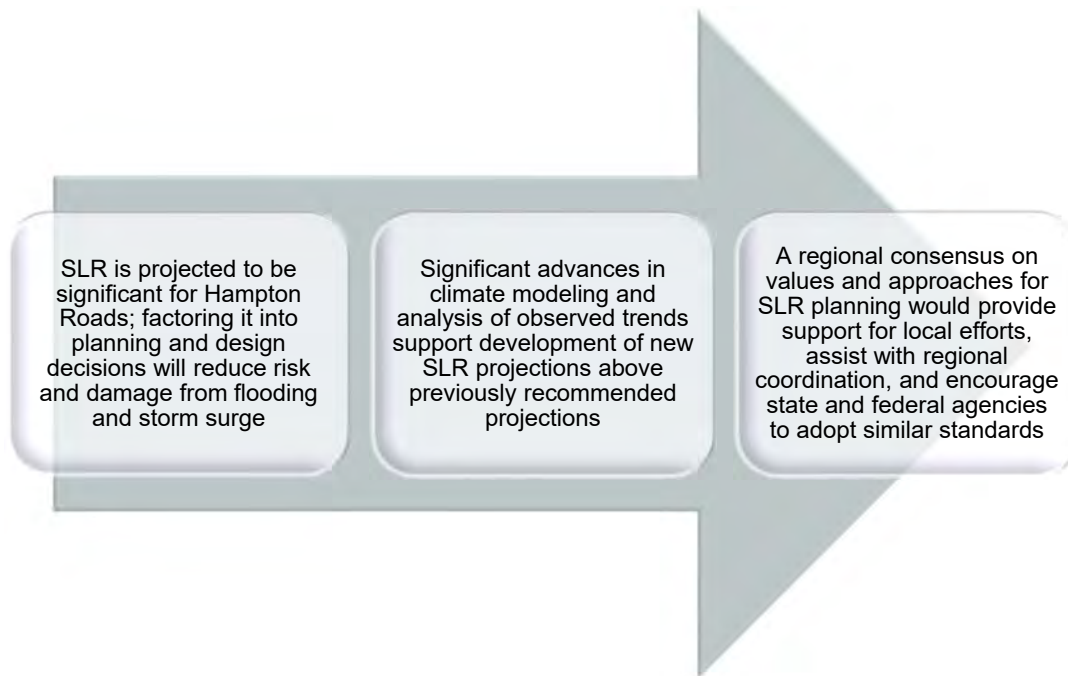


Figure 13: Rationale Behind HRPDC SLR

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 movement⁴⁴.

⁴⁴ (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 2100⁴⁵.

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 VIMS⁴⁶.

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:⁴⁷ [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

⁴⁵ (HRPDC, 2018)

⁴⁶ (HRPDC, 2018)

⁴⁷ (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 through 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 impacts⁴⁸.” 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.

⁴⁸ (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 issues⁴⁹. Emergency Response personnel are also trained as such.⁵⁰ The City is also providing public education outreach on litter and bacteria reduction for the public⁵¹. 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].⁵²

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 include⁵³:

- 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 waters⁵⁴. 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

⁴⁹ (City of Suffolk, 2016)

⁵⁰ (Hampton Roads Planning District Commission, 2017)

⁵¹ (Engineering, 2012)

⁵² (Council, Unified Development Ordinance , 2021)

⁵³ (Hampton Roads Planning District Commission, 2017)

⁵⁴ (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.⁵⁵

As opportunities are identified and vetted, the City plans to seek grant funding through 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 facilities⁵⁶. As opportunities are identified and vetted, the City plans to seek grant funding through 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
 - o Pughsville Neighborhood Drainage Improvements
 - o Jefferson Street Drainage
 - o Constant's North Park – Phase I & II
 - o Cedar Hill Slope Stabilization
 - o Train Station Hydrodynamic Separator BMP
- Mid-term
 - o Oldetown Drainage Improvements (Phased)
 - o Driver Drainage
 - o Woodrow South Suffolk Drainage
 - o First Avenue Drainage
 - o Sadler Heights Drainage
 - o Godwin Millpond Dam Rehabilitation
- Long-term
 - o Installation of Flood Depth Markers
 - o Kimberly Bridge AKA North Main Street (Route 10/32)
 - o Towne Point Road between Pughsville and Route 17
- Phased
 - o James River Watershed Drainage Infrastructure Improvements
 - o Chowan River Watershed Drainage Infrastructure Improvements
 - o Great Dismal Swamp Watershed Drainage Infrastructure Improvements

⁵⁵ (Chesapeake Bay TMDL Action Plan, 22)

⁵⁶ (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.⁵⁷ [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

⁵⁷ (Planning C. o., Comprehensive Plan for 2026, 2006)

Works Cited

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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 Hoffer 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-Hoffer-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: <ul style="list-style-type: none"> • 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		

	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
Criterion	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	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	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	Jun-18	Nov-18	Oct-18	Aug-17
	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 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.				
4	Forward-looking goals, actionable strategies, and priorities through as seen through an equity-based lens.	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.				
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.				
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 117
9	Identified ecosystems/wetlands/floodplains suitable for permanent protection.				
10	Identified incentives for restoring riparian and wetland vegetation.				
11	A framework for implementation, capacity building and community engagement.	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 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: <ul style="list-style-type: none"> • 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)
- 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)

Documents reviewed for Projects and Plan Requirements

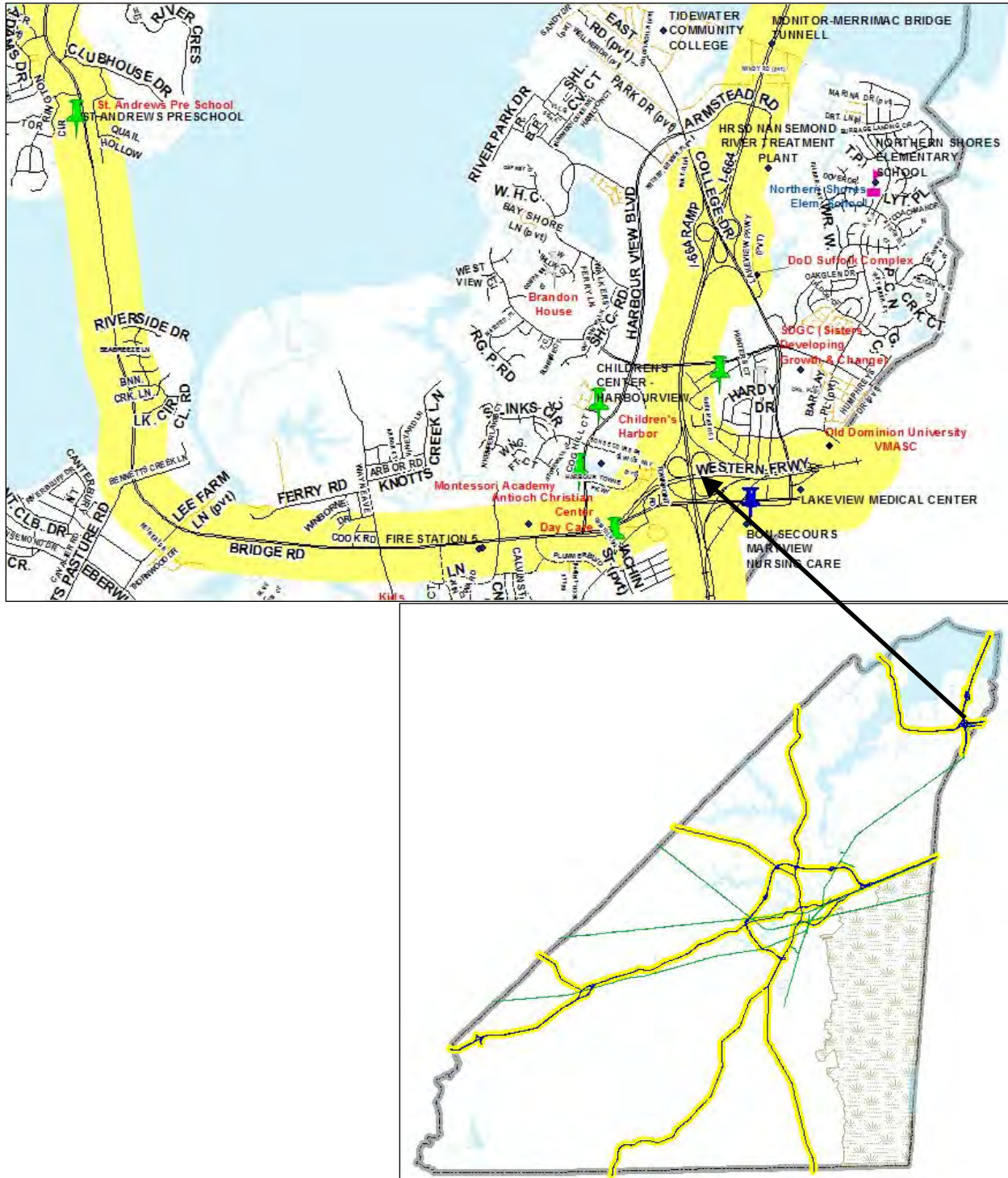
- Capital Improvement Projects List (2022)
- Capital Improvements Programs FY 2022-31 (2020)
- Chesapeake Bay TMDL Action Plan (2016)
- Chesapeake Bay TMDL Action Plan Phase II (2019)
- Chowan River Watershed Master Plan (2008)
- Driver Lane Drainage Study (2021)
- Great Dismal Swamp Watershed Master 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

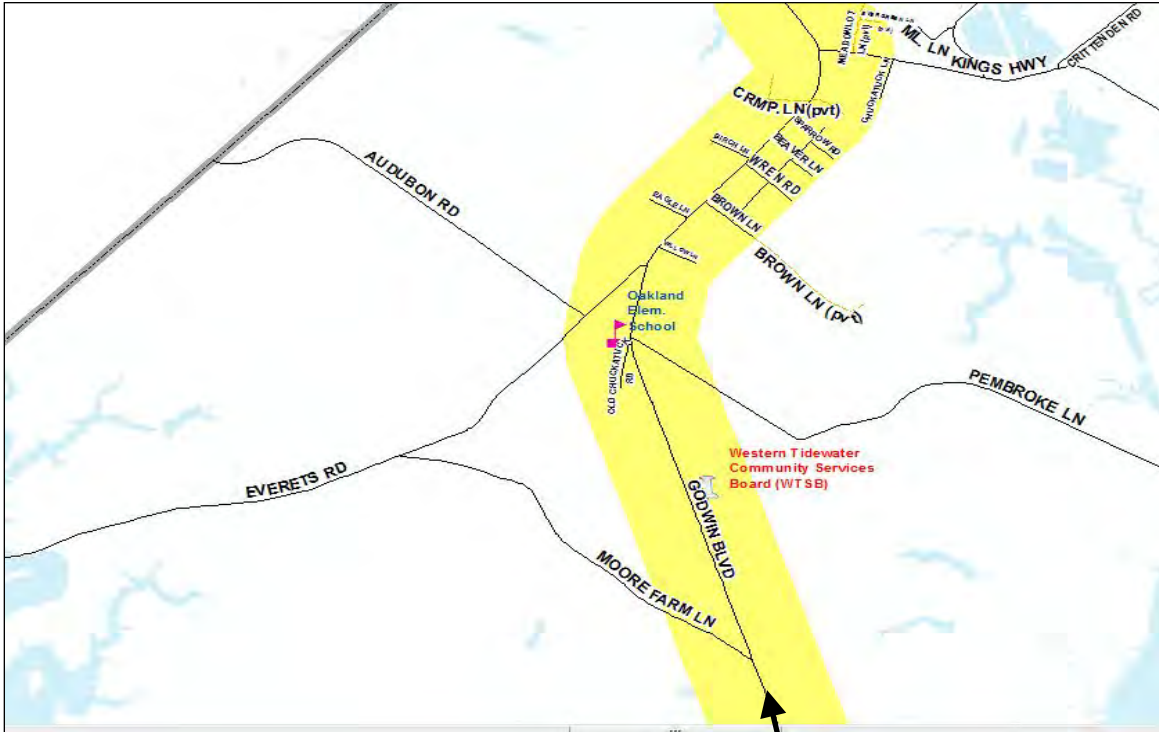
1. ELEVATED RISK FACILITIES WITHIN 1000 FEET OF MAJOR HIGHWAYS

Attachment 1

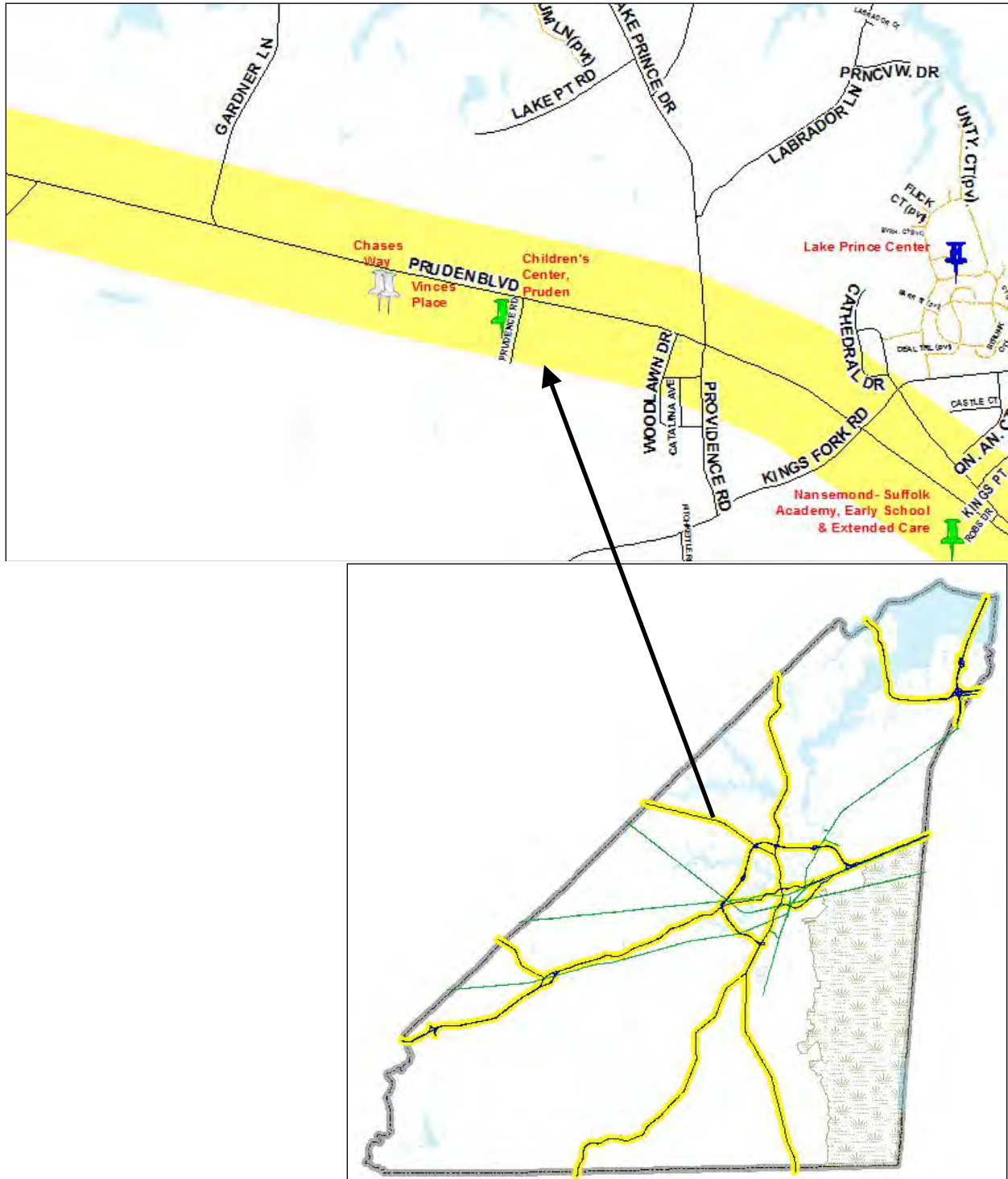


ELEVATED RISK FACILITIES WITHIN 1000 FEET OF MAJOR HIGHWAYS

Attachment 3

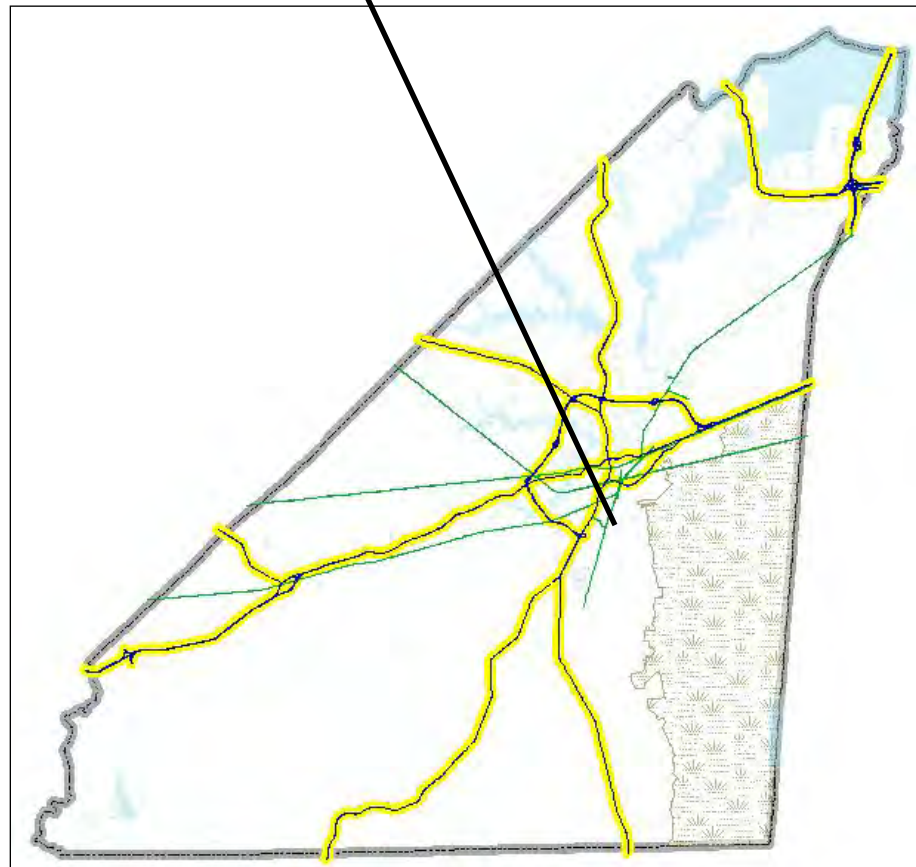
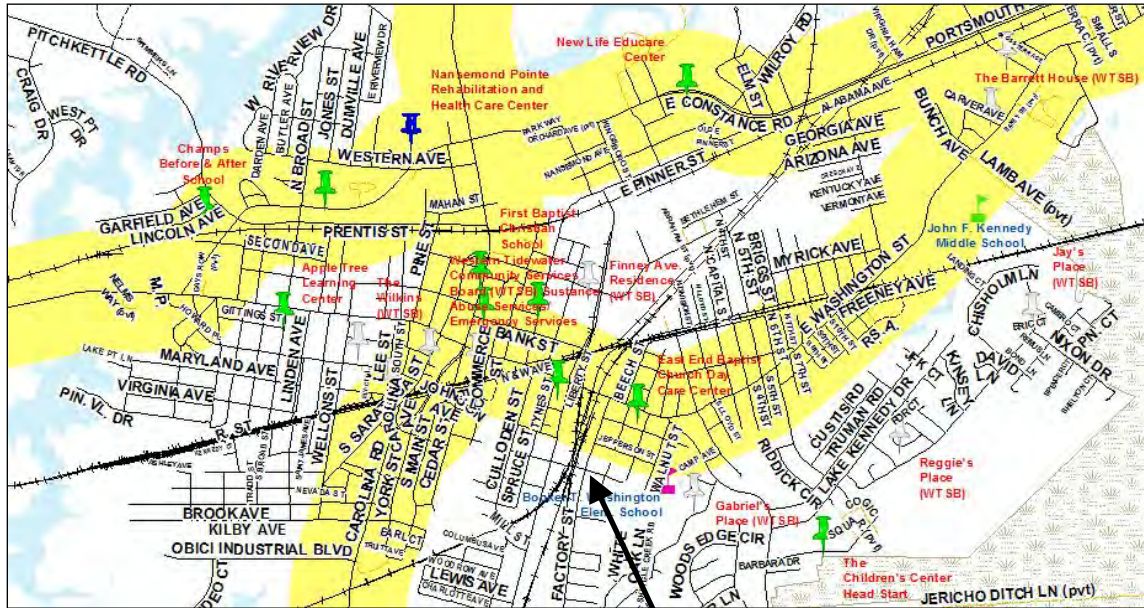


ELEVATED RISK FACILITIES WITHIN 1000 FEET OF MAJOR HIGHWAYS Attachment 4



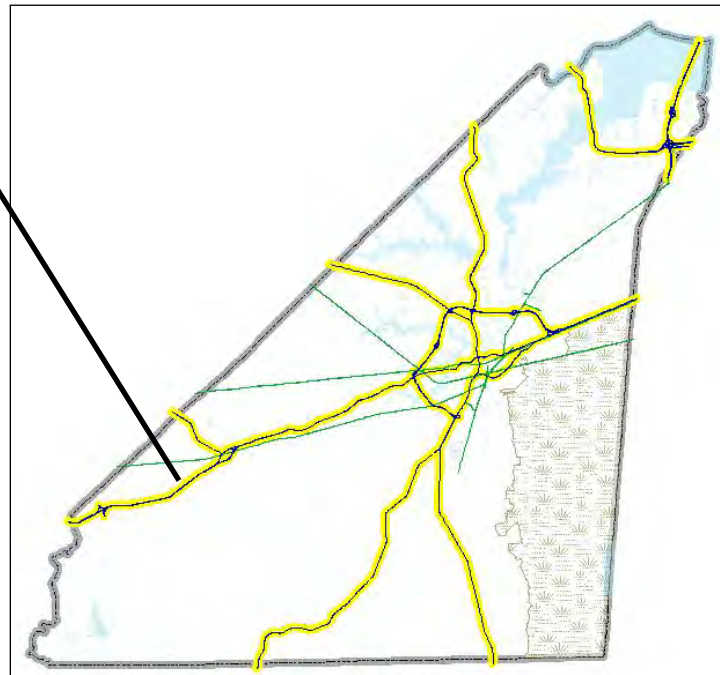
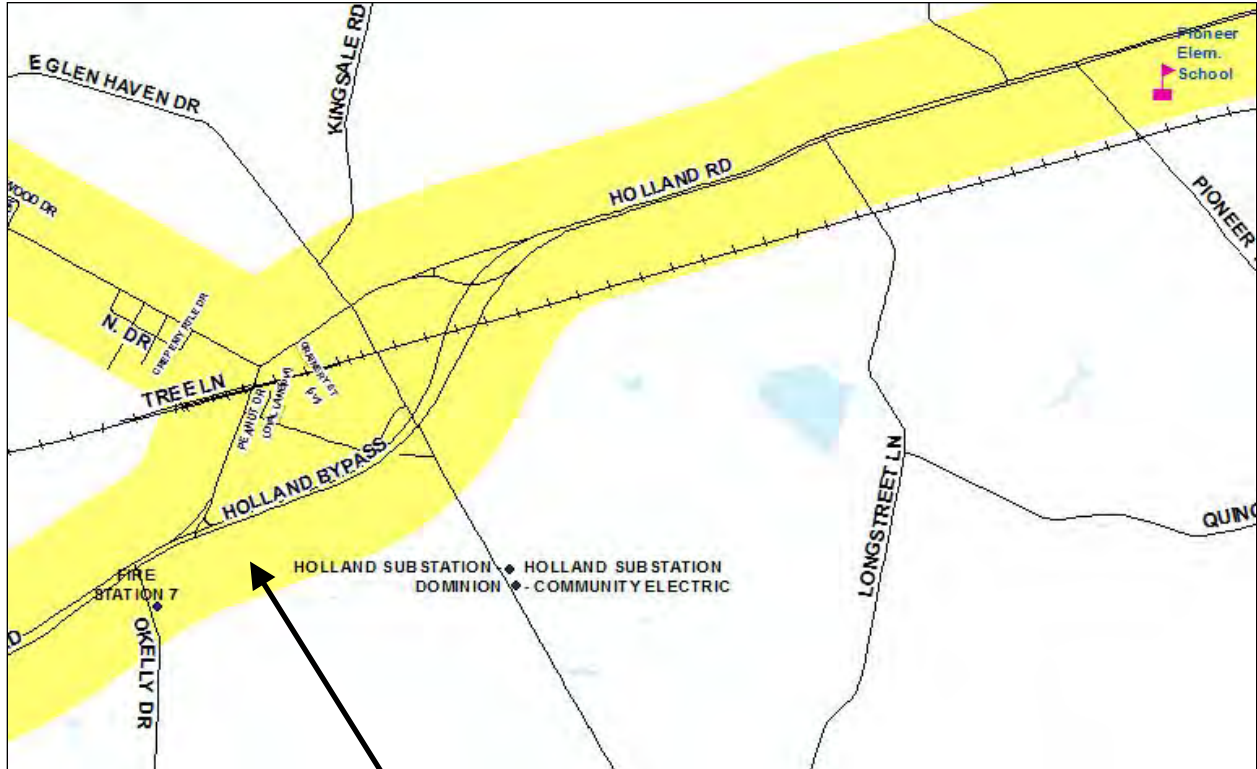
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Attachment 5



ELEVATED RISK FACILITIES WITHIN 1000 FEET OF MAJOR HIGHWAYS

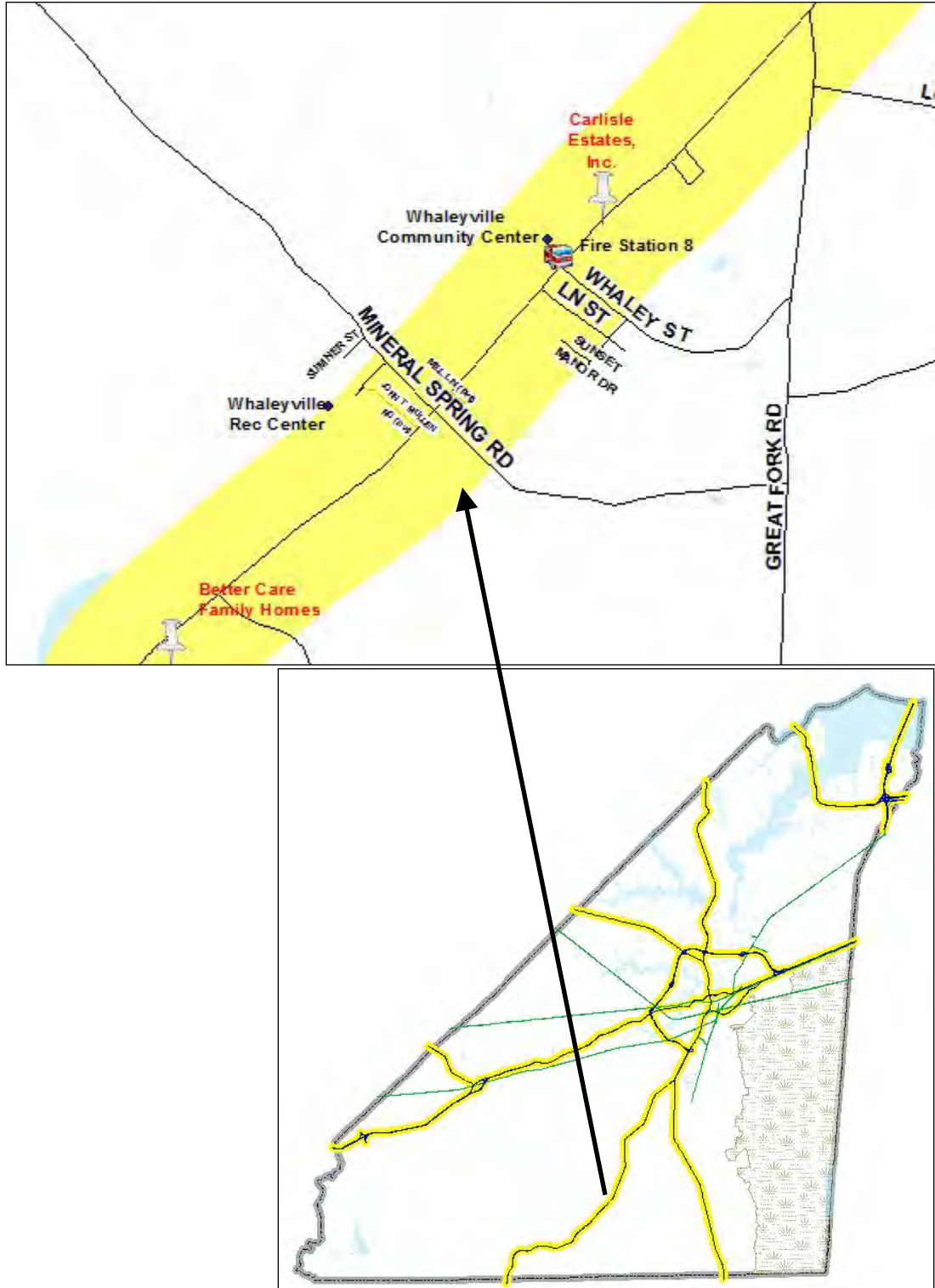
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ELEVATED RISK FACILITIES WITHIN 1000 FEET OF MAJOR HIGHWAYS Attachment 7

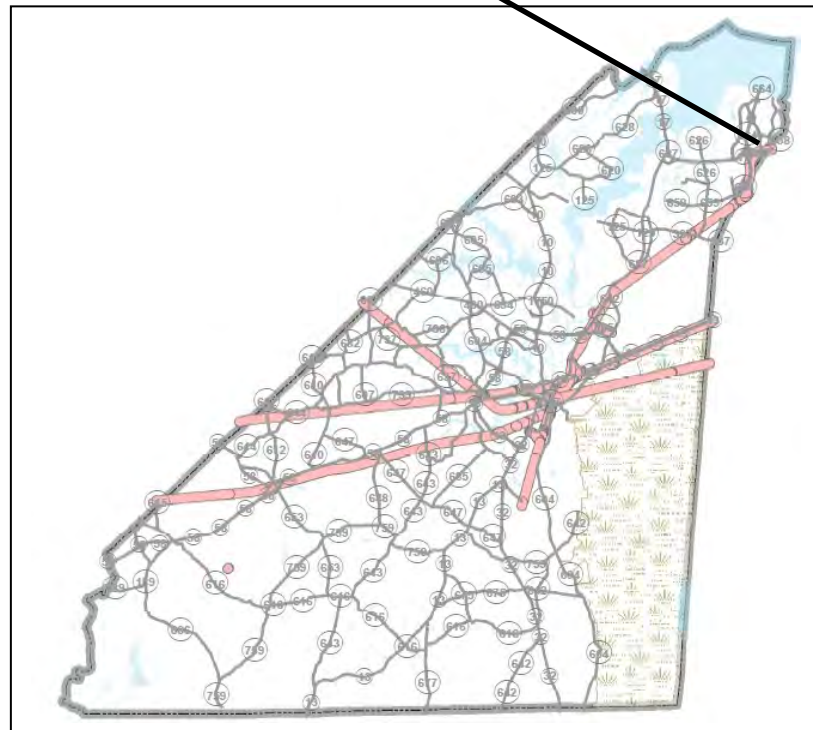
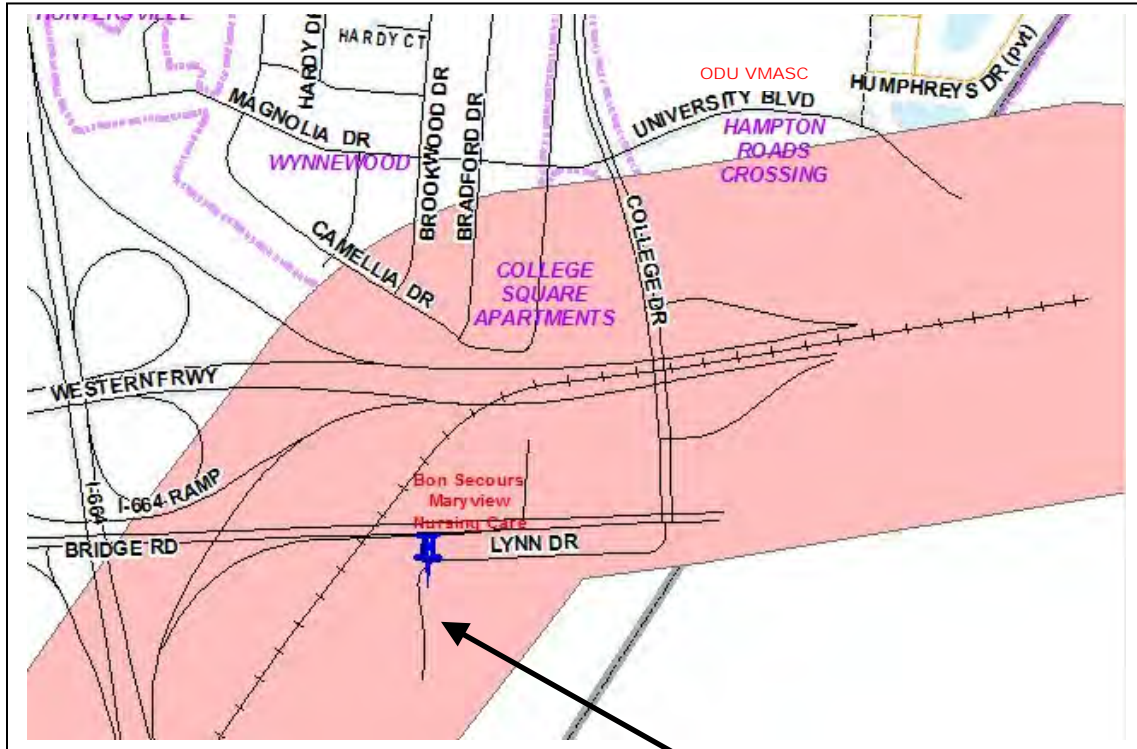


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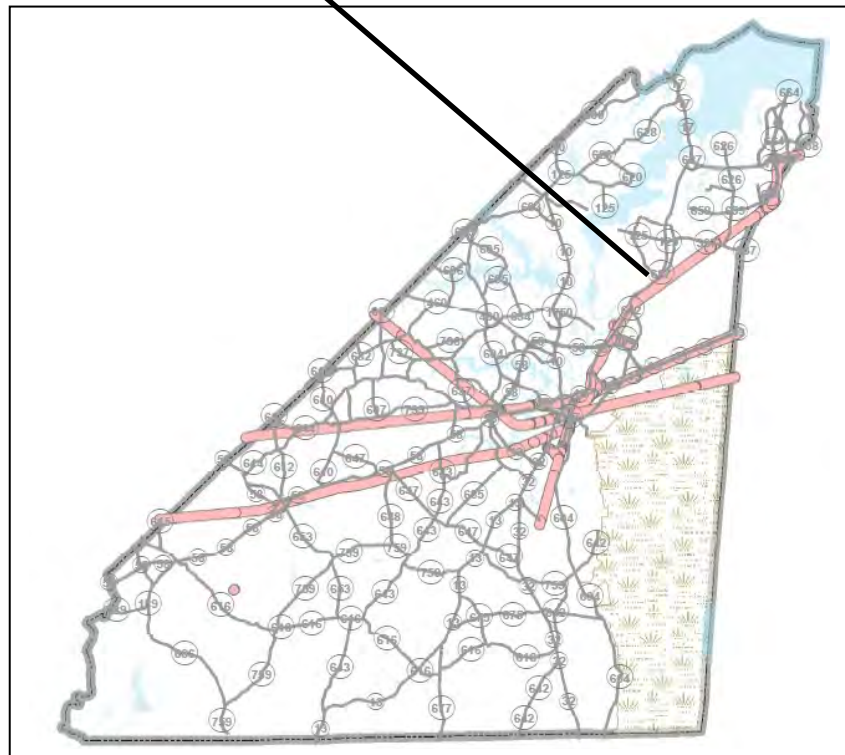
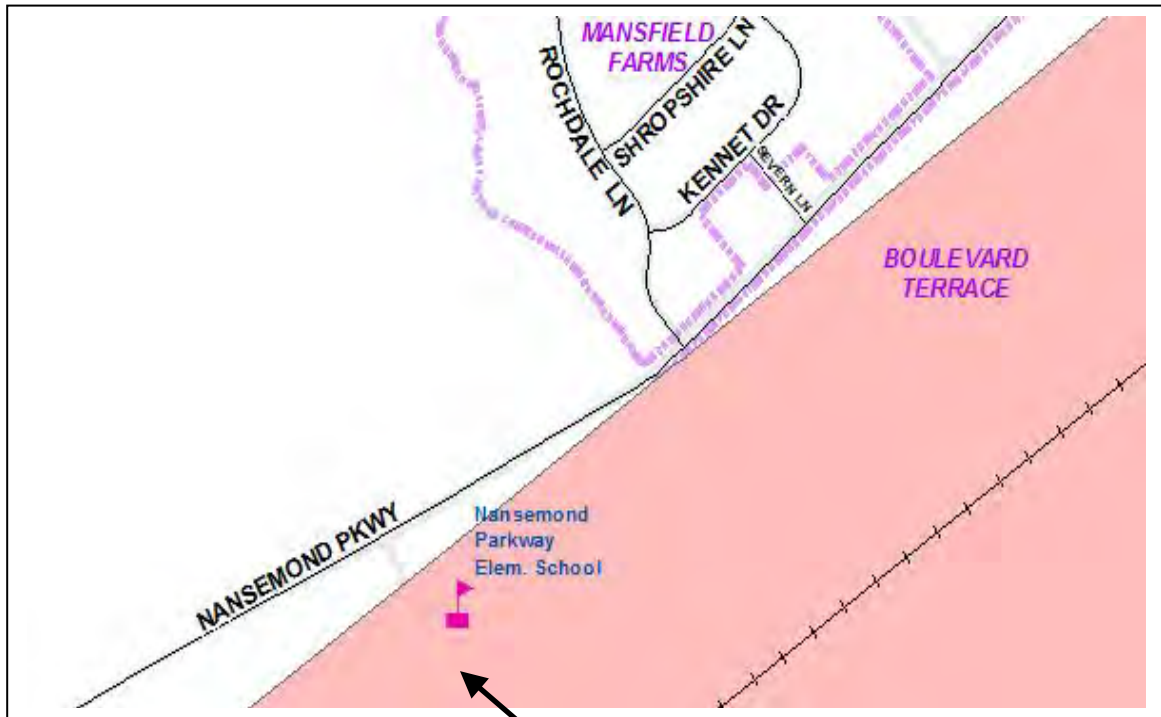
ELEVATED RISK FACILITIES WITHIN 1000 FEET OF RAILROADS

Attachment 1



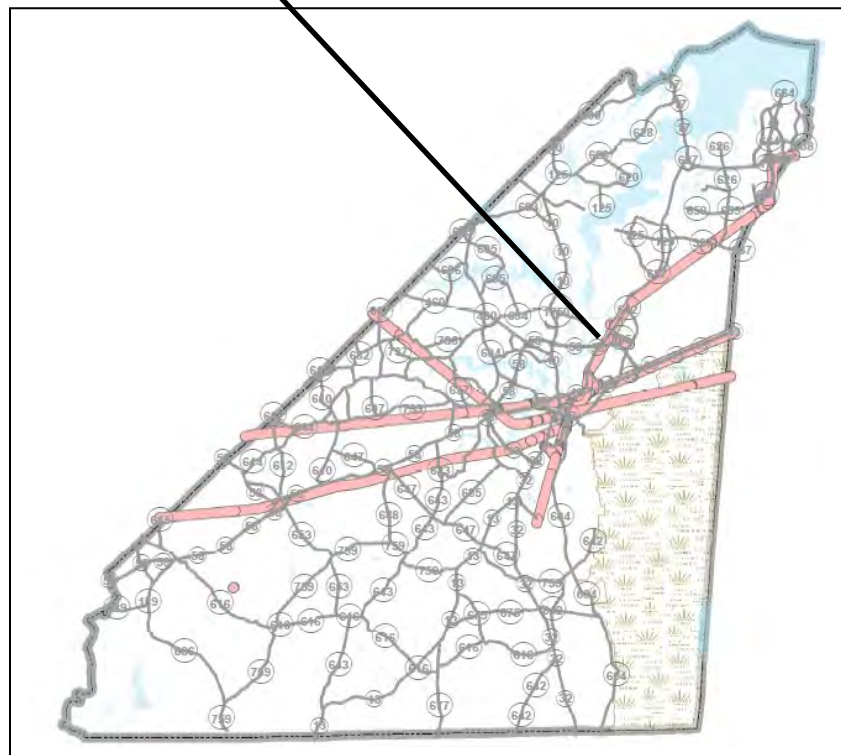
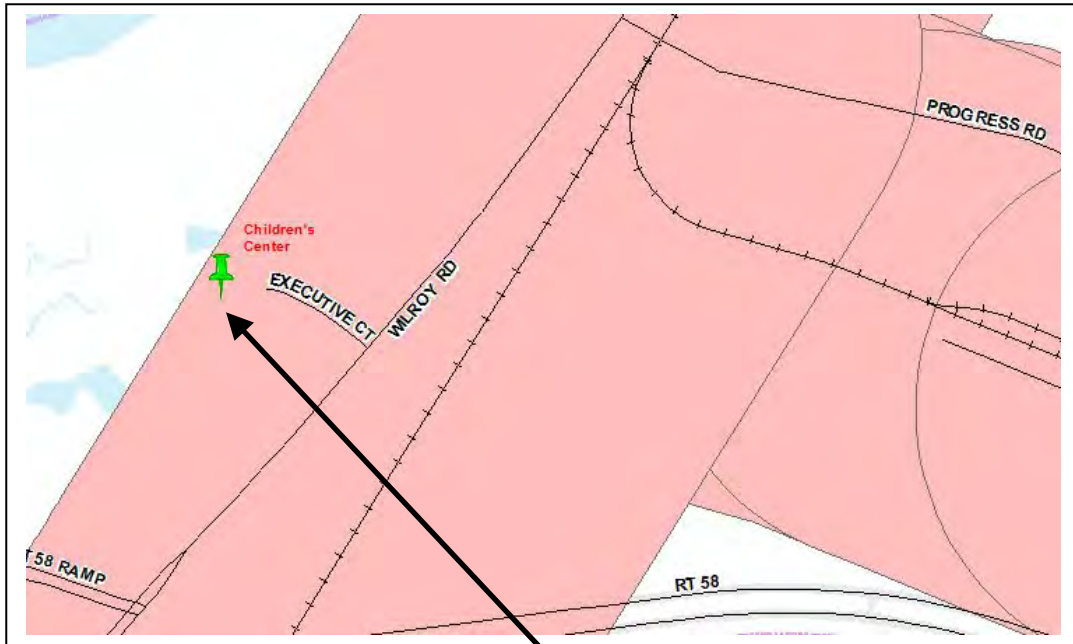
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Attachment 2



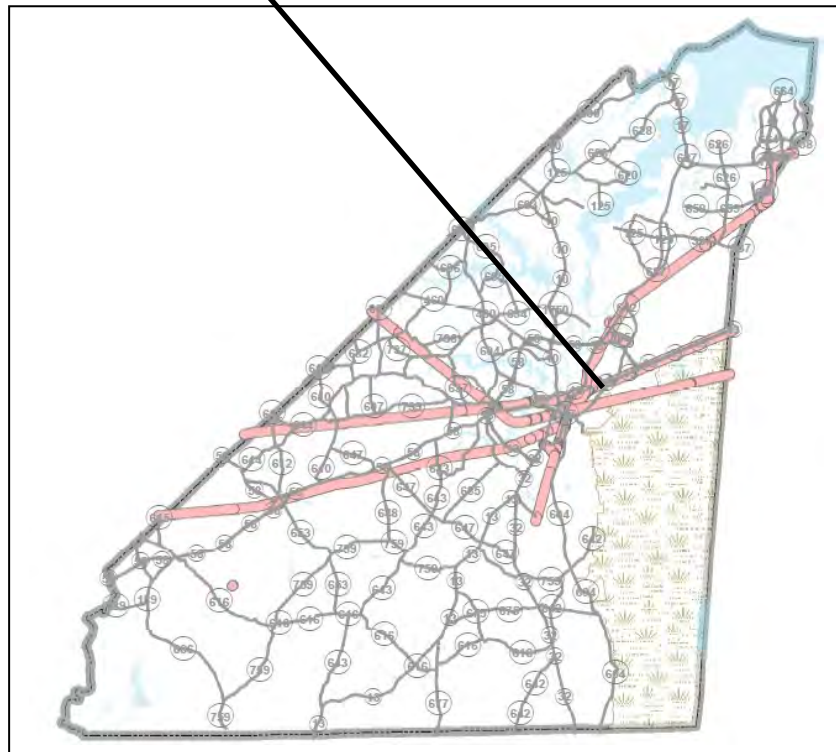
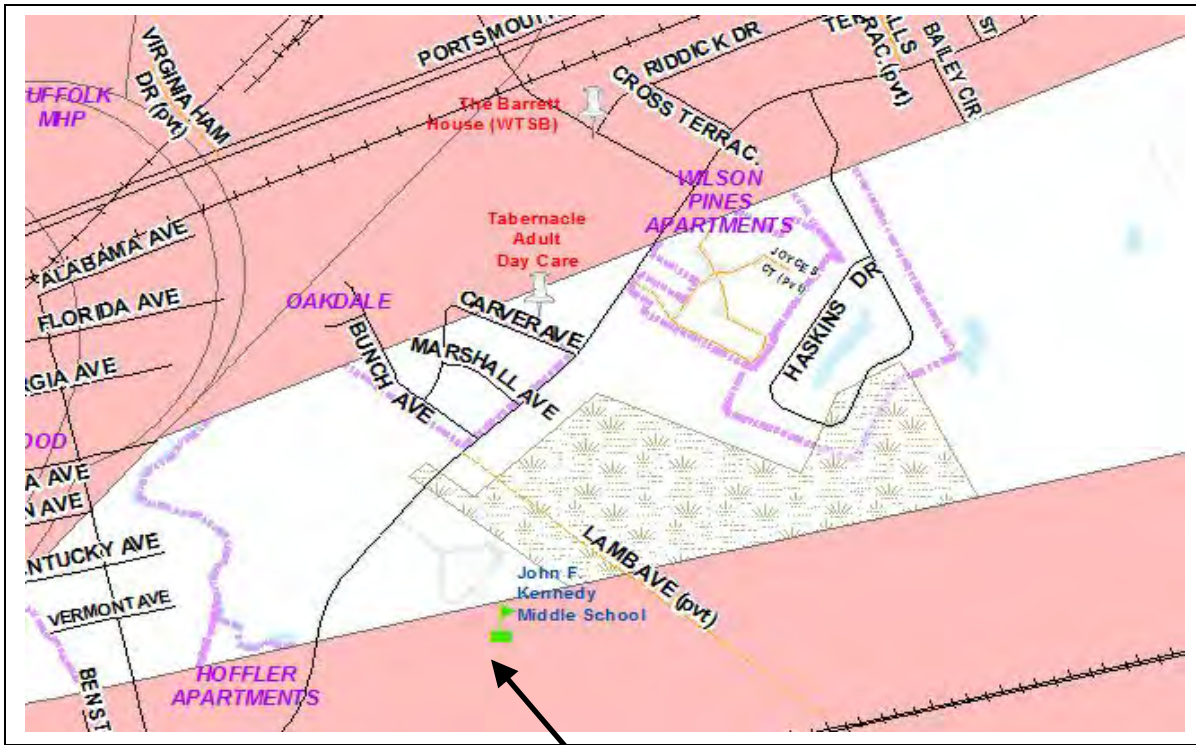
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Attachment 3



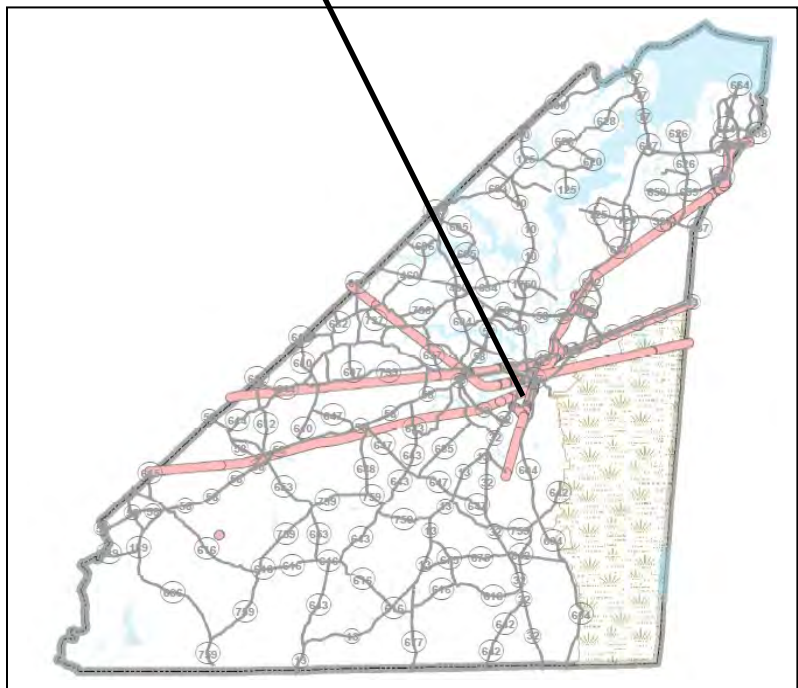
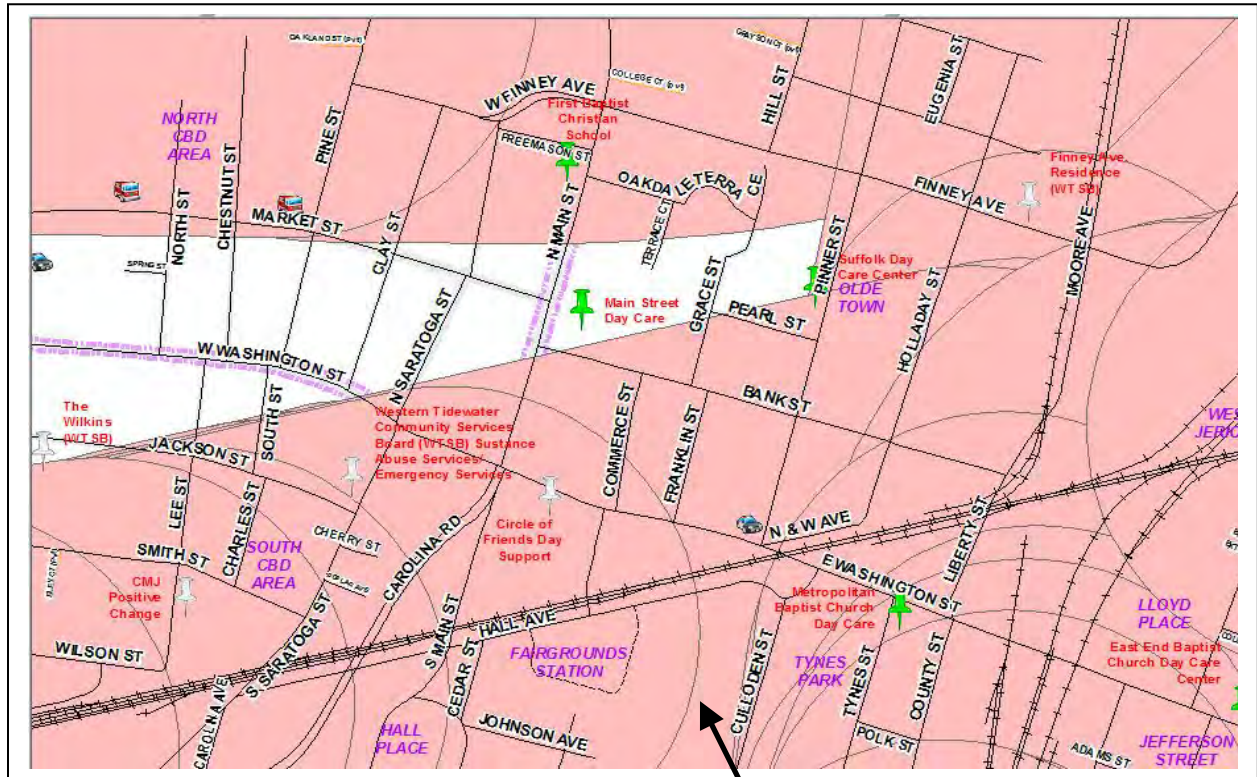
ELEVATED RISK FACILITIES WITHIN 1000 FEET OF RAILROADS

Attachment 4



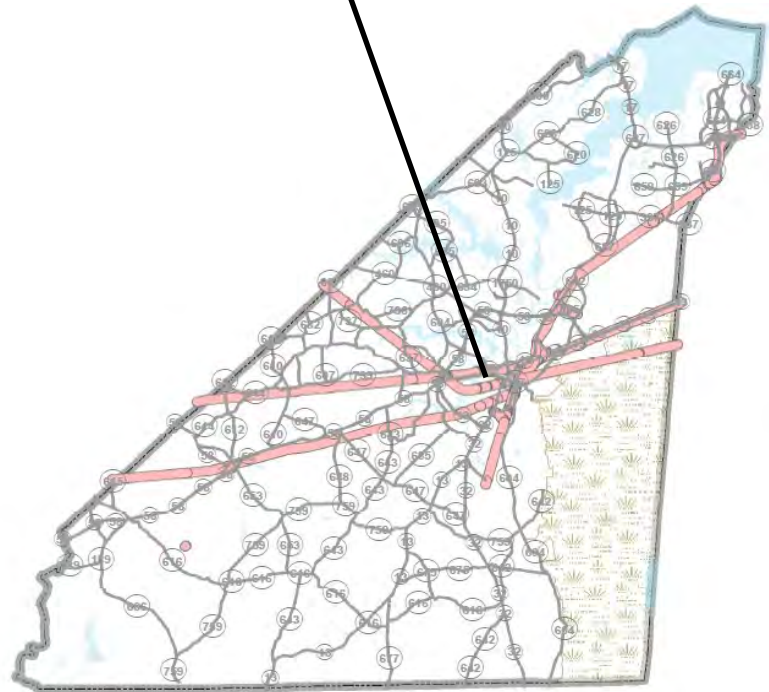
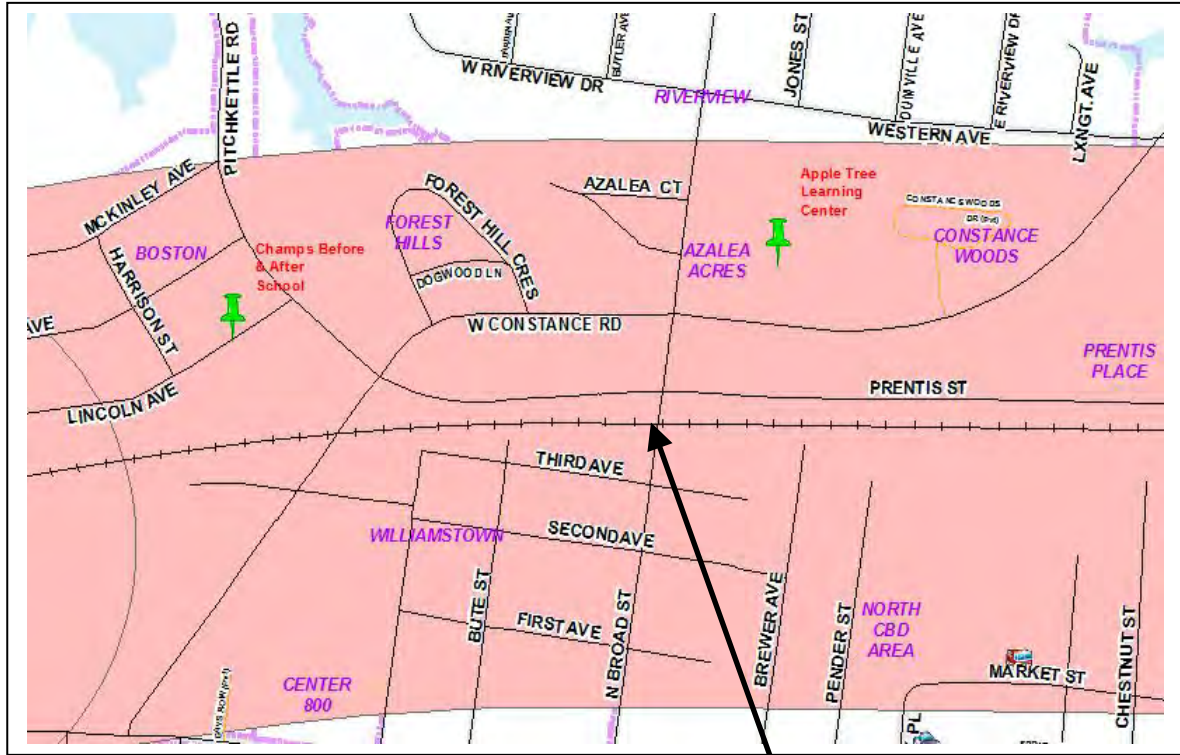
ELEVATED RISK FACILITIES WITHIN 1000 FEET OF RAILROADS

Attachment 5



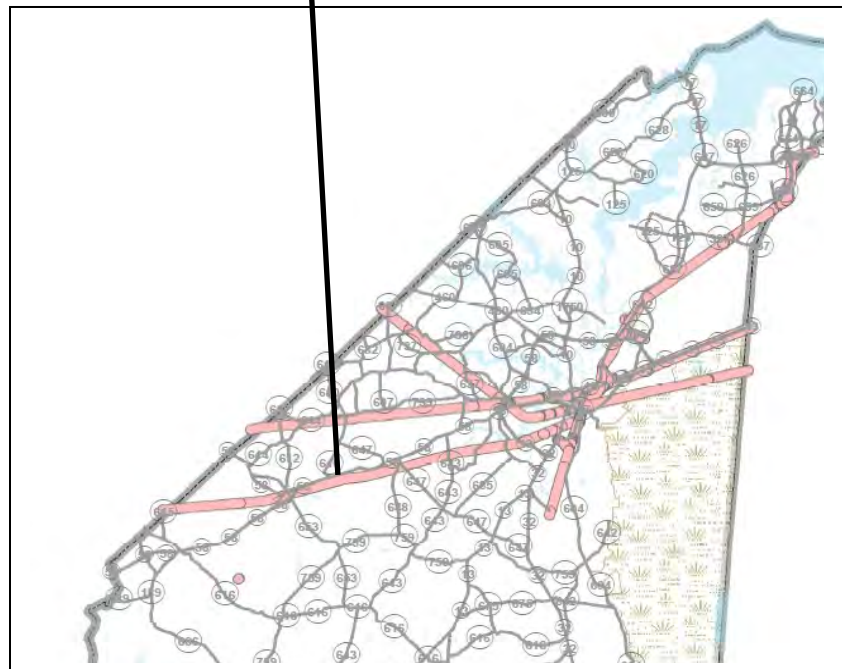
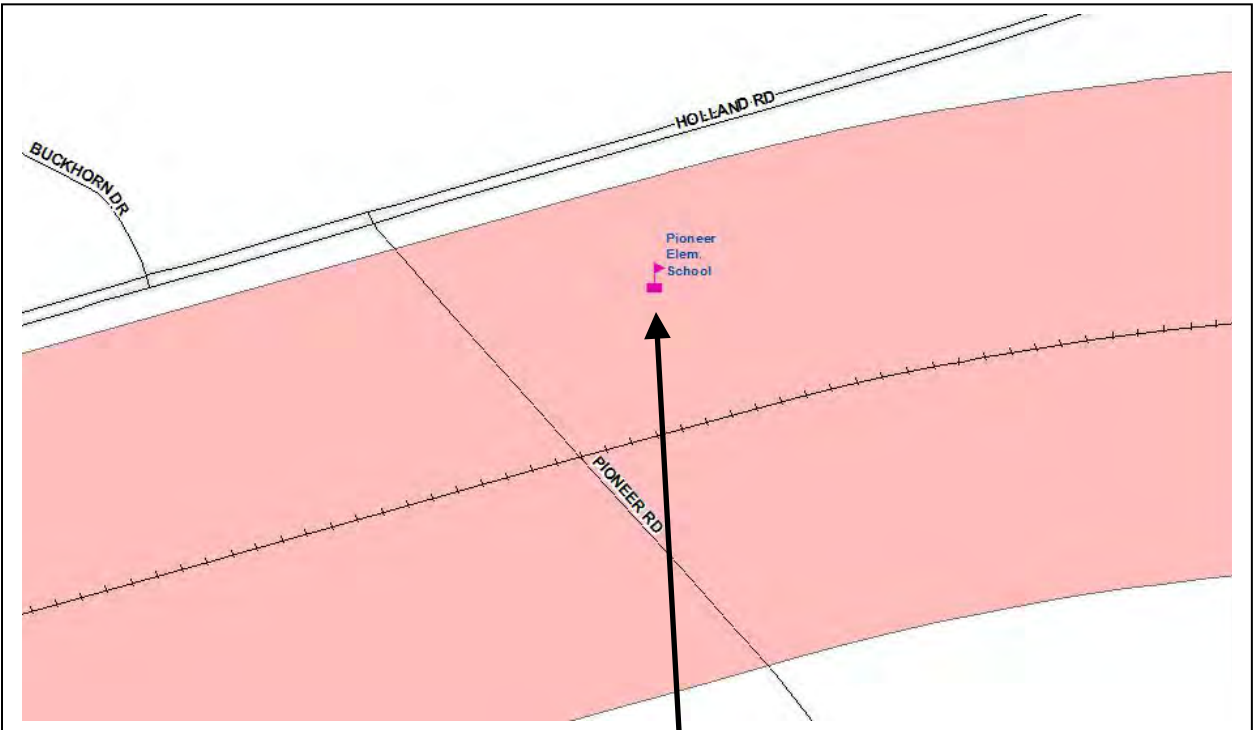
ELEVATED RISK FACILITIES WITHIN 1000 FEET OF RAILROADS

Attachment 6



ELEVATED RISK FACILITIES WITHIN 1000 FEET OF RAILROADS

Attachment 7



ELEVATED RISK FACILITIES & NEIGHBORHOODS LOCATIONS Colonial Pipeline Company

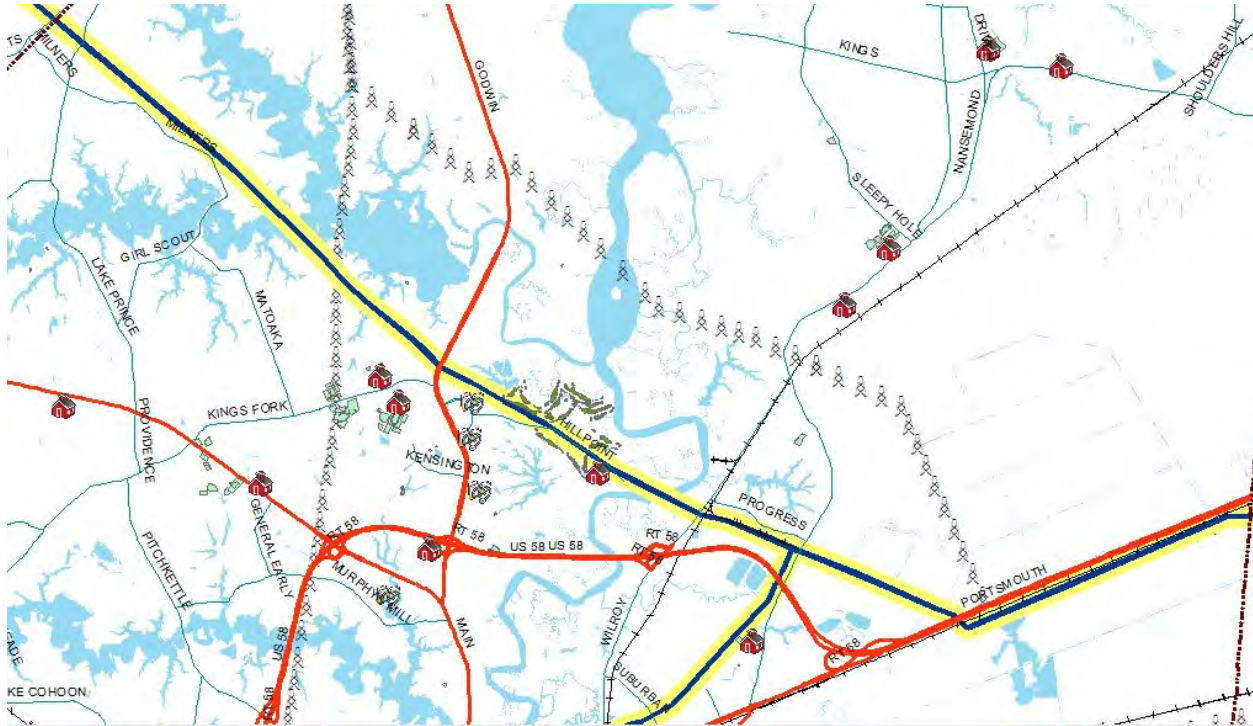


Note: The yellow highlighted area indicates a 500 foot buffer on each side of the pipeline.

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

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

ELEVATED RISK FACILITIES & NEIGHBORHOODS LOCATIONS Columbia Gas Transmission



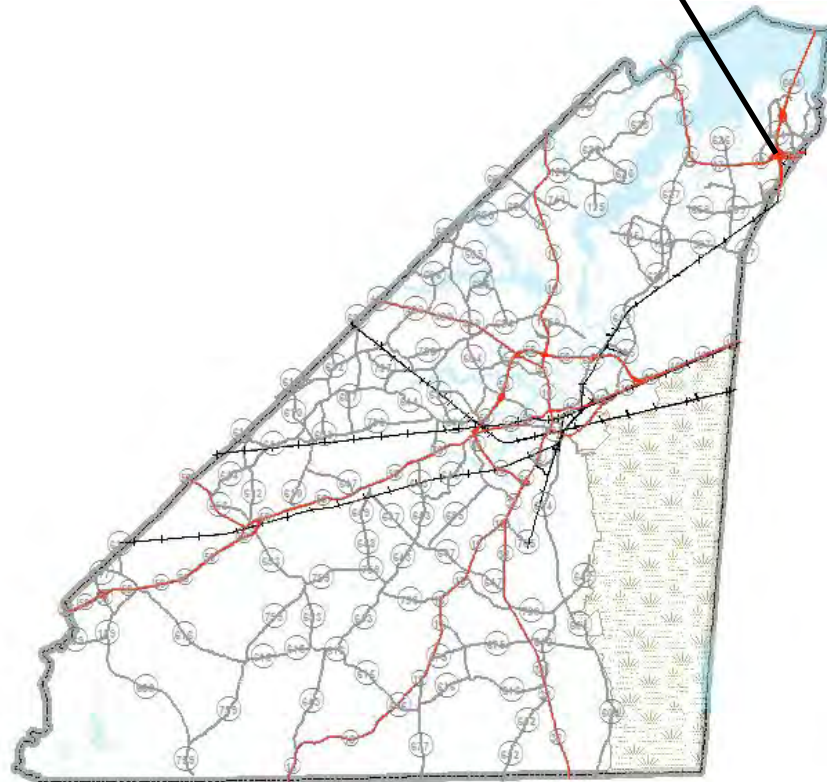
Note: The yellow highlighted area indicates a 500 foot buffer on each side of the pipeline.

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.

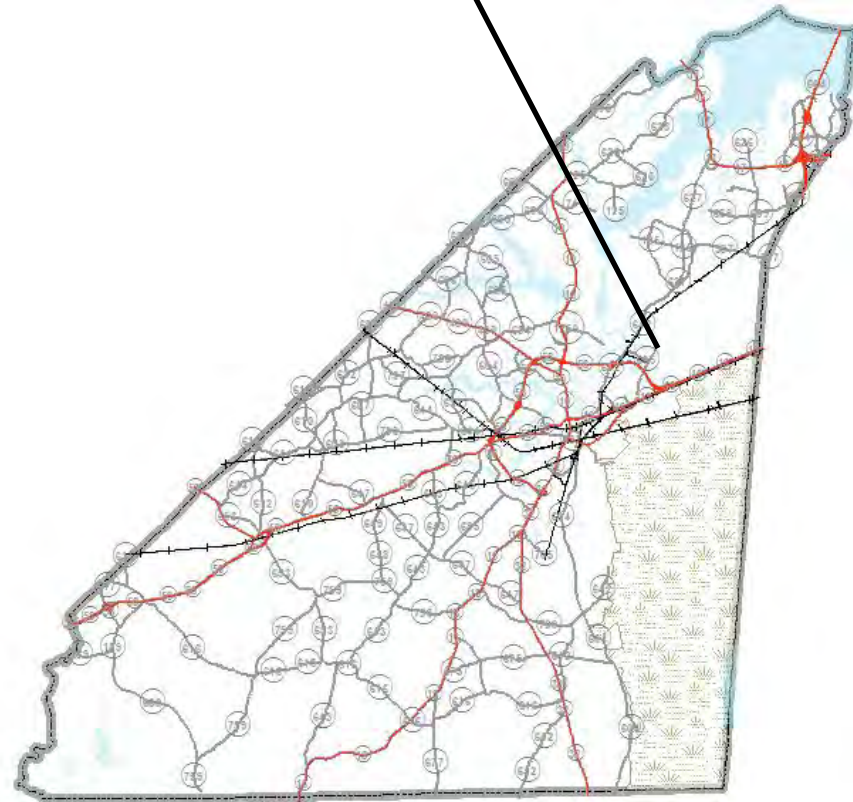
EXTREMELY HAZARDOUS SUBSTANCES FACILITIES

Attachment 1



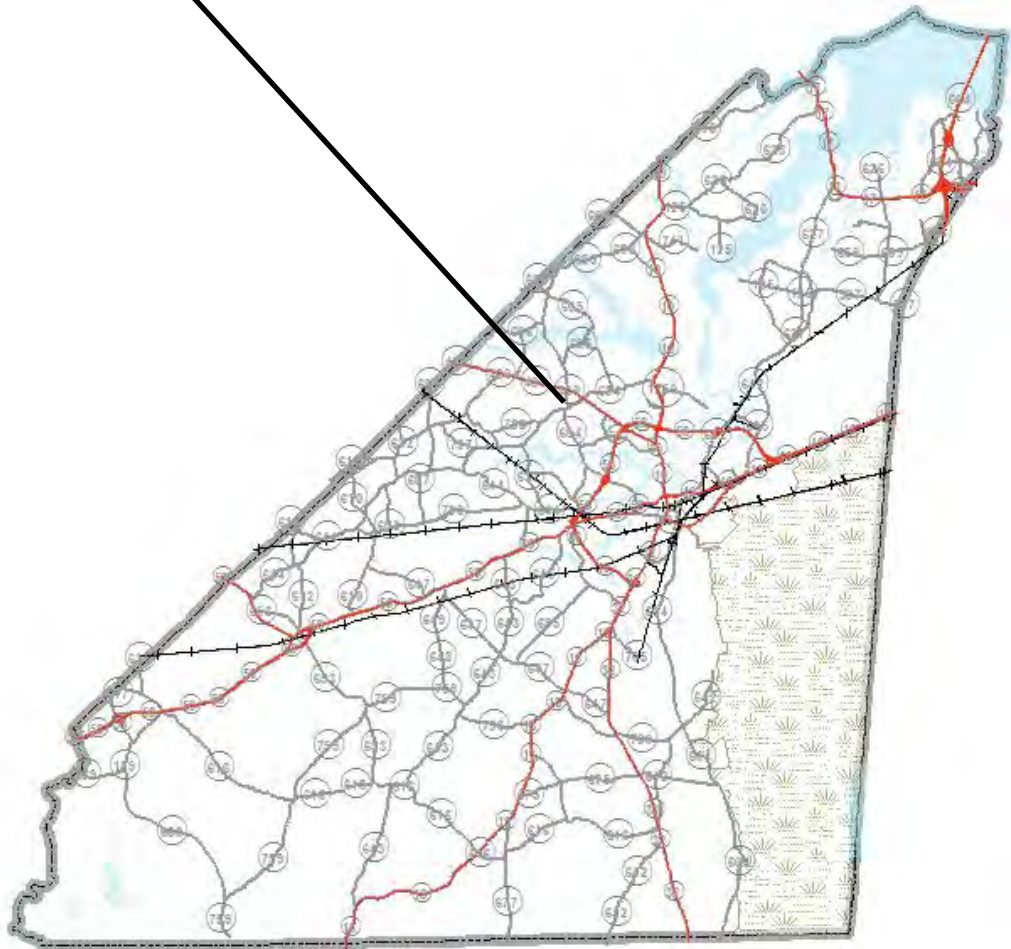
EXTREMELY HAZARDOUS SUBSTANCES FACILITIES

Attachment 2



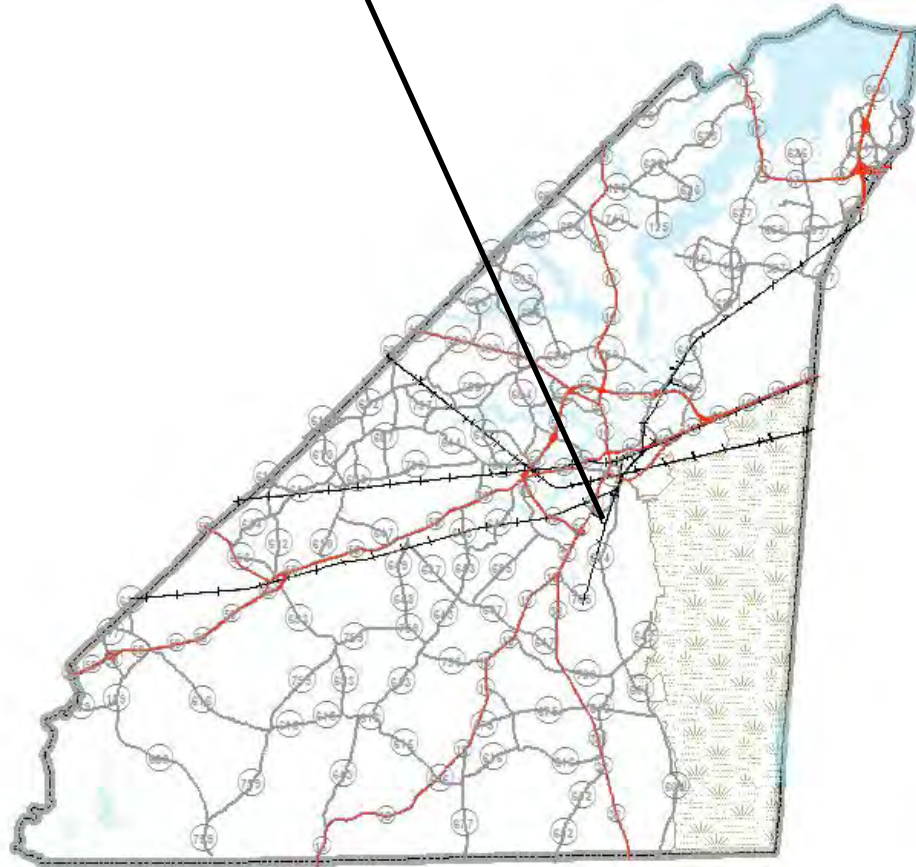
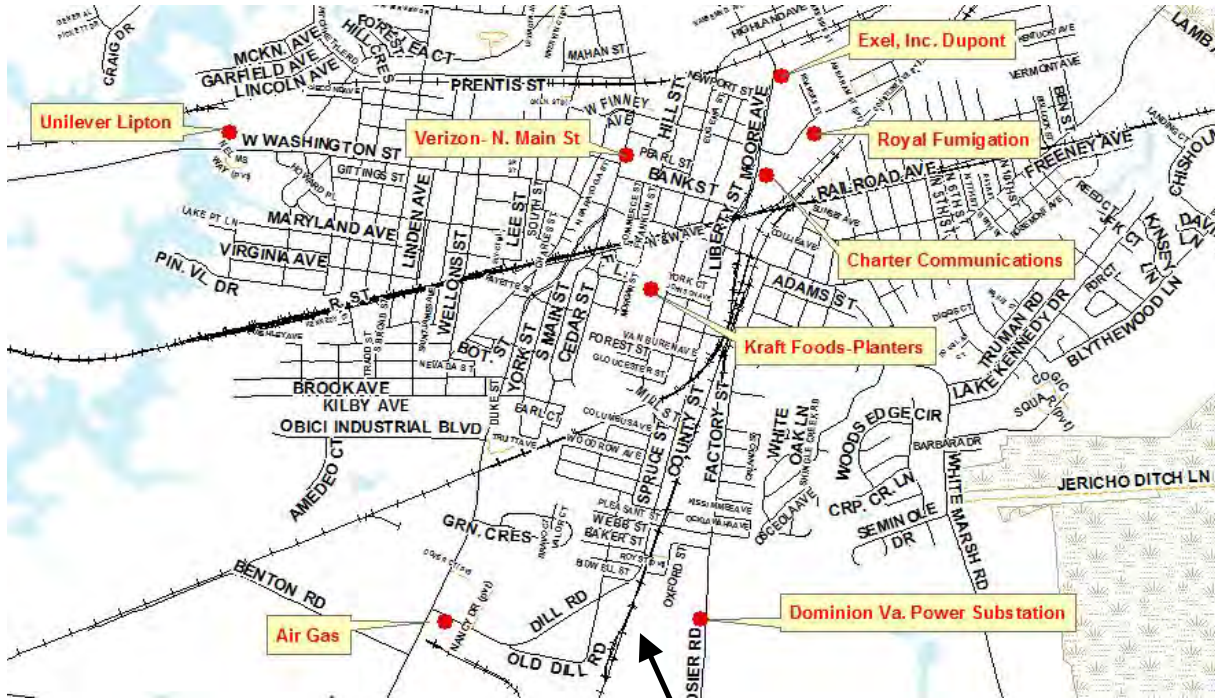
EXTREMELY HAZARDOUS SUBSTANCES FACILITIES

Attachment 3



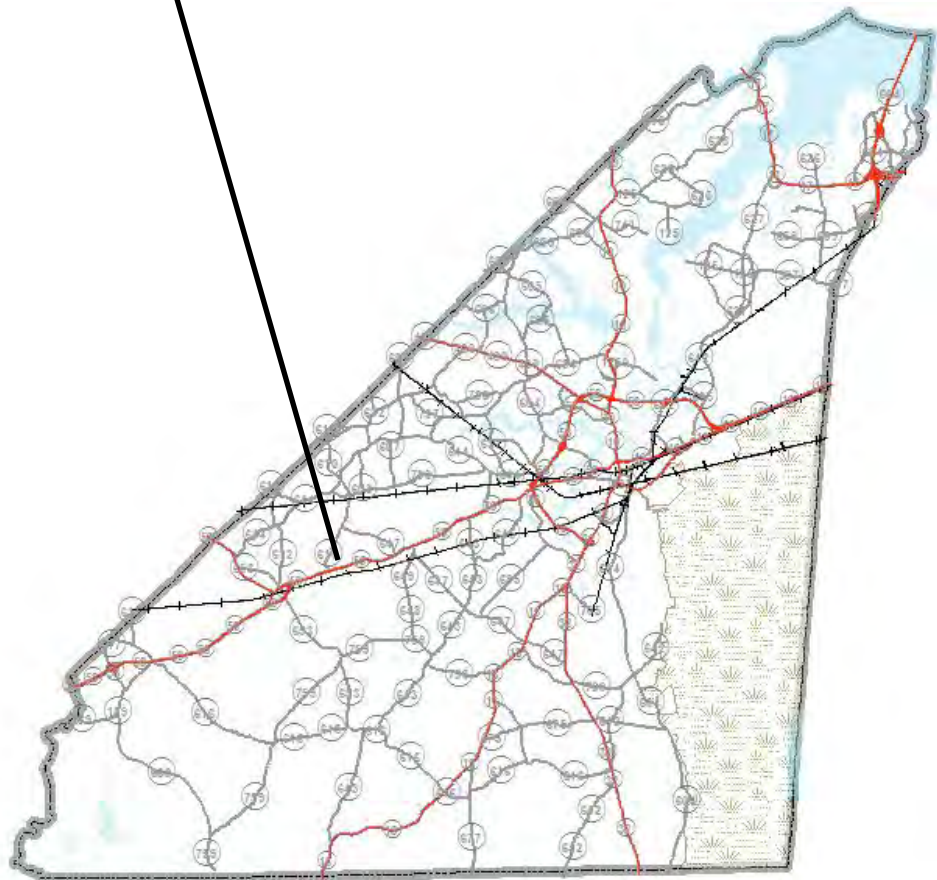
EXTREMELY HAZARDOUS MATERIALS FACILITIES

Attachment 4



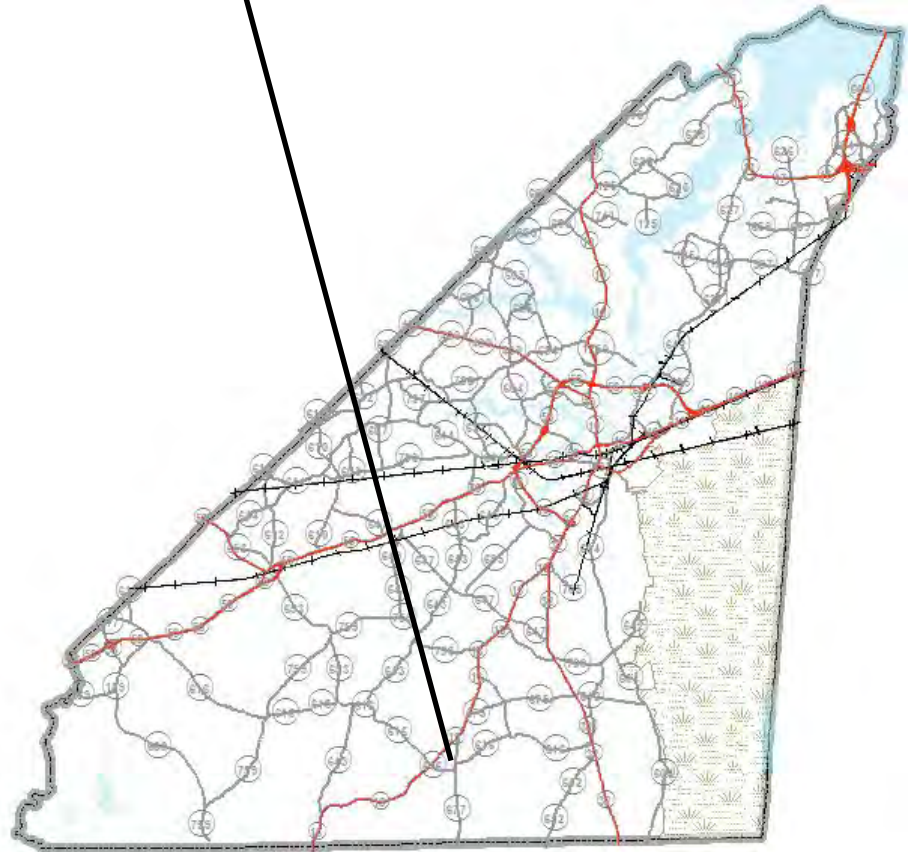
EXTREMELY HAZARDOUS SUBSTANCES FACILITIES

Attachment 5

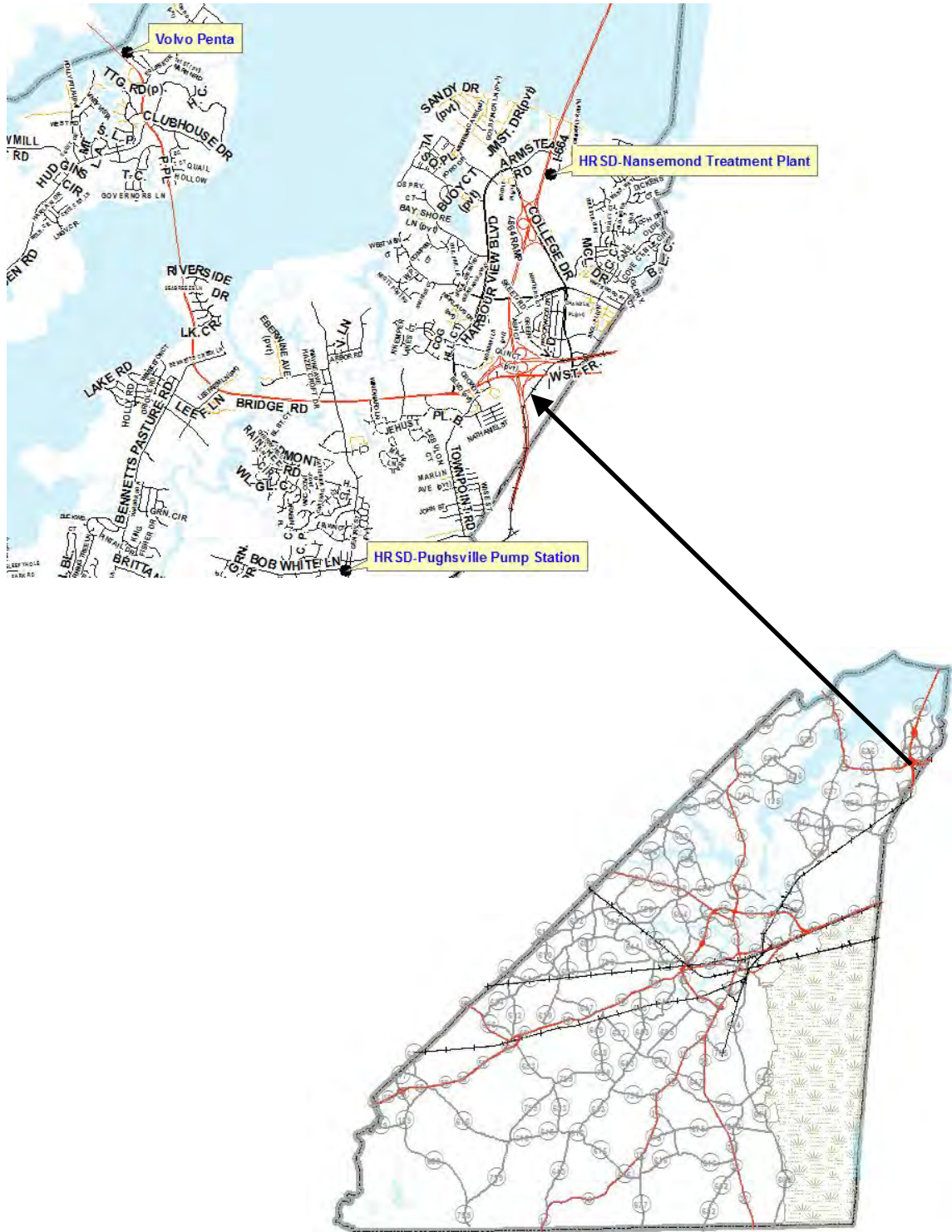


EXTREMELY HAZARDOUS SUBSTANCES FACILITIES

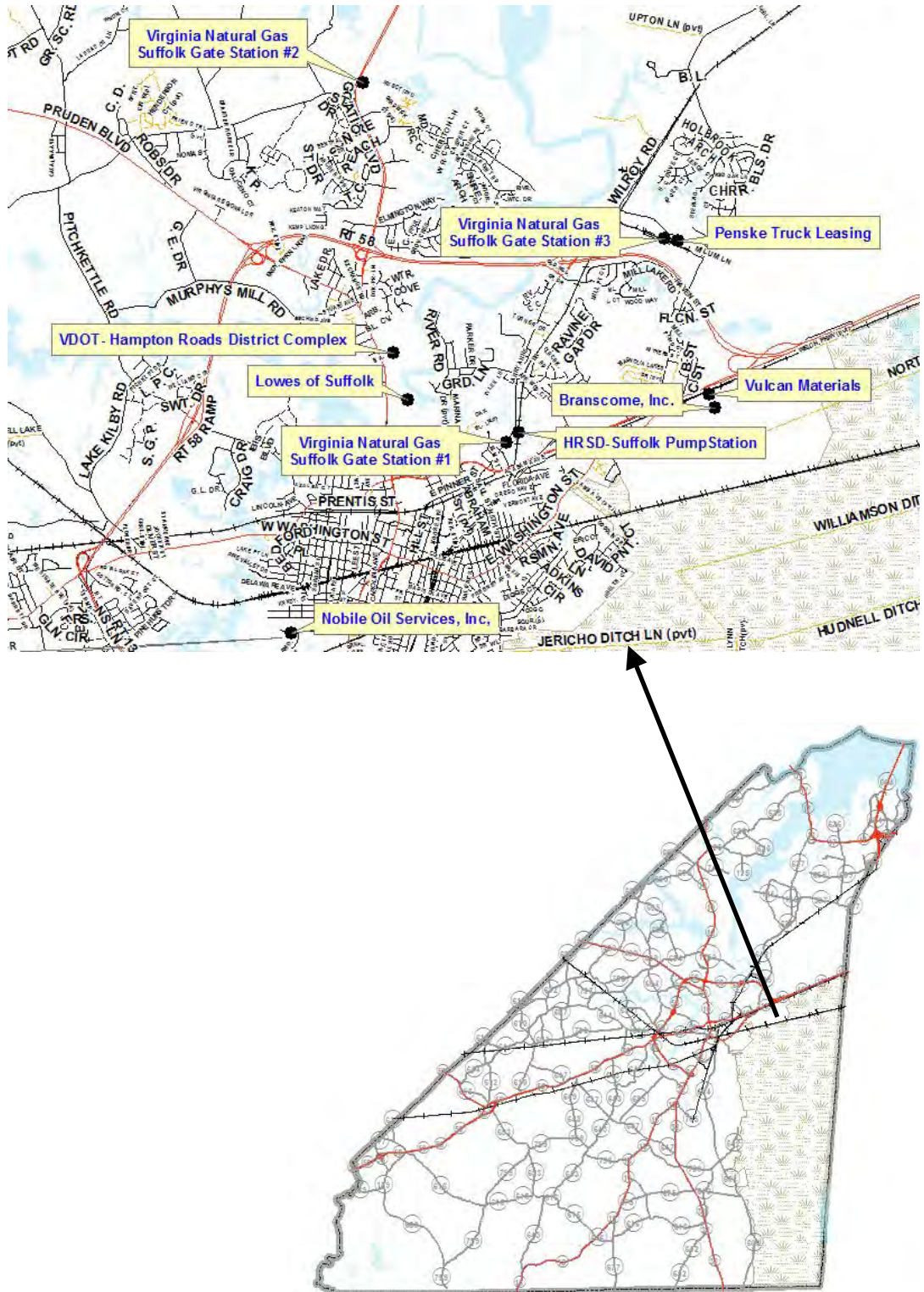
Attachment 6



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:	January 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	<ol style="list-style-type: none"> 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	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 Separator 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 individual 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 reconstruction by means of rip rap reinforcement or sheet pile construction. The existing spillway will be reconstructed. The rehabilitation 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	
Level of Protection / Design Storm		Based on individual culvert project	Based on individual 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 +